VIAS institute

Research report no. 2017-R-11-SEN

Sleepy at the wheel

Analysis of the extent and characteristics of sleepiness among Belgian car drivers in 2017

Federal Public Service
Mobility and Transport

Summary

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Pelssers, B., & Diependaele, K. (2017). Somnolence au volant - Analyse de l'ampleur et des caractéristiques de la somnolence chez les conducteurs Belges en 2017. Bruxelles, Belgique : l'Institut Vias – Centre de Connaissance Sécurité Routière

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Summary

Introduction

Road crashes caused by drowsiness while driving are frequently serious. According to international estimates, approximately 20% of all serious road crashes are attributable to sleepiness at the wheel. This proportion is comparable with driving under the influence of alcohol (25%).

Given that little is known about the prevalence of drowsiness at the wheel in 2014, Vias institute conducted a survey for the first time to find out the extent of the issue among Belgian car drivers. This research showed that 4.8% of Belgian car drivers at some point get behind the wheel when they are feeling sleepy. In 2017, it was decided to conduct this survey again.

This survey into drowsiness while driving is based on two aspects: (1) sleepiness at the wheel was examined using a large-scale representative sample of Belgian drivers, and (2) the study measured sleepiness on individual driving-based journeys, rather than considering drowsiness over a certain period of time. The data were gathered using an online questionnaire dealing with one single journey over the previous 24 hours. The questionnaire used validated scales of sleepiness, measuring the extent of (acute) drowsiness while driving (*Karolinska Sleepiness Scale*, KSS) and chronic drowsiness (*Epworth Sleepiness Scale*, ESS). In addition to establishing the extent of drowsiness using the sleepiness scales mentioned above, questions were also asked about the specific circumstances of the journey, the person's sleeping habits, driving behaviour, and various socio-demographic characteristics. This report contains the results of the 2nd edition of this survey, conducted in 2017.

Method

Between 3rd and 30th April 2017, Vias institute conducted an online survey about sleepiness and driving for the second time. Around 3,750 respondents, selected from a panel of 150,000 individuals, completed the questionnaire. At the beginning of the questionnaire, the participants were asked to state whether they had driven a car during the previous 24 hours. If they had, they were then asked to cast their mind back to the previous 24 hours and answer questions about that particular journey as precisely as possible. The journey in question was selected at random.

The questionnaire was divided into 6 themes (see Annexe 2 for the full questionnaire):

