FATIGUE: SURVEY, TEST AND 2020 CAMPAIGN

Werner De Dobbeleer
Federale Commissie Verkeersveiligheid
3 March 2020

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FATIGUE: GENERAL OVERVIEW

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FATIGUE BEHIND THE WHEEL

Fatigue is an underestimated killer

- One of the five largest risk factors in traffic.
  - *10 to 20% of all accidents are caused by drowsiness*
  - *On motorways: 20 to 30% of accidents*

- Accidents caused by fatigue are often more severe.
  - *They frequently lead to serious injuries or fatalities.*
  - *Because the driver falls asleep, there is often no braking track*

Sources: European Commission - DG MOVE (ERSO); UK Road Safety Observatory; SWOV

PAST INITIATIVES

Fatigue campaign 2018

- July 2018, start of summer holiday season
- Focus on long journeys, day- and nighttime driving
- Focus on fatigue prevention **before** driving
- Demonstration
  - *Brain activity monitoring during long journey in driving simulator (Hasselt + Antwerp universities)*
  - *Self-assessment: test persons drive until they feel too sleepy to continue*
- Results
  - *Test persons drove approx. 2 hrs longer than safety allows*
  - *Increased accident risk due to "sleepy" brain*
  - *> Correct self-assessment is very difficult*
- Core messages
  - *When you feel sleepy, it is already too late!*
  - *Avoid getting sleepy: prepare yourself before making a long journey,* ***get enough sleep (8 hrs) before driving***

FATIGUE CAMPAIGN 2020

- February 2020
- Focus on driving at night (“biological night”), any type of journey
- Focus on solution, remedy to prevent fatigue
- Collaboration with Groningen and Antwerp universities

Elements

1. Fatigue survey (789 car drivers)
2. Fatigue measurement at night (± 380 car drivers)
3. Campaign

FATIGUE SURVEY (OCTOBER 2019)

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METHODOLOGIE

Steekproef

16-64 jarigen woonachtig in Vlaanderen

Steekproefgrootte

n=789 autobestuurders

Quota

Geslacht: 50% Man; 50% vrouw
Leeftijd: 16% 16-24; 20% 25-34; 20% 35-44; 22% 45-54; 22% 55-64
Provincie: 18% West-Vlaanderen; 23% Oost-Vlaanderen; 28% Antwerpen; 17% Vlaams-Brabant; 13% Limburg

Gemiddelde duur interview

14 minuten

Data-collectie methode

Online Panel Interviews (Device Agnostic)

Veldwerk

Van 8/10/2019 tot en met 13/10/2019

Fatigue survey: conclusions

Driving in risky conditions is more common in 18-44 age group than in 45+

- Driving at night: more frequently in age group 18-34
- Driving when >18 hrs awake: decreases with age

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Fatigue survey: conclusions

Risk perception: high, but 18-44 age group is more tolerant.

- Sleepy driving is not accepted, but age group 18-44 has a more neutral attitude.
- Overall: 69% say their environment would disapprove of sleepy driving.
- 36% finds it difficult to self-assess sleepiness/fitness to drive. This is more common in age group 18-44 (38 to 47%)

Fatigue survey: conclusions

Behavioural intentions to prevent drowsy driving could be better. Solutions used differ with age.

- 50% intends to keep driving when feeling sleepy.
- 18-44 age group prefers fast “in-car” solutions: drinking caffeïne, opening windows, loud music (current declared behaviour + behavioural intentions).

Fatigue survey: conclusions

Behavioural intentions to prevent drowsy driving could be better. Solutions used differ with age.

- 45+ age group drives less often when sleepy (self-declared behaviour). Current and intended solutions are powernaps and stretching one's legs (break without sleeping).
- Overall: 63% is convinced that a powernap can prevent sleepiness. It remains necessary to counter perceptions such as "powernap is too short" or "more sleepy after powernap".

FATIGUE TEST (DECEMBER 2019)

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SLEEPINESS BEHIND THE WHEEEL

Dr. Marijke C.M. Gordijn, Dr. Marina Giménez,
Erica Zuidersma MSc.

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Chrono@Work
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FATIGUE TEST

How many drivers are sufficiently alert on late journeys?

Methodology

- Roadside sleepiness test with 379 drivers
- Between 10:00 PM and 02:30 AM
- At 8 locations throughout Flanders
- From 29/11 to 21/12/2019
- Combined with police alcohol checks

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FATIGUE TEST

How many drivers are sufficiently alert on late journeys?

