

Thematic report Driver Fatigue



E-Survey of Road users' Attitudes

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2nd ESRA Symposium



18 June 2019

9:30 – 12:30

Thon EU Hotel,
Brussels

VIAS
institute

**bfu
bpa
upi**



IFSTAR

SWOV

bast

AVP

Rådet for
Sikker Trafik
Danish Road Safety Council

Finland Road Safety Council
LIIKENNETURVA

TRANSPORT
RESEARCH
CENTRE

AAA
Foundation
for
Traffic Safety

DGT
Dirección General
de Tráfico

Australian Government
Department of Infrastructure, Transport,
Cities and Regional Development

Republic of Serbia
Road Traffic Safety Agency

KFV
Korpus für Verkehrswissenschaften

PRP

ITS

ETL
CENTRO DI RICERCA
PER IL TRASPORTO
E LA LOGISTICA

IATSS
International Association
of Traffic and Safety Scientists



TIRF

vti

RSA

Department
for Transport

KTI
Atapliva - Since 1938

Israel National
Road Safety Authority

THE KOREA
TRANSPORT INSTITUTE

GRUPE RENAULT

Presentation outline



▶ **Descriptive statistics**

- Self-declared fatigued driving in the past 30 days
- Personal acceptability of fatigued driving
- Perception of fatigued driving as an accident cause

▶ **Statistical modelling analysis**

- Importance of variables on driver fatigue – Random Forest Analysis (personal acceptability of fatigued driving, perception of fatigued driving as an accident cause)
- Logistic regression model (self-declared fatigued driving)

▶ **Key results**

▶ **Key recommendations**

Self-declared fatigued driving, by country

SELF-DECLARED BEHAVIOUR AS A CAR DRIVER
 Drive when you were so sleepy that you had trouble
 keeping your eyes open

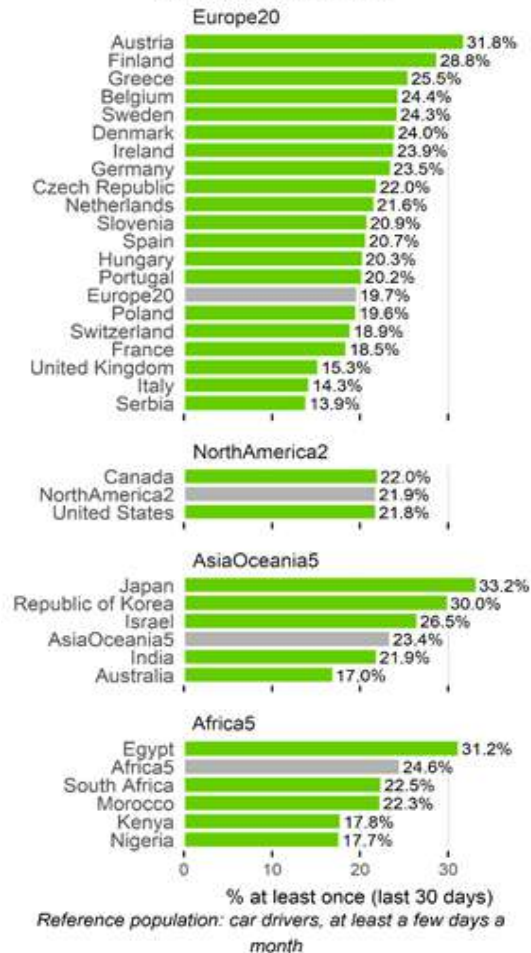


Figure: Self-declared fatigued driving by car drivers per region and country (% of car drivers that did it at least once show the behaviour in the past 30 days).

- The self-declared fatigued driving in past 30 days varies from 20% in **Europe** to 25% in **Africa**.
- The rates of self-declared fatigued driving are in between for **North American** (22%) and **Asia-Oceania** (23%).
- In **Europe**, Austrian (32%) and Finnish drivers (29%) report the highest rates, whereas drivers in Italy and Serbia report the lowest rates (14%).
- In **Asia-Oceania**, Japanese drivers most frequently report fatigued driving (33%) and Australian drivers least frequently (17%).
- In **Africa**, Egyptian drivers more frequently report fatigued driving (31%) than drivers in Kenya and Nigeria (both 18%).