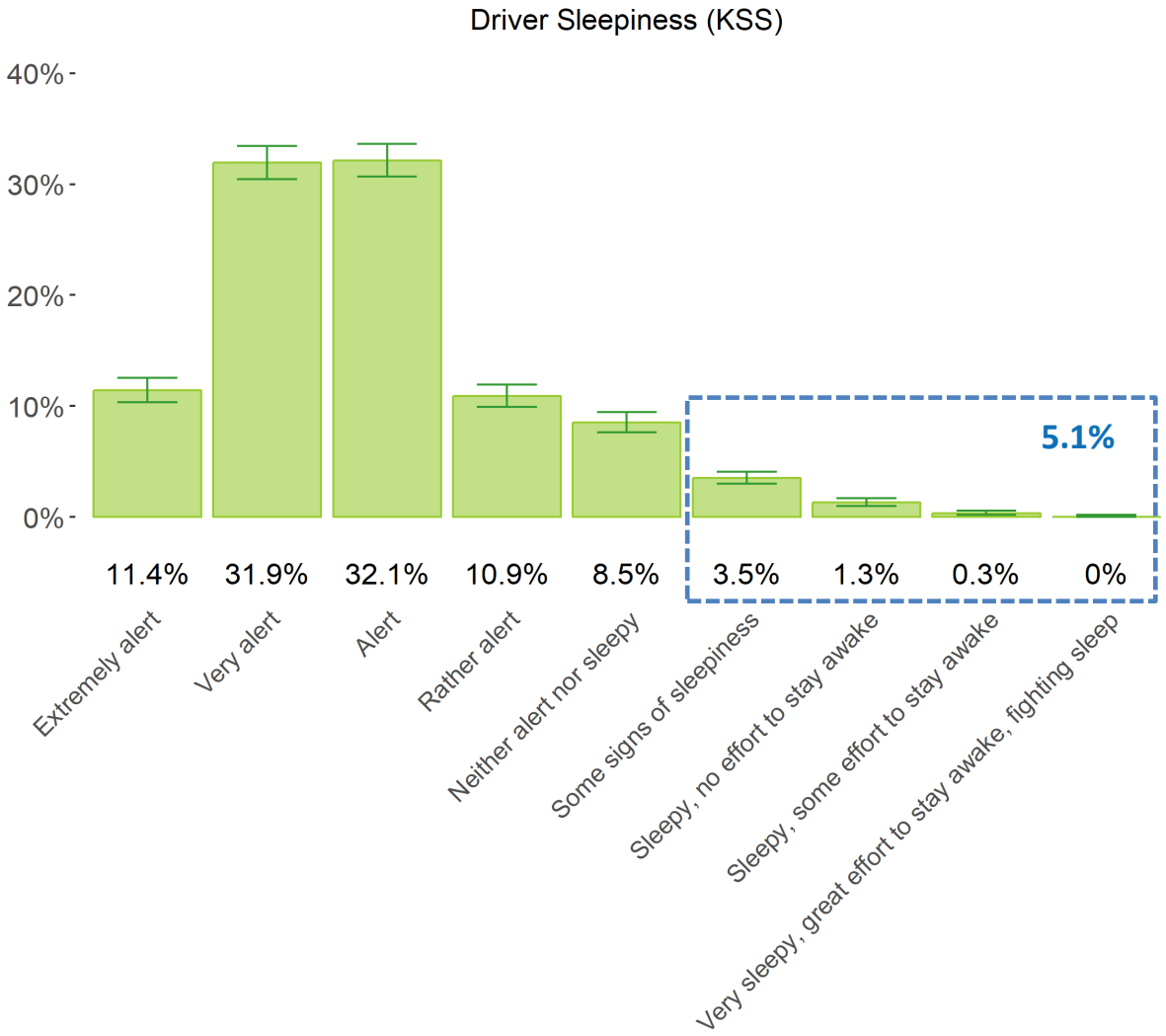
- Physical characteristics of the journey
- Drowsiness encountered during the journey
- Last period of sleep before the journey
- Driving behaviour
- Tiredness
- Socio-demographic details

The most important dependent variable was sleepiness during the journey, measured using the Karolinska Sleepiness Scale.

Results

The results indicated that 5.1% of the journeys taken by Belgian drivers were done while feeling sleepy at the wheel. Figure A shows the breakdown obtained for the various levels of the Karolinska Sleepiness Scale.

Figure A. Prevalence of sleepiness behind the wheel, as measured using the Karolinska Sleepiness Scale (KSS). Error margins reflect 95% confidence intervals, estimated using a proportional-odds model.