Methodology

- Questionnaire on tablet computer: sleep pattern (Munich ChronoType Questionnaire), sleep quality in the previous night, sleepiness during the current ride (Karolinska sleepiness scale - KSS).
- Saliva sampling to determine “biological night” based on melatonin values.

- Melatonin value analyses and chronotype calculation by Chrono@Work (Groningen University).

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FATIGUE TEST

How many drivers are sufficiently alert on late journeys?

Sample description

- 61% men, 39% women
- average age: 40 years (41 for men, 39 for women)
- 24% were on their way for work, 76% for a private trip
- 49% had driven less than 10 km, 25% between 10 and 24 km, 26% more than 24 km

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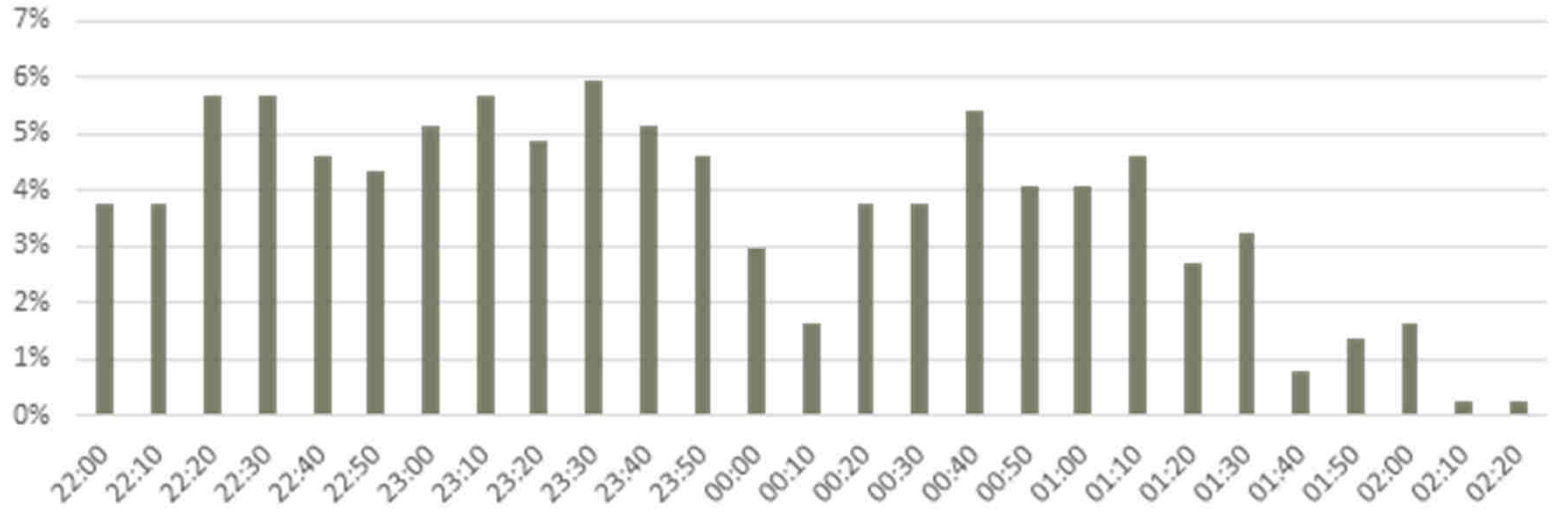
FATIGUE TEST

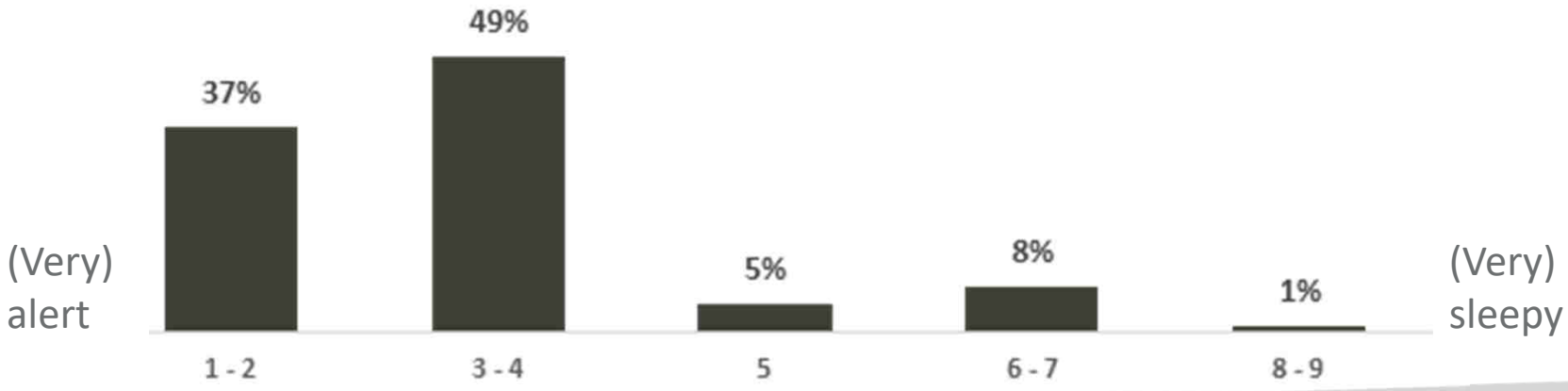
Distribution of drivers according to time of testing