Self-declared fatigued driving, by age group

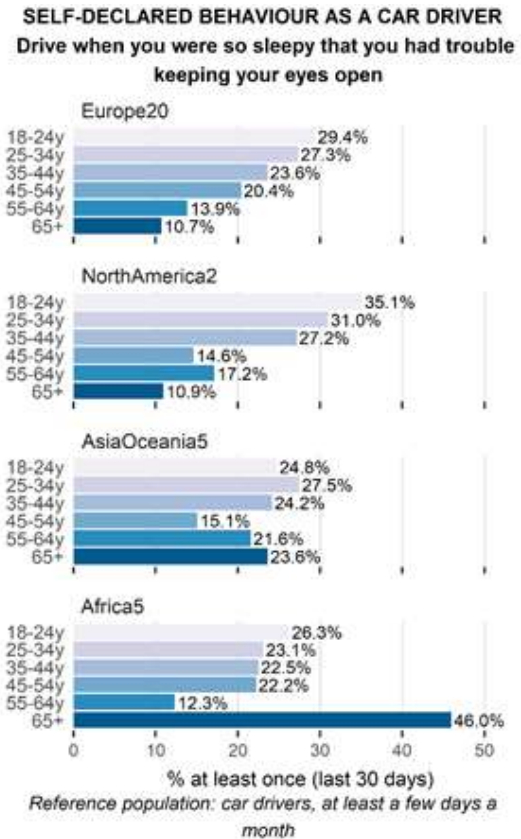


Figure: Self-declared fatigued driving by car drivers per region and age group (% of car drivers that did it at least once ... in the past 30 days).

- In **Europe** and **North America** the self-declared fatigued driving rates tend to decrease with increasing age.
- The highest rates are found amongst the **youngest car drivers**, age 18 to 24 (29% to 35%), while the lowest rates among the oldest (65+) age group of car drivers (11%).
- In **Asia-Oceania**, self-declared fatigued driving rates are not much different between young and older age groups.
- Surprisingly, in **Africa**, the self-declared fatigued driving rates are the highest for the oldest age group. However, the answers of 65+ African respondents are not considered as being representative due to low numbers of respondents.

