



ESRA

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E-Survey of Road users' Attitudes



Young Road Users

ESRA2 Thematic report Nr. 14



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List of Abbreviations

Country codes

AT	Austria
AU	Australia
BE	Belgium
CA	Canada
CH	Switzerland
CZ	Czech Republic
DE	Germany
DK	Denmark
EG	Egypt
EL	Greece
ES	Spain
FI	Finland
FR	France
HU	Hungary
IE	Ireland
IL	Israel
IN	India
IT	Italy
JP	Japan
KE	Kenya
KR	Republic of Korea
MA	Morocco
NG	Nigeria
NL	Netherlands
PL	Poland
PT	Portugal
RS	Serbia
SE	Sweden
SI	Slovenia
UK	United Kingdom
US	United States
ZA	South Africa

Other abbreviations

ESRA	E-Survey of Road Users' Attitudes
EU	European Union
ICW	Individual country weight used in ESRA2
ISA	Intelligent Speed Assistant
OR	Odds Ratio
US	United States
WEF	World Economic Forum
WHO	World Health Organisation

Executive summary

Objective and methodology

ESRA (E-Survey of Road users' Attitudes) is a joint initiative of road safety institutes, research centres, public services, and private sponsors from all over the world. The aim is to collect and analyse comparable data on road safety performance, in particular road safety culture and behaviour of road users. The ESRA data are used as a basis for a large set of road safety indicators. These provide scientific evidence for policy making at national and international levels.

Vias institute in Brussels (Belgium) initiated and coordinates ESRA, in cooperation with eleven core group partners (BAST, BFU, CTL, IATSS, IFSTTAR, ITS, KfV, NTUA, PRP, SWOV, TIRF). At the heart of ESRA is a jointly developed questionnaire survey, which is translated into national language versions. The themes covered include self-declared behaviour, attitudes and opinions on unsafe traffic behaviour, enforcement experiences and support for policy measures. The survey addresses different road safety topics (e.g. driving under the influence of alcohol, drugs and medicines, speeding, distraction) and targets car occupants, motorcycle and moped drivers, cyclists and pedestrians.

The present report is based on the second edition of this global survey, which was conducted in 2018 (ESRA2_2018). In total this survey collected data from more than 35.000 road users across 32 countries. An overview of the ESRA initiative and the project-results is available on: www.esranet.eu.

This thematic ESRA report on young road users focuses on two road safety issues, 1) driver impairment due to alcohol, drugs, driving while drowsy or driving while distracted using a mobile phone and 2) driving over the speed limit. The report includes the analysis of aspects related to self-declared unsafe behaviours in traffic, personal acceptability of unsafe traffic behaviours, attitudes towards driving while impaired and speeding, risk perception of driving while impaired and speeding, support for policy measures and opinions of traffic rules and penalties. In these analyses the focus is on differences between young drivers (aged 18-24) and other age groups. Moreover, analyses on differences between young road users (aged 18-24) and the age group of 25 years and older with regard to a) the perception of the interaction between road users in European countries and b) the influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour of car-drivers in Europe were carried out.

Key results for driver impairment of young road users

Self-declared unsafe behaviours in traffic

The results show that young drivers typically report higher or at least similar rates of risky behaviours than other age groups with the exception of Africa5, where rates of risky behaviours (except for driving while distracted) are nearly consistently highest for respondents of age group 65+.

For driving when potentially over the legal limit for drink-driving, in Europe20, NorthAmerica2 and AsiaOceania5 the rate for young drivers is the highest of all age groups. In Africa5 the rate for young drivers is second highest, but highest for the age group 65+.

For driving while drowsy, in Europe20 and NorthAmerica2 young drivers reported the highest rates among age groups. In AsiaOceania5 and Africa5 young drivers reported the second highest rates among age groups.

For talking on a hand-held phone while driving, young drivers reported the highest rates amongst age groups in Europe20, NorthAmerica2 and AsiaOceania5. For reading a text message/email or checking social media while driving, young drivers reported the highest rate amongst age groups only in Europe20, whereas in all other regions the reported rates of young drivers were second highest.

