Motorcycle Safety Research in Belgium

Wouter Van den Berghe
Research Director, Belgian Road Safety Institute

August 2016
Mission: to develop, share and apply knowledge in road safety in view of reducing road fatalities and traffic injuries.

Some key figures

• Not for profit making organisation, partially publicly funded
• 120 staff
• Turnover of some 13 million euro

Main departments

• Knowledge Centre (= Research Department) – 25 staff
• PAIR (Public Affairs, Policy and Regulation)
• RS@W - Road Safety at Work (training, consulting, campaigns)
• Laboratories
• Driver Improvement Training
• CARA - Fitness to drive assessment
• Reintegration Assessment
Activities in relation to motorcycling (outside research)

- Laboratory for helmet testing and accreditation (Europe)
- Fitness to drive assessment of functionally impaired motorcyclists
- Campaigns for road safety of motorcyclists
- Rehabilitation courses for motorcyclists with speed violations
- Training motorcycle safety for driving school instructors
- Comparison of comfort, safety, consumption, … of mopeds
- Representation in Belgian Motor Cycle Council (MCC)
Recent and ongoing research projects in relation to motorcycling safety

1. Descriptive statistical analyses
2. Analysis of the risk of serious and fatal injuries (@Risk)
3. MOTAC – Motorcycle Accident Causation
4. MOPED – crash causation of accidents with mopeds
5. Effect of traffic filtering on crashes with motorcycles
6. Seasonal and weather effects as predictor for crashes
7. Speeding by motorcyclists
8. Thematic file on motorcycles
9. Injuries of motorcyclists due to crashes
1. (Descriptive) statistical analyses
(as part of descriptive statistical reports on crashes)

Annelies Schoeters, Nina Nuyttens, Nathalie Focant, Quentin Lequeux, Julien Leblud, Katrien Torfs, Uta Meesmann
Use of different transport modes
(provisional - from trip analyses in MONITOR household travel survey)

[Graph showing the percentage of use for various transport modes, with Car at 37.5% and Pedestrian at 36.1%, followed by Public transport and (Electric) bicycle at lower percentages, and others at very low percentages.]
Evolution of the registered injury crashes involving at least one motorcyclist (Quarterly Road Safety Barometer)
Subjective (un)safety of transport modes
(from ESRA – European Survey of Road users’ safety Attitudes)

<table>
<thead>
<tr>
<th>Country</th>
<th>Pedestrian</th>
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<th>Motorbike</th>
<th>Driver</th>
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BRISI
Self-declared unsafe travel behaviour  
(from ESRA – European Survey of Road users’ safety Attitudes)

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Notes:
2. Analysis of the risk of serious and fatal injuries (“@Risk” project)

Heike Martensen
Analysis of the risk of serious and fatal injuries (@risk)

- Research questions, e.g.
  - Is it safer to drive 10 kilometres by car than by bicycle?
  - Who is more likely to be seriously injured: a senior or a child?

- The risk of serious injuries or being killed in a crash is calculated for different types of road users and for different age groups.

- Serious injury = injuries with MAIS3+

- Data sources:
  - BELDAM household travel survey (2009)
  - Hospital data on serious injuries (2007-2011)

- Risk is calculated per unit of exposure (distance or time travelled)

- Also relative risk compared to the risk for the average car driver
Differences between exposure and crash distribution

Kilometres

- Pedestrian
- Cyclist
- Powered two-wheeler
- Car driver
- Car passenger
- Passenger of tram & bus
- Other & unknown

Killed & seriously injured

- Pedestrian
- Cyclist
- Powered two-wheeler
- Car driver
- Car passenger
- Passenger of tram & bus
- Other & unknown
Relative risk to get killed or seriously injured, compared to a car driver

<table>
<thead>
<tr>
<th>Age</th>
<th>Pedestrian</th>
<th>Cyclist</th>
<th>Powered two wheeler</th>
<th>Car driver</th>
<th>Car passenger</th>
<th>Passenger of bus &amp; tram</th>
<th>All users</th>
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<td>18,9</td>
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<td>0,03</td>
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<td>1,6</td>
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<td>1,4</td>
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<td>4,1</td>
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<td>4,9</td>
<td>8,0</td>
<td>72,6</td>
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<td>All age groups</td>
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<td>57,0</td>
<td>1,0</td>
<td>1,0</td>
<td>0,6</td>
<td>2,5</td>
</tr>
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</table>
3. MOTAC – Motorcycle Accident Causation

Heike Martensen, Mathieu Roynard
MOTAC – Motorcycle Accident Causation

- **Purpose:** gather knowledge about accident causes, aggravating circumstances and risk factors to determine effective measures