Self-declared fatigued driving, by gender

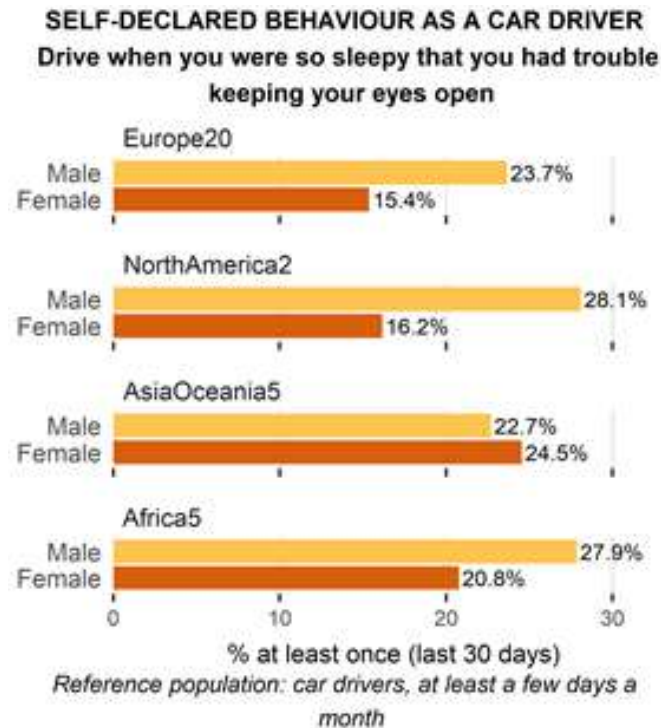
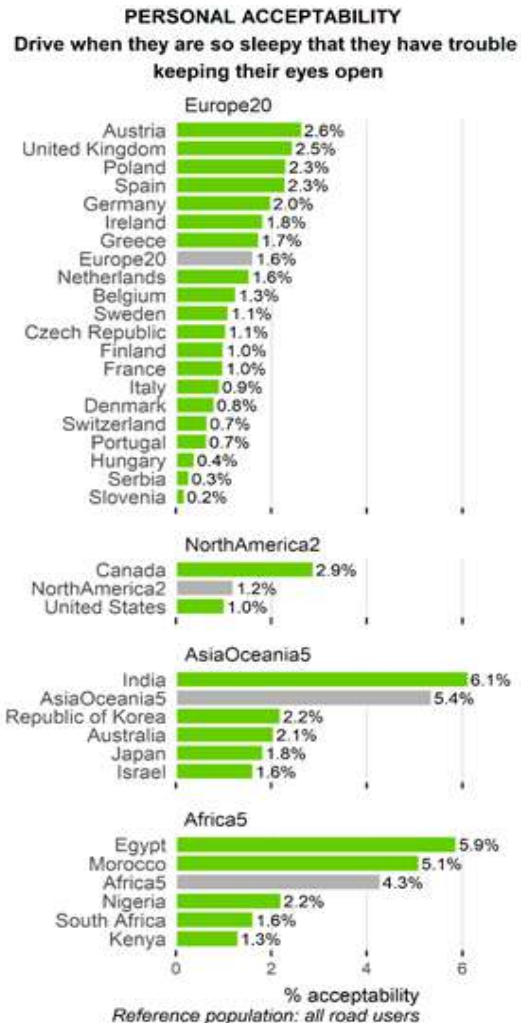


Figure: Self-declared fatigued driving by car driver per region and gender (% of car drivers that did it at least once ... in the past 30 days).

- In **Europe**, **North America** and **Africa**, self-declared fatigued driving rates are considerably higher for male drivers (24% to 28%) than for female drivers (15% to 21%).
- In **Asia-Oceania**, the rates for male and female drivers are similar (23%, 24%).

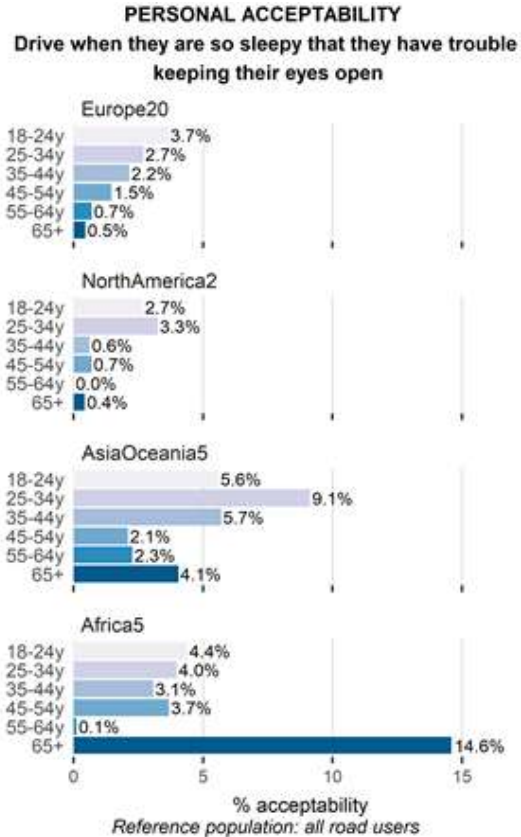
Personal acceptability of driving while tired, by country



- The rates of road users who find that fatigued driving is **acceptable** are quite low in each world region.
- Less than 2% road users in **Europe** and **North America**, and less than 6% of road users in **Africa** and **Asia-Oceania** find it acceptable.
- The three countries with the highest rates of personal acceptability of fatigued driving are **India** (6%), **Egypt** (6%) and **Morocco** (6%).