Acceptability of unsafe traffic behaviours

Attitudes of personal acceptability are very low towards driving while impaired by alcohol or drugs, driving while drowsy and driving while distracted, with the exception of talking on a hands-free mobile

phone while driving for which acceptability from participants is quite high. In addition, except for talking on a hand-held phone and talking on a hand-free mobile phone while driving, rates of acceptance in Europe20 and NorthAmerica2 are consistently lower than in AsiaOceania5 and Africa5.

Percentages of the personal acceptability of driving while potentially impaired, drowsy or distracted are much lower than the percentages of the correspondent self-declared behaviours, showing that a significant number of drivers engage in risky behaviours related to driving while potentially impaired, drowsy or distracted even if they consider the behaviour unacceptable.

Attitudes towards unsafe behaviour in traffic

With regard to the percentage of respondents who reported most of their friends would drive after drinking alcohol, there is an increasing trend the lower the age in Europe20 and AsiaOceania5 where the rates for young drivers were the highest of all age groups.

For the ability to write a message on the mobile phone while driving, age was a factor in all regions and young drivers reported the highest rates amongst age groups in Europe20, AsiaOceania5 and NorthAmerica2, with the latter being also the highest level of agreement across regions. In Africa5, young drivers reported the third highest rate amongst age groups.

Risk perception

Overall, respondents from Europe20 and NorthAmerica2 are more likely to report alcohol, drugs, driving while tired and driving while using a hand-held mobile phone while driving as a factor in road car crashes than respondents from AsiaOceania5 and Africa5.

With regard to alcohol, young drivers reported the lowest rate of agreement amongst age groups in Europe20 and in NorthAmerica2 young drivers reported the second lowest agreement amongst age groups. However, in AsiaOceania5 young drivers reported the highest rate of agreement amongst age groups, but the lowest across regions.

For driving while tired, young drivers reported the lowest rate of agreement amongst age groups in Europe20 and NorthAmerica2 and the second lowest rate amongst age groups in Africa5 and AsiaOceania5.

Regarding using a hand-held mobile phone while driving, Europe20 is the only region in which young drivers reported the lowest rate of agreement amongst age groups. In NorthAmerica2 and Africa5 young drivers reported the second lowest rates amongst age groups.

Enforcement, support for policy measures, traffic rules and penalties

Overall, there is a high level of support for policy measures aimed at reducing alcohol related impaired driving. However, there is a general trend in Europe20, NorthAmerica2 and AsiaOceania5 in lower rates of support the younger the age groups, with young drivers being among the least if not the least supportive. In Africa5 young drivers reported the lowest support rates except for elderly drivers (65+) whose rates are much lower than those of the other age groups for all alcohol related policy measures.

Regarding zero tolerance for using any type of mobile phone while driving, overall, there is a lower level of support, especially from young drivers. In Europe20 and AsiaOceania5 young drivers reported the lowest rate of support amongst age groups and in NorthAmerica2 and Africa5 young drivers reported the second lowest rate amongst age groups.

Key results for driving over the speed limit

Self-declared unsafe behaviours in traffic

For speeding behaviours, young drivers mostly report (one of the) highest rates in all three environments in Europe. In NorthAmerica2 age was a factor for speeding on motorways/freeways, however young drivers reported the lowest rate of speeding of all age groups. In AsiaOceania5 age was a factor for speeding outside built-up areas (but not motorways/freeways) and on motorways/freeways and young drivers reported the highest rates amongst age groups. In Africa5 age was a factor for speeding inside built-up areas and on motorways/freeways and in both cases young drivers reported among the highest rates of speeding, except for the age group of 65+ years and 25-34 years.