- **Sample:**
  - 200 police files of serious accidents (103 fatal accidents and 97 accidents with serious injuries) in 2009 and 2010 in which at least one motorcycle was involved

- **Data collection (based on coding of police files):**
  - Standard variables: time, location, road, age, sex, ...
  - Causal and aggravating factors: list of 200 possible causes, max. 5 causes for each driver
  - Accident patterns based on road users involved, manoeuvre, ...
Initiator of the crash

**Single vehicle accidents**
- Motorcyclist: 90%
- Other road user: 7%
- Other road user (+ motorcyclist): 3%

**Multi-vehicle accidents**
- Motorcyclist: 26%
- Motorcyclist (+ other road user): 12%
- Other road user (+ motorcyclist): 38%
- External: 0%
- Unknown: 24%

Source: IBSR-BIVV
Speeding behaviour of motorcyclists in the sample

- More than 40 km/h over speed limit
- 20-40 km/h over speed limit
- 0-20 km/h over speed limit
- Suspicion of speeding
- Unadapted speed
- Adapted speed
- Slow (manoeuvre)
- Not applicable (cyclist or pedestrian)
- Unknown

Motorcycle alone
Motorcycle with other road user
Other road user with motorcycle
Typical crash scenarios

- Motorcyclist loses control: 31.5%
- Other road user overlooks the motorcyclist: 14.0%
- Motorcyclist cannot easily be seen while overtaking: 6.5%
- Incorrect overtaking by the motorcyclist: 5.5%
- Other road user comes onto the motorcyclist’s lane: 12.5%
- Other: 30.0%

Source: IBSR-BIVV
4. MOPED – Analysis of causes and circumstances of crashes with mopeds

*(Ongoing)*

Freya Slootmans, Philip Temmerman, Tim De Ceunynck
Overall objective: to get a better understanding of the causes and circumstances of crashes with mopeds in urban areas.

The analysis will be based on a list of 200 possible causal factors and situational characteristics. Subsequently all accidents will be clustered in accidents profiles.

Sampling criteria:
- crashes involving at least 1 moped in 2013
- crashes with at least one severely injured person
- crashes occurring in urban area

This study runs in parallel with a similar project undertaken in the Netherlands (SWOV), based on on-site in-depth research. This will allow to compare and complement each other findings.
Sample and timing

199 crashes in the official crash database meet the criteria:

- **REGION** | **Number of crashes**
  - Brussel | 8
  - Flanders | 150
  - Walloon | 41
  - TOTAL | 199

Timing:
- Data collection: August – December 2015
- Data coding: April 2016 – August 2016
- Analysis: September 2016 – January 2017
- Reporting: February 2017 – March 2017
5. Effect of traffic filtering on crashes with motorcyclists

*(submitted for presentation at TRB)*

*Heike Martensen, Julien Leblud*
Effect of traffic filtering on crashes with motorcycles

- Since 2010 traffic filtering by motorcyclists is allowed in Belgium if:
  - the motorcyclist passes between the two leftmost lanes
  - he does not go faster than 50 km/h
  - and the maximum difference in speed between motorcyclist and passed cars is 20 km/h.

- The investigation is focused on motorway accidents as this is the road type where traffic filtering is mostly observed.

- We compare accidents before (2009-2010) and after the legalization of traffic filtering (2012-2013).

- Multivehicle accidents (MV) on motorways, which are very likely to be related to traffic filtering, are compared to single vehicle (SV) accidents which are unrelated to traffic filtering.
Crash types before and after the implementation of the law in 2011
Monthly number of motorcycle crashes on Belgian motorways: single vehicle versus multiple vehicle crashes
Average number of weekday crashes involving a motorcycle and at least one other vehicle on motorways by time of day and period
6. Seasonal and weather effects as predictors for crashes

*(interim results presented at conferences, part of ongoing project)*

*Heike Martensen, Nathalie Focant*
Seasonal and weather effects as predictor for crashes

- Meteorological variables can influence the number of crashes. The objective of the study is to identify the relation between variations in the meteorological conditions and variations in the number of traffic victims, taking into account the type of road user.

- The models presented quantify the effects of different weather conditions and can therefore facilitate the interpretation (and communication) of variation in victim numbers.

- The monthly road traffic accident victim numbers in Belgium (2003-2014) were analyzed in latent trend time series models separately for pedestrians, cyclists, moped riders, car occupants and all road user types jointly.