Figure: Personal acceptability of fatigued driving among all road users by region and country ("How acceptable do you, personally, feel it is for a CAR DRIVER to drive when they're so sleepy that they have trouble keeping their eyes open?")

Personal acceptability of driving while tired, by age group



- In **Europe**, **North America** and **Asia-Oceania**, the personal acceptability of fatigued driving is slightly higher among the younger aged car drivers than among older age groups.
- The **difference** between age groups is, however, only a few percentage points.
- In contrast to the other regions, in **Africa**, the personal acceptability of fatigued driving is far higher (15%) for the oldest age group (65+) road users than for the younger age groups of road users. However, the answers of 65+ group cannot be regarded as representative.

Figure: *Personal acceptability of fatigued driving among all road users by region and age group ("How acceptable do you, personally, feel it is for a car driver to drive when they're so sleepy that they have trouble keeping their eyes open?")*

Personal acceptability of driving while tired, by gender

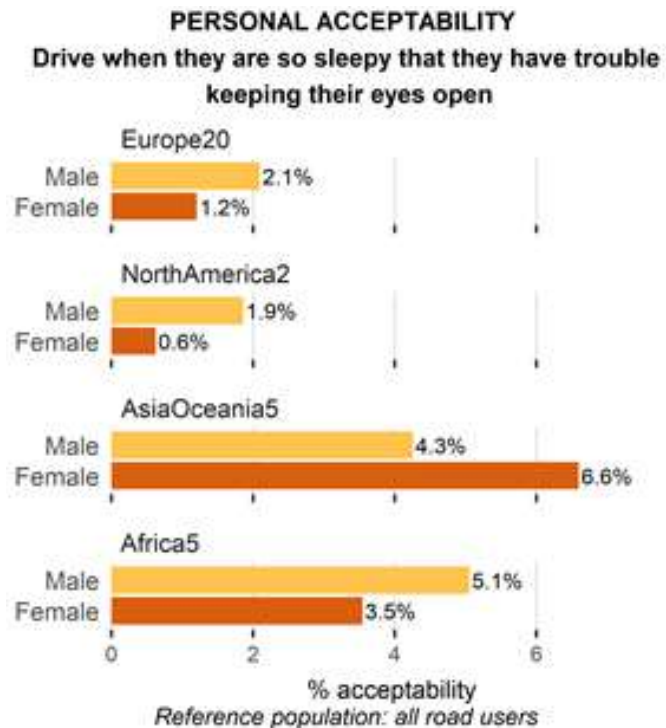
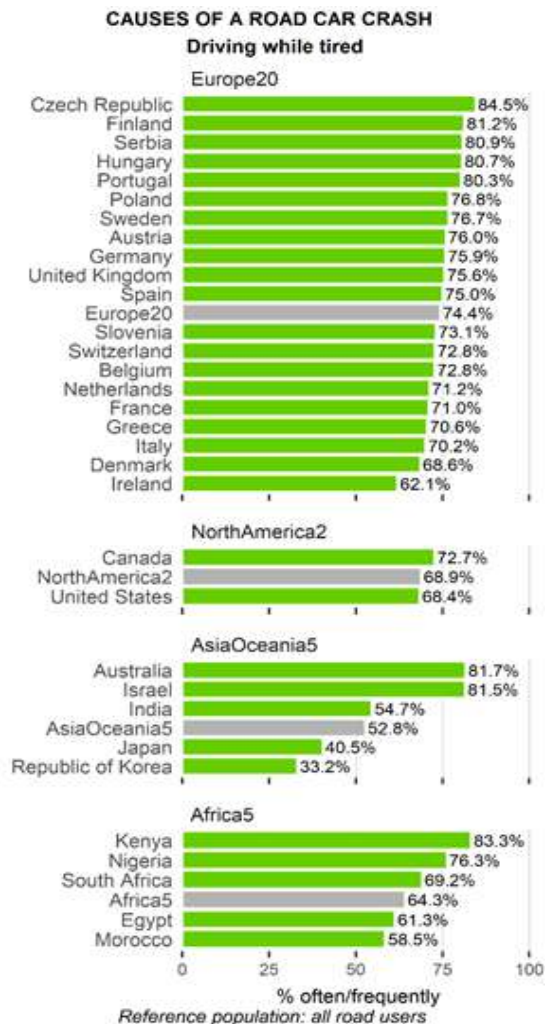