Acceptability of unsafe traffic behaviours

The rate of acceptance for speeding is higher than for driving while impaired, driving while drowsy or driving while distracted (except for talking on a hand-free mobile phone while driving) especially in Europe20 and NorthAmerica2, but a majority of respondents still indicate speeding is personally unacceptable. Percentages of the personal acceptability of speeding behaviour are much lower than the percentages of the correspondent self-declared behaviours, showing that a significant number of drivers engage in risky behaviours related to speeding even if they consider the behaviour unacceptable.

With respect to age, in all three environments young drivers reported the highest level of acceptance of all age groups in Europe20 and NorthAmerica2 and the second highest level of acceptance of all age groups in AsiaOceania5 and Africa5.

Attitudes towards unsafe behaviour in traffic

For the percentage of respondents who reported most of their friends would drive 20 km/h over the speed limit in a residential area, in Europe20 young drivers reported the highest rate amongst age groups, and the second highest rates amongst age groups in NorthAmerica2 and AsiaOceania5, with the latter being the highest reported rate of young drivers across all regions.

Regarding the declaration of trust in the ability for exceeding the speed limit, young drivers reported the highest rate amongst age groups in Europe20 and AsiaOceania5, with the latter being also the highest rate across regions. In NorthAmerica2 and Africa5 young drivers reported the second highest level of agreement.

Risk perception

Overall, respondents from Europe20 and NorthAmerica2 are more likely to report driving faster than the speed limit as a factor in road car crashes than respondents from AsiaOceania5 and Africa5. Here, age was a factor in all regions except of AsiaOceania5 and young drivers reported the lowest rates of agreement amongst age groups in Europe20 and NorthAmerica2 and the third lowest rate amongst age groups in Africa5.

Enforcement, support for policy measures, traffic rules and penalties

With regard to policy measures aimed at speeding, age was a factor in all regions except NorthAmerica2. For both the installation of dynamic speed warning signs and the installation of Intelligent Speed Assistance (ISA) in new cars, young drivers reported the lowest support rates amongst age groups in AsiaOceania5 and the second lowest support rates amongst age groups in Europe20 and Africa5.

Influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour

Focusing on car drivers in Europe, all variables on norms, attitudes and behavioural control towards the speeding behaviour (e.g. 'Most of my friends would drive 20 km/h over the speed limit in a residential area.') had a significant influence on the self-reported speeding behaviour of young road users except for the variable 'I have to drive fast; otherwise, I have the impression of losing time.' In contrast to car drivers aged 25 years or older for which all variables – and also the variable 'I have to drive fast; otherwise, I have the impression of losing time' – had a significant influence on the reported speeding behaviour, young car drivers do not drive faster than the speed limit because they have the impression of losing time.

Interaction between road users

Focusing on nine European countries, overall young road users perceive the interaction between road users as less aggressive and less harsh than road users aged 25 and older. Especially young road users from Austria, Germany and Italy perceived the interaction as less aggressive than road users aged 25 and older and similarly, especially young road users in Austria, Germany and Denmark perceived the interaction as less harsh than road users aged 25 and older. With regard to a perception of the interaction between road users as helpful or considerate, nearly no differences were observable between the two age groups, except for Germany where young road users perceive the interaction as more helpful and more considerate than road users aged 25 and older.

1. Introduction

In many countries worldwide young people account for the largest share of road traffic crashes and fatalities and are far more likely to be victims in road accidents than people in any other age group (European Commission, 2018a; European Commission 2018b). According to the World Health Organization (2018), road traffic injuries are the leading cause of death for children and young adults aged 5-29 years. Young drivers, especially young male drivers constitute the age group with highest crash involvement when looking at their likelihood to be involved in accidents relative to their prevalence in the population of all drivers but also when looking at their crash likelihood per kilometre of driving, relative to drivers in other age groups (Shinar, 2007). Besides their overall high likelihood of being involved in a road accident, young drivers are especially over-represented in single-vehicle crashes, those crashes that are closely associated with risky driving such as speeding, fatigue and alcohol impaired driving (OECD, 2006; Shinar, 2007).