RESULTS: SELF-ASSESSMENT

- 9% of drivers admitted that they no longer felt alert while driving (KSS score 6 or higher).
- 2% (7 drivers) indicated that they felt like falling asleep during the ride. That does not seem much, but it could possibly have resulted in 7 near-accidents.

How alert or sleepy did you feel during the last 10 minutes of the ride?



RESULTS: BIOLOGICAL NIGHT

Biological night

Period during which you are naturally less alert and would normally sleep (reduced mental and physical processes)

In this test, biological night was determined in two ways:

- based on melatonin levels in saliva
- based on the sleep-wake patterns as reported by drivers (Munich ChronoType Questionnaire - Roenneberg et al., 2007; Ghotbi et al., 2019).

RESULTS: BIOLOGICAL NIGHT

Melatonin and the biological night

- Melatonin: hormone that varies according to biological day-night cycle.
  - *Tells your body what time it is.*
  - *When melatonin reaches a threshold level, your body knows it is biological night and prepares for sleep.*
- In this test, biological night was defined as the period 3 hours before and 3 hours after peak melatonin level (Mullhall et al. 2019).
- The melatonin threshold level for biological night was set at 7.6 pg melatonin per ml saliva.
- The period 3 hours before and 3 hours after peak melatonin level corresponds to a 30% increased accident risk (after Mulhall et al. 2019).

RESULTS: BIOLOGICAL NIGHT

How many drivers drove during their biological night?

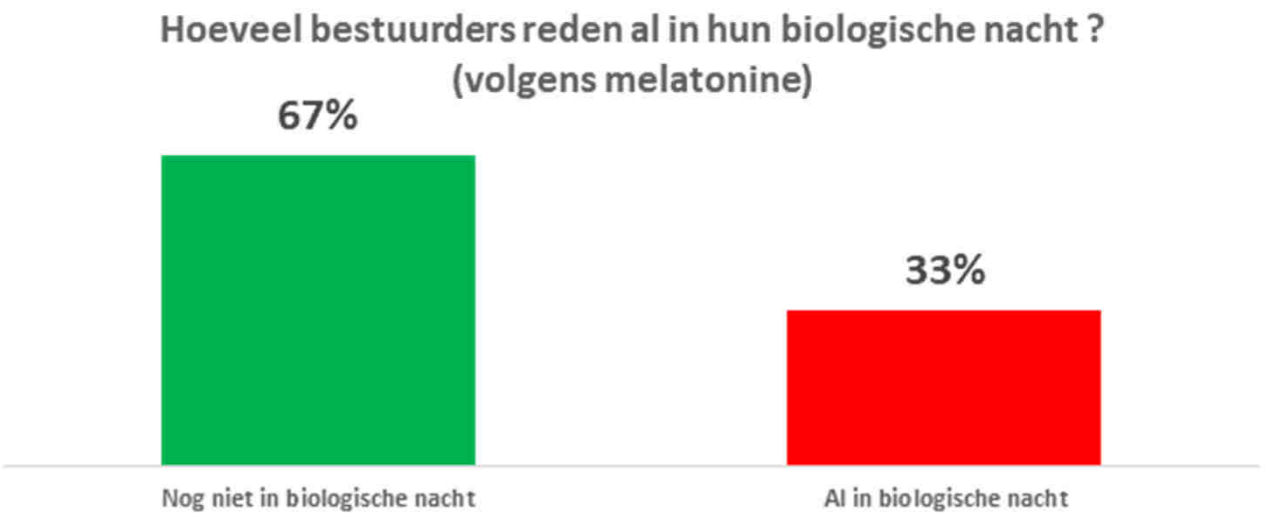
- According to melatonin levels
  - *33% of drivers tested were in their biological night (= above the melatonin threshold of 7.6 pg/ml)*
  - *After midnight, 50% of drivers were in their biological night.*
  - *Only 12% of drivers who were in their biological night felt sleepy (KSS score 6 or over).*
- According to the sleep-wake data (chronotype)
  - *47% were in their biological night*
  - *After midnight this was 77%*
- No differences according to age or gender were observed.