Figure: Personal acceptability of fatigued driving among all road users by region and gender ("How acceptable do you, personally, feel it is for a car driver to drive when they're so sleepy that they have trouble keeping their eyes open?")

- In the four world regions, the gender differences in personal acceptability of fatigued driving are quite **small** (1 to 3 percentage points difference).

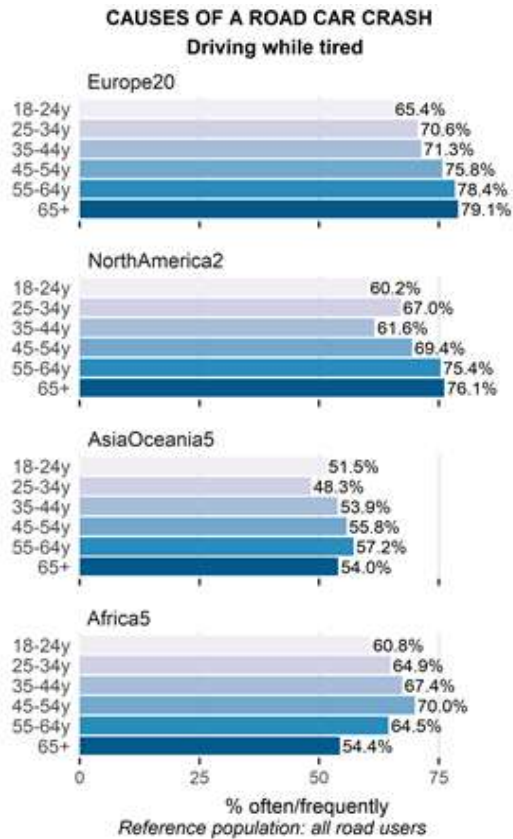
Perception of fatigued driving as an accident cause, by country



- **European** road users most commonly perceive fatigued driving as a frequent crash cause (74%).
- Lower rates have been reported amongst road users in **North-America** (69%), **Africa** (64%) and **Asia-Oceania** (53%).
- In most countries a **large majority** of road users (between 70% and 85%) perceive fatigued driving to be a frequent cause of crashes with car drivers involved.
- In a **few countries** a much smaller percentage of road users has this perception (Republic of Korea: 33%; Japan: 40%; India: 55%; Morocco: 58%).

Figure: Perception of fatigued driving as accident cause among all road users by region and country ("How often do you think 'driving while tired' is the cause of a road crash involving a car?")

Perception of fatigued driving as an accident cause, by age group



- In **Europe** and **North America**, the perception of fatigued driving as a frequent crash cause is more prevalent among older age groups (55-64; 65+) than younger age groups, with differences in the range of 10 to 15 percentage points.
- In **Asia-Oceania** the differences between age groups are small and there is no clear trend in these differences.
- In **Africa**, surprisingly, the perception of fatigued driving as a frequent crash cause is less prevalent amongst the oldest age group (54%) than amongst younger age groups (61-70%).