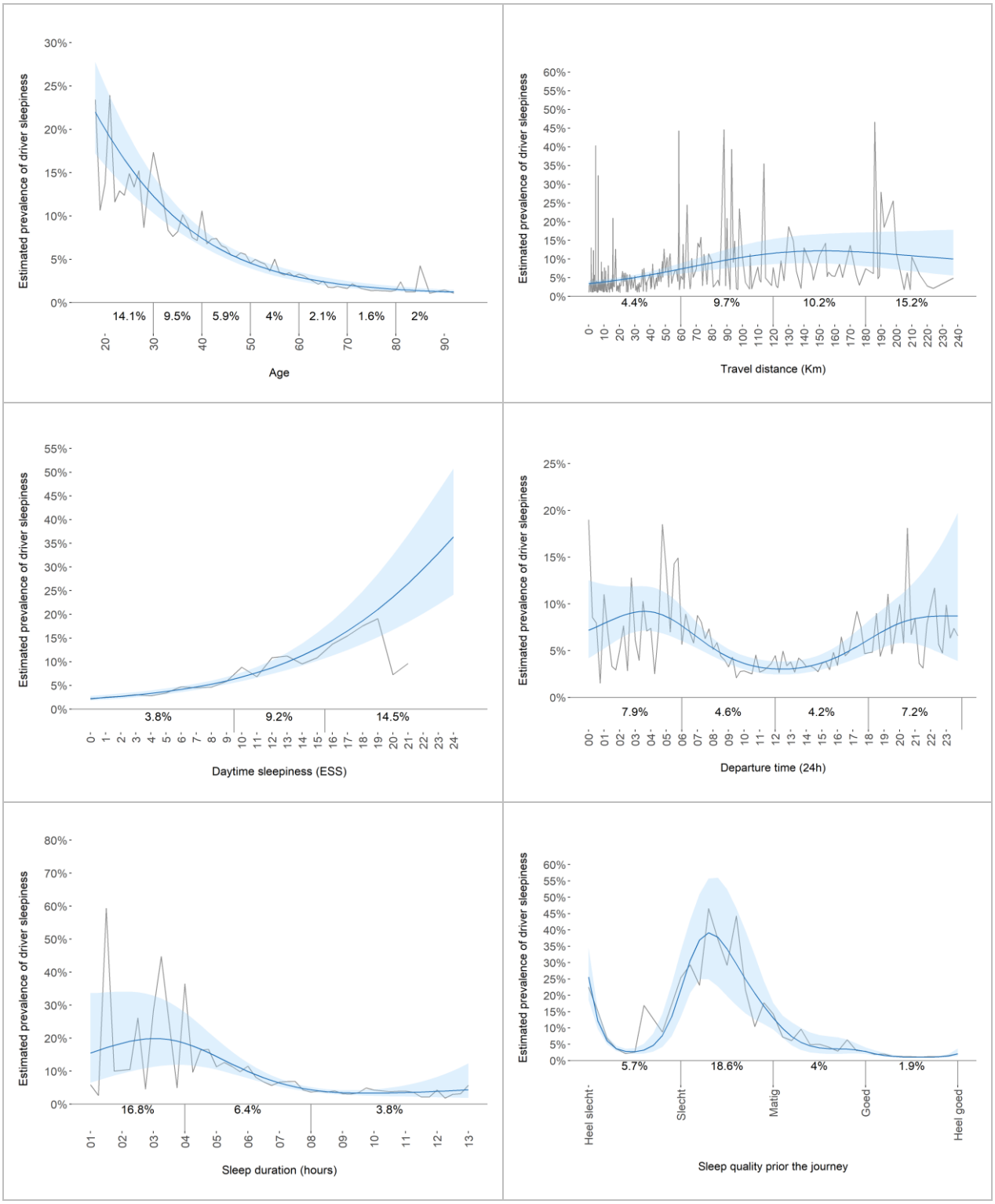


However, analysis of the contextual variables (e.g. gender, length of journey, etc.) show that drowsiness behind the wheel occurs more frequently under various circumstances than the overall estimate of 5.1%. A regression analysis shows a unique relationship between the prevalence of sleepiness and the following numerical variables (ordered according to decreasing effect sizes; prevalence estimates are shown between parentheses):

1. Has caused a road crash or near-crash in the past twelve months (14.8%; see paragraph 3.2.7)
2. Is an adolescent/young adult (18-30 years: average 14.1%; see paragraph 3.2.1)
3. Drives over a long distance (> 60 km and ≤ 120 km: average 9.7%. > 120 km and ≤180 km: average 10.2%; > 180 km: average 15.2%; see paragraph 3.2.3)
4. Experiences excessive (chronic) sleepiness during the day (9 < ESS ≤ 15: average 9.2%; ESS > 15: average 14.5%; see paragraph 3.2.5)
5. Drives in the evening or at night (6 pm - midnight: average 7.2%; Midnight – 6 am: average 7.9%; see paragraph 3.2.2)
6. Fewer than 8 hours of sleep (four to eight: average 6.4%; zero to four hours: average 16.8%; see paragraph 3.2.4)
7. Poor to very poor sleep quality prior to driving (5.7%; paragraph 3.2.6)

Figure B illustrates the continuous nature of these effects (with the exception of the binary variable 'road crash history'). The individual effects are shown in blue, with 95% confidence intervals. The irregular grey lines show the estimated prevalence based on the combination of all individual effects. The percentages below indicate the same prevalence, but averaged per category, delineated by the vertical lines.