In this report young road users are defined as those who are between 18 and 24 years old. With regard to this age group, in the EU countries for example, 13% of people killed in road accidents in 2016 were aged 18-24 years although only 8% of the population falls within this age, with especially driver and passenger fatality rates for 18-24 year olds being higher than those of other age groups (European Commission, 2018a). The high crash rates of young drivers primarily result from immaturity, lack of experience, impairment and lifestyles associated with their age and their gender, with young men in particular often being over-confident about their driving skills (European Commission, 2018b).

At the age of 18 or younger when most young people learn to drive they are still adolescents and areas of the human brain which are responsible for the integration of information and impulse control especially when persons are planning tasks, weighing risks or doing other tasks related to decision making, are still developing. The late maturation of these areas of the brain have tentatively been associated with the high crash rate of young novice drivers, as the driving process places significant demands on limited cognitive resources for young, novice drivers (Isler, 2008; European Commission, 2018b). Moreover, especially skills such as the anticipation of potentially hazardous traffic situations needs a lot of practice. However, young drivers – especially young males – often tend to overestimate their skills and underestimate the complexity of the traffic situation (European Commission, 2018b).

In addition, adolescence, the transitional stage in human development between childhood and adulthood where most young people are in when they learn to drive, comprises a number of psychological phenomena that can stimulate risky driving behaviour: the power of friends, the optimism bias (cognitive bias that causes young people to believe that they themselves are less likely to experience a crash), mood swings as well as novelty-seeking and sensation-seeking (Arnett et al., 2002; Jonah, 1997). Friends in particular have a strong normative influence as adolescents often form cliques (peer groups) that are one of their most important social group they belong to. To impress friends, conform their expectations or to alleviate boredom young people, especially boys, are inclined to show risky behaviour (e.g. how fast they can drive etc.), but the peer group can also encourage the driver to take risks (e.g. peer pressure to drive faster etc.) away from parental influence (European Commission, 2018b).

In this regard, speeding is particularly prevalent among young drivers: in a survey of novice drivers aged 18-20 years in Australia (Scott-Parker et al., 2014), 87% of the participants reported at least occasionally exceeding speed limits. For Florida, Hassan and Abdel-Aty (2013) report that attitudes towards speeding were a significant factor affecting young drivers' involvement in at-fault crashes or traffic violations at the age of 18-24 and that running late and racing with other cars were the two most frequently quoted reasons for speeding. In a survey of young drivers aged 16-25 years in Australia, New-Zealand and Colombia (Scott-Parker & Oviedo-Trespalacios, 2017) independently of country the participants reported elevated levels of speeding. Similarly, the results of the first edition of ESRA in 2015 – with participants from 17 European countries – indicated that the acceptability of speeding was higher for younger age groups compared to older ones (Yannis et al., 2016).

Moreover, young drivers are often impaired while driving. This impairment results from alcohol and drug use, fatigue or drowsiness and distraction by passengers or mobile phone use (European Commission, 2018b).

Alcohol has a greater deteriorating effect on young drivers than on more experienced drivers. The tolerance for alcohol may be lower, because young drivers are not yet accustomed to alcohol. Furthermore, mental workload is already higher for young drivers since various subtasks of the driving task are not yet executed fully automatically (anchored in the procedural memory). (de Waard, 2002; Patten et al., 2006). Especially the combined use of alcohol and different drugs while driving leads to a substantially higher crash rate (European Commission, 2018b). Scott-Parker et al. (2014) surveyed young novice drivers in Australia and indicate that drunk driving was reported by 19% of the male and 12% of the female participants and drugged driving was reported by 6% of the male and 1% of the female participants. Similarly, Achermann Stürmer (2016) reports higher levels of acceptability for drink-driving and drug-driving as well as a higher percentage of self-declaration of such behaviours among the youngest age group (18-34 years) compared to the oldest age group (55 years or older) of participants from 17 European countries within ESRA1. Mathijssen and Houwing (2005) report that the age group of drivers between 18 and 24 had the highest prevalence of illicit drug driving amongst all age groups in the Netherlands. For Australia, New Zealand and Colombia, Scott-Parker and Oviedo-Trespalacios (2017) report that driving after drinking alcohol was the second strongest predictor of crashes of young drivers aged 16-25 years.