Figure: *Perception of fatigued driving as accident cause among all road users by region and age group ("How often do you think 'driving while tired' is the cause of a road crash involving a car?")*

Perception of fatigued driving as an accident cause, by gender

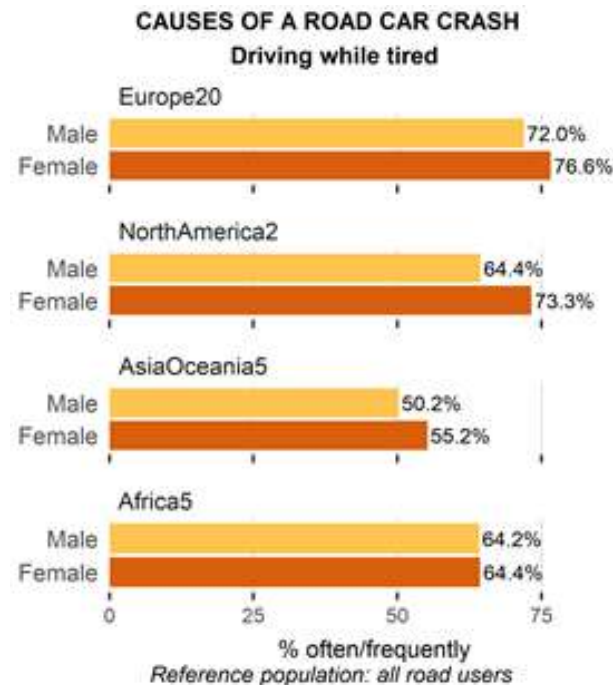


Figure: Perception of fatigued driving as accident cause by region and gender ("How often do you think 'driving while tired' is the cause of a road crash involving a car?")

- In **Africa**, female and male road users' perception does not differ.
- Female and male road users differ only modestly in **Europe** and **Asia-Oceania** (with females 4 to 5 percentage points lower rates).
- In **North America** the difference between female and male road users is more substantial (with 64% of female road users perceiving tired driving as a frequent crash cause versus 73% male road users).

Statistical Modelling Analysis

- How acceptable do you, personally, feel it is for a car driver to drive when they're so sleepy that they have trouble keeping their eyes open? → Variable importance ranking from **Random Forest Analysis**
- How often do you think 'driving while tired' is the cause of a road crash involving a car? → Variable importance ranking from **Random Forest Analysis**
- Over the last 30 days, how often did you as a car driver drive when you were so sleepy that you had trouble keeping your eyes open? → **Binary Logistic regression** model

Importance of variables on driver fatigue

- Random Forest analyses are used to provide insight on the importance of variables on driver fatigue.

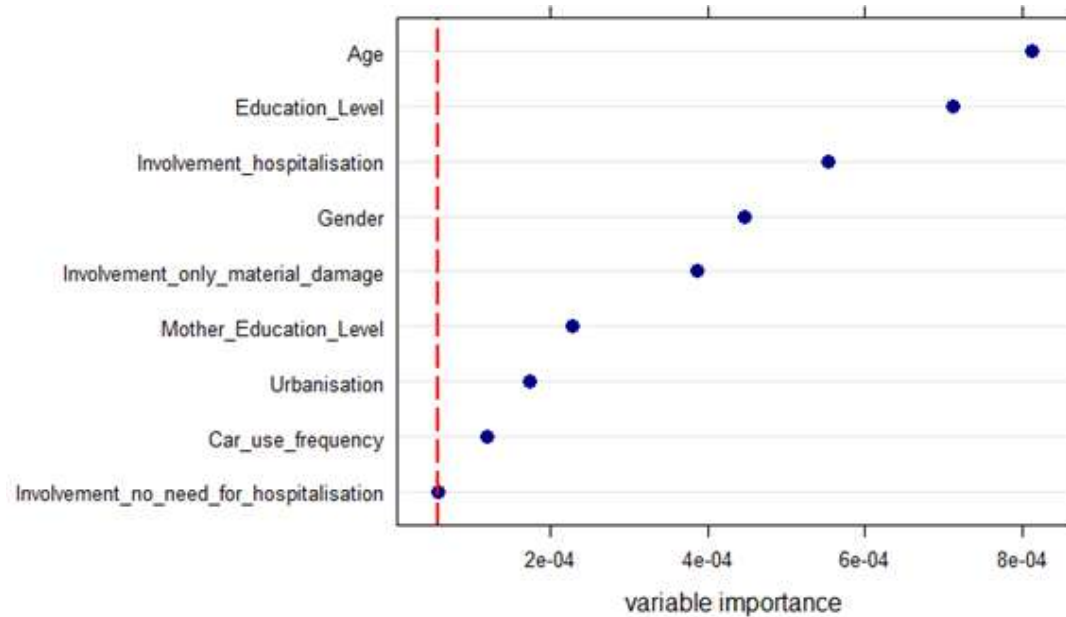


Figure: Variable importance ranking from Random Forest Analysis (personal acceptability of fatigued driving)