! The difference between biological night based on melatonin levels and chronotype can be explained by biological variability in melatonin production.

Not everyone produces the same amount of melatonin. Some people may have been in their biological night, even if they had not yet reached the threshold level.

RESULTS: BIOLOGICAL NIGHT

How many drivers drove during their biological night? (melatonin)



RESULTS: OTHER RISK FACTORS

Additional risk factors can cause fatigue behind the wheel, e.g.

- poor sleep quality in the previous night
- being awake for a long time

- 29% of drivers indicated “insufficient” sleep quality in the previous night
- 4% indicated “poor” sleep quality.

- 13% of drivers had been awake for more than 17 hrs.
- Significantly more drivers awake for >17 hrs were in their biological night based on melatonin (6 out of 10, vs. 3 out of 10 on average).

FATIGUE CAMPAIGN (FEBRUARY 2020)

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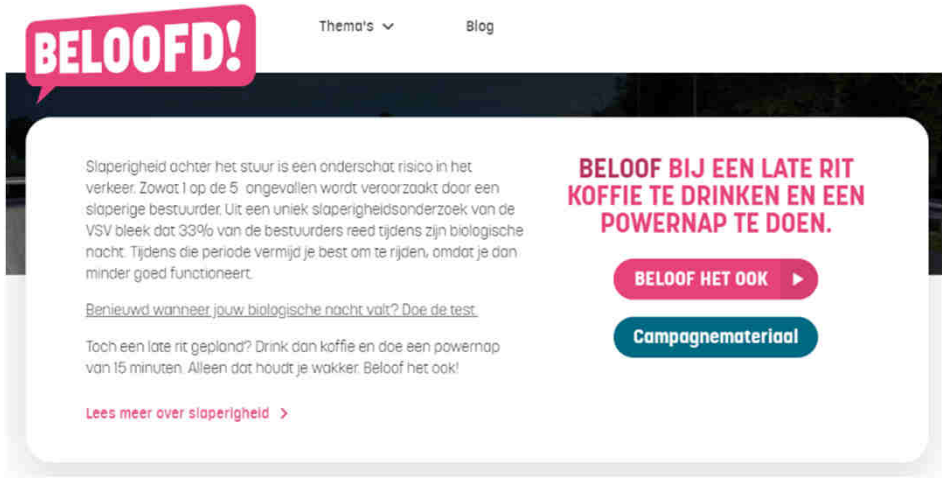
PROBLEM DEFINITION

Late journeys are risky,
drivers may not be aware of this

During late night journeys, 1 in 3 drivers were in their biological night and were therefore no longer sufficiently alert to drive, although they did not necessarily feel themselves sleepy.

CAMPAIGN SOLUTIONS

- Calculate your biological night
  - *Beloofd.be: ultra short MCTQ (Ghotbi et al 2019)*
- Avoid driving during your biological night
- Do you need to drive late? Only coffee and powernap help to stimulate your alertness.



MEDIA

- Roadside billboards
- Press release
- Beloofd.be website
- Social media
  - *Video report on fatigue test + results*

REFERENCES

- Ghotbi, N., et al. (2019), The µMCTQ: An Ultra-Short Version of the Munich ChronoType Questionnaire, Journal of Biological Rhythms, https://doi.org/10.1177/0748730419886986.
- Mulhall et al. (2019) Sleepiness and driving events in shift workers: the impact of circadian and homeostatic factors, SLEEPJ, Vol. 42, No. 6.
- Roenneberg T., et al. (2007) Epidemiology of the human circadian clock, Sleep Medicine Reviews, 11, 6, 429-438.

Questions?

Stijn Dhondt, researcher, VSV
stijn.dhondt@vsv.be, tel. +32 15 44 32 64

THANK YOU!

werner.dedobbeleer@vsv.be

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