Figure B. The estimated prevalence of sleepiness while driving (Y-axis) based on the age of the driver, length of journey, sleepiness during the day, departure time, length of sleep and sleep quality (X-axes).



Distribution analyses show that there are also significant links between the prevalence of sleepiness while driving and the following categorical variables:

8. Lives in the Flemish region (5.9%; paragraph 3.3.1)

9. Has a full-time job (8.1%) or more than one part-time jobs, meaning employed more than 100% (12.0%; paragraph 3.3.2)
10. Works a regular shift (11.0%; paragraph 3.3.3)
11. Has a master's degree (7.5%; paragraph 3.3.4)
12. Is a white-collar worker (7.3%) or a blue-collar worker (9.94%; paragraph 3.3.5)
13. Is involved in circumstances that have a chronic negative effect on sleep quality: stress or depression (8.0%), obliged to get up early (8.5%), chronic pain (7.4%), irregular working hours (12.0%), chronic fatigue (11.7%), and drug use (22.8%; paragraph 3.3.6)

Conclusions and recommendations

This study shows that, in terms of individual journeys, an average of 5.1% of Belgian motorists show signs of sleepiness. Compared with the first survey, conducted in 2014, there is a slight increase of 0.3%. However, it is too early to draw reliable conclusions from this negative trend because this is only the second survey.

As in the first edition of this survey (Diependaele, 2015), after the analysis of the independent variables it became clear that sleepiness at the wheel occurs more frequently under certain circumstances than the general estimate of 5.1%. However, this second edition did show a few differences compared with the first:

- a higher prevalence was no longer found with regard to the following circumstances:
  - consuming alcohol less than two hours before driving;
  - driving regularly; and
  - having an irregular sleeping or waking pattern.

- there was a higher prevalence of the following circumstance:
  - having poor sleep quality.

Based on this second edition, the scenario with the highest level of risk can be described as follows:

"A young driver has slept fewer than eight hours, has caused a road crash or near-crash in the past twelve months, and has driven a car at around midnight over long distances. He or she has poor sleep quality prior to the journey and often feels sleepy during the day".

Subsequent editions of this survey will reveal what contextual variables play a more or less consistent role in sleepiness at the wheel.

Although no precise Belgian data exist about the proportion of sleepiness in the causes of road crashes, international figures suggest that drowsiness at the wheel is responsible for 20% of all serious accidents (ASFA/INSV, 2013; Zwahlen et al., 2016). The combination of a relatively low prevalence and a relatively high proportion of road crashes implies a very high risk that is even comparable to driving under the influence of alcohol. According to the latest survey about drink-driving, conducted by Vias institute, 2.7% of journeys on Belgian roads take place under the influence of alcohol (Focant, 2016). In addition, the proportion of alcohol usage in the causes of road crashes is up to 25% (SafetyNet, 2011). This means that just like driving under the influence of alcohol, the importance of sleepiness behind the wheel should not be underestimated in terms of road safety.

The recommendations resulting from this survey are the same as from the previous one (Diependaele, 2015). To summarise, Vias institute recommends the following measures for combatting drowsiness while driving:

- Infrastructure: introduce rumble strips on the road and introduce more rest areas;
- Technology: further development of built-in warning systems that detect sleepiness in the driver and encourage him/her to stop and rest, as well as research into the validity and reliability of existing systems on the market;
- Awareness: campaigns to inform drivers about the risks of sleepiness behind the wheel, information about strategies for fighting, and avoiding drowsiness;
- Sleep hygiene: information about the health risks of poor sleeping habits, introduction of flexible working hours by employers;

- Further research: journey-based prevalence estimates over a whole year and across countries, as well as better registration of sleepiness as a cause of accidents.

Compared with Diependaele (2015), portable warning systems were not included as a measure of reducing sleepiness at the wheel. Indeed, a recent study by Vias institute (Vandemeulebroek, 2017) in which various portable warning systems were examined (an anti-sleep alarm, a radar alert system, and an eye movement monitor) showed that these devices are considered to be of little help to drivers. The study also showed that the systems lack effectiveness. Some models sounded the alarm or gave a warning too early, while others gave no warning at all, even in a state of advanced sleepiness.

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