Young people are also strongly affected by loss of sleep, the task duration (driving a long time) and the circadian rhythm, when driving at night. These three factors lead to increased fatigue (due to long driving) and sleepiness (insufficient sleep), which lead to reduced energy, a reduced tendency to react and reluctance to continue with the task, ultimately resulting in falling asleep at the wheel (European Commission, 2018b). Young drivers have a greater vulnerability to sleep restriction than older drivers (Filtner et al. 2012; Lowden et al., 2009) and sleepiness is often prevalent among young drivers: in a survey of novice drivers in Australia for example (Scott-Parker et al., 2014), 84% of the participants reported at least occasionally driving when tired. Similarly, also results of ESRA1 indicated that driving when tired is more prevalent among younger drivers (Trigoso et al., 2016). Moreover, young drivers – especially young males – are also at higher risk for involvement in sleep-related crashes (Stutts et al., 2003; Hutchens et al., 2008). For Norway, Phillips and Sagberg (2013) analysed accident-involved drivers of all ages and concluded that younger age was associated with fatigue- and sleepiness-involved crashes and reports of falling asleep behind the wheel, particularly for young males.

In addition, distraction as a cause of driving error is more prominent in novices than in experienced drivers and young drivers are frequently distracted for example by passengers or mobile phones, which reduces attention to the traffic situation (European Commission, 2018b; Dingus et al. 2008). In particular the use of the mobile phone while driving to text or read messages has increased amongst young drivers. While texting drivers spend long periods without looking to the road, which has a huge impact on the visual information reception and increases the risk of being in an accident (Olson et al., 2009). In the US for example, the percentage of drivers aged 16-24 years old visibly manipulating hand-held devices while driving has increased from 1.1% in 2009 to 4.2% in 2018 (from 0.6% to 2.1% among all drivers) (NHTSA, 2019). Moreover, results of ESRA1 indicated that the prevalence of the self-reported use of the mobile phone to talk or to read/send text messages while driving is higher among younger drivers (Trigoso et al., 2016). For Florida, an analysis of young driver's crashes (Hassan & Abdel-Aty, 2013) revealed that in-vehicle distractions are a significant factor as well, affecting young drivers' involvement in at-fault crashes or traffic violations at the age of 16-17 and 18-24. Similarly, for Australia, New Zealand and Colombia, Scott-Parker and Oviedo-Trespalacios (2017) report that hand-held mobile phone usage was the strongest predictor of crashes of young drivers aged 16-25 years.

Building on these aspects this thematic ESRA2 report aims at describing the differences between young drivers (aged 18-24 years) and all other age groups in the self-declared behaviours, attitudes, beliefs and perceived norms related to driving while exceeding the speed limit and driving while impaired (alcohol & drugs, driving while drowsy and driving while distracted) in a sample from 32 countries from four regions of the world (Europe, North America, Asia-Oceania and Africa). Further analyses, moreover, investigate the differences between young road users (aged 18-24) and the age group of 25 years and

older in Europe with regard to a) the perception of the interaction between road users and b) the influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour of car-drivers.

The ESRA2 findings are used to answer the following research questions:

- What are the differences in the prevalence of driving while exceeding the speed limit and driving while impaired between young drivers and all other age groups?
- What are the differences in the level of self-declared acceptability of driving while exceeding the speed limit and driving while impaired between young drivers and all other age groups?
- How common is the perception that driving while exceeding the speed limit and driving while impaired is the cause of a road crash for young drivers and in comparison to all other age groups?
- What are the opinions on traffic rules, penalties and support for policy measures of young drivers concerning driving while exceeding the speed limit and driving while impaired compared to all other age groups?
- What are the differences in the perception of the interaction between road users between young road users and all other age groups?
- To what extent do norm variables, attitude, behaviour and behaviour control influence the prevalence of the