The most important factors are **age**, **educational level** and the frequency of past **involvement in road crashes** in which at least one injured person had to be hospitalized followed by gender.

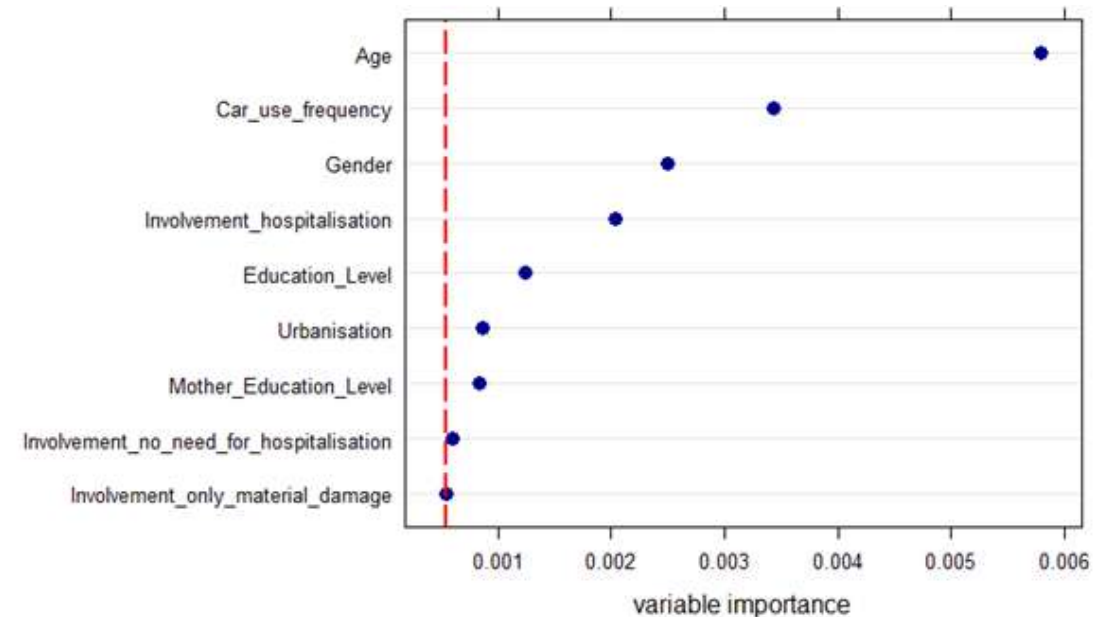


Figure: Variable importance ranking from Random Forest Analysis (perception of fatigued driving as an accident cause)

The three most important factors are **age**, **frequency of car use**, and **gender** followed by the frequency of involvement in road crashes (in which at least one injured person had to be taken in hospital).

Logistic regression model for driving while tired (1/2)

Dependent variable: "Over the last 30 days, how often did you as a car driver drive when you were so sleepy that you had trouble keeping your eyes open?" (0=never; 1=at least once)

Factors (reference category)	Odds Ratio (CI 95%)
Gender (Ref. male)	
Female	0.53** (0.50-0.56)
Age group (Ref. 55+)	
(18-34 yrs.)	1.30** (1.21-1.39)
(35-54 yrs.)	1.08* (1.01-1.15)
Educational level (Ref. Master's degree or higher)	
Primary education or none	0.50** (0.43-0.59)
Secondary education	0.49** (0.46-0.53)
Bachelor's degree or similar	0.54** (0.51-0.58)
Personal acceptability (Ref. unacceptable/neutral)	
Driving when you have trouble keeping the eyes open (acceptable)	6.53** (5.34-7.97)
Risk perception (Ref. not that often)	
Driving while tired is the cause of a road crash involving a car(often)	0.60** (0.56-0.63)
Urbanisation (Ref. semi-urban and rural)	
Urban	0.71** (0.67-0.75)

Notes: * $p < 0.05$, ** $p < 0.01$

- The odds of driving when tired for **women**, in comparison with men, decrease by 47%.
- When comparing with the drivers aged 55+, the odds of driving when tired increase by 30% for drivers **aged 18 to 34**, and by 8% for drivers **aged 35 to 54**.
- The odds of driving when tired for drivers with **primary education level or lower**, in comparison with drivers with a Master's degree or higher, decrease by 50%.
- Comparing with drivers with a Master's degree or higher, the odds of driving when tired decrease by 51% for drivers with **secondary education level**, and by 46% for drivers with a **bachelor's degree** or similar.

Logistic regression model for driving while tired (2/2)

Dependent variable: "Over the last 30 days, how often did you as a car driver drive when you were so sleepy that you had trouble keeping your eyes open?" (0=never; 1=at least once)

Factors (reference category)	Odds Ratio (CI 95%)
Gender (Ref. male)	
Female	0.53** (0.50-0.56)
Age group (Ref. 55+)	
(18-34 yrs.)	1.30** (1.21-1.39)
(35-54 yrs.)	1.08* (1.01-1.15)
Educational level (Ref. Master's degree or higher)	
Primary education or none	0.50** (0.43-0.59)
Secondary education	0.49** (0.46-0.53)
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Personal acceptability (Ref. unacceptable/neutral)	
Driving when you have trouble keeping the eyes open (acceptable)	6.53** (5.34-7.97)
Risk perception (Ref. not that often)	
Driving while tired is the cause of a road crash involving a car(often)	0.60** (0.56-0.63)
Urbanisation (Ref. semi-urban and rural)	
Urban	0.71** (0.67-0.75)

Notes: * $p < 0.05$, ** $p < 0.01$

- Drivers who feel that it is **acceptable** to drive being so sleepy that they have trouble keeping their eyes open are 6.53 times more likely to drive when they are tired.
- The odds are significantly lower for those who believe that driving while tired is the **cause of a road crash** involving car frequently.
- When comparing with the drivers who live in semi-urban and rural areas, the odds of driving when tired decrease by 29% for drivers who live in **urban areas**.

Key results

- Less than 3% of road users find fatigued driving **personally acceptable**.
- In all countries worldwide a large majority of road users **perceive tired driving as a frequent cause of accidents**.
- However, in most countries one fifth to one quarter of car drivers report to **have driven while having trouble keeping eyes open** in the past 30 days.
- The **personal acceptability** of fatigued driving is slightly higher among the younger age groups.
- **Self-declared fatigued** driving rates are higher for male drivers than for female drivers.
- Drivers who think it is **acceptable to drive being so sleepy** that you have trouble keeping your eyes open are 6.5 times more likely to drive while tired.

Key recommendations

- The self-report data in ESRA2 confirm that fatigued driving is an **important problem** for road safety worldwide. The high prevalence of self-declared fatigued driving warrants serious attention of road safety policy makers.
- Within professional companies, an active safety culture and **fatigue management** are the best measures to address professional driver fatigue.
- **Awareness-raising campaigns** on fatigued driving should provide helpful and clear instructions how to prevent the problem and how to react in a real situation.
- Drivers can be advised to familiarise themselves with **fatigue detection systems** in their vehicles and to take warning signals by these systems seriously.
- However, drowsiness detection systems are only an aid and drivers themselves have the **prime responsibility** for fatigued driving prevention.
- The implementation of **rumble strips** on major roadways (motorways and rural roads) is a proven safety measure against fatigued driving.

Thank you very much for
your attention !

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2nd ESRA Symposium

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