- For each road-user type the effect of a range of meteorological variables was tested. The resulting models allow a detailed view on the weather effects for different modes of transport.
Main trends per type of road user

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pedestrian</th>
<th>Cyclist</th>
<th>Moped</th>
<th>Motorcycle</th>
<th>Car</th>
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<th>All</th>
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<td>Number of Snow Days</td>
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</table>
Differences between actual and predicted number of crashes

Figure 6 Accidents involving motorcycles in Belgium 2008–2012. Modelled with (bottom) and without (top) meteorological variables.
Final model for motorcyclists
7. Speeding by motorcyclists

Philip Temmerman, Mathieu Roynard
Speeding by motorcyclists

- Part of a series of behavioural measurements by BRSI
- Undertaken in 2014
- The goal is to obtain an objective measure of the driver’s speed in situations with no restrictions or enforcement.

Methodology:
- 7 different road types were included. The observations were weighed for the occurrence of the particular road type in the regional road network.
- The observations were performed at about 300 sites
- Only the motorcyclists who were not following other drivers at less than 5 seconds were included.
- Laser guns were used to measure the speed
- The measured speeds are compared to the speed limits and to the speed of car drivers.
### V85 (in km/h) by type of road (free speed)

<table>
<thead>
<tr>
<th>Type of Road</th>
<th>Motorbike</th>
<th>Motorscooter</th>
<th>Passenger car</th>
</tr>
</thead>
<tbody>
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<td>48.7</td>
<td>51.1</td>
<td>52.2</td>
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<td>30 km/h - School zone</td>
<td>55.5</td>
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<td>48.5</td>
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<td>50 km/h</td>
<td>68.1</td>
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<td>70 km/h</td>
<td>85.1</td>
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<td>120 km/h - Highway</td>
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</table>
Speed infringements on 70 km/h roads by type of road user

- Speed infringement >30 km/h: 3.5%, 1.1%, 0.6%
- Speed infringement >10 & ≤30 km/h: 18.9%, 6.4%, 9.7%
- Speed infringement ≤10 km/h: 30.1%, 19.1%, 24.5%
- No speed infringement: 47.5%, 73.4%, 65.3%
Speeding with lane splitting (traffic filtering)

- Lane splitting speed limit = 50 km/h
- Average lane splitting speed on highways = 72 km/h
8. Thematic file “Motorcycles”

*Freya Slootmans, Heike Martensen*
Thematic file motorcycles

- A thematic file is a high-level synthesis of the current knowledge with respect to the issue in question.
- A thematic file should be suitable for interested non-expert parties (policy-makers, journalists, police ...) and might form a point of entry into the subject for more scientifically oriented stakeholders.
- About 30 thematic files are planned; about 10 are ready.
- Typical content
  - Synthesis of international literature
  - Legal situation in Belgium
  - Crash statistics
  - Possible measures
  - Further reading
- Thematic file on motorcycles is being drafted
9. Injuries of motorcyclists

(Ongoing project)

Emmanuelle Dupont, Nina Nuyttens
Injuries of motorcyclists due to crashes

- Based on REKOVER Database, including medical information on:
  - all traffic casualties
  - in all Belgian hospitals
  - registered in 2009-2011
  - both at emergencies as staying in hospitals
- Over 38,000 records relating to motorcyclists and moped drivers
- Analysis of data has just started
- Comparisons will be made with Swedish database STRADA (2011-2013)
- No results published yet
A result from STRADA (opponent distribution)
Distribution of hospitalized PTW (Belgium 2009-2011)
Distribution of injured PTW drivers by day of the week

- **Monday**
  - MAIS3+: 12%
  - Hospitalized: 14%
  - Emergencies: 14%

- **Tuesday**
  - MAIS3+: 12%
  - Hospitalized: 14%
  - Emergencies: 14%

- **Wednesday**
  - MAIS3+: 12%
  - Hospitalized: 14%
  - Emergencies: 14%

- **Thursday**
  - MAIS3+: 12%
  - Hospitalized: 14%
  - Emergencies: 14%

- **Friday**
  - MAIS3+: 16%
  - Hospitalized: 16%
  - Emergencies: 16%

- **Saturday**
  - MAIS3+: 18%
  - Hospitalized: 18%
  - Emergencies: 18%

- **Sunday**
  - MAIS3+: 20%
  - Hospitalized: 20%
  - Emergencies: 20%
Type of injuries of PTW admitted at the emergencies

- Contusion / abrasion / crushing: 46%
- Fracture: 17%
- Open wound: 18%
- Sprain, strain: 16%
- Luxation: 2%
- Other: 1%
Body region of injuries (hospitalised and MAIS3+)

- Head/neck
- Face
- Chest
- Abdomen
- Extremity
- External
- Unknown

Graph showing the distribution of injuries by body region among hospitalised and MAIS3+ cases.
More information

www.brsi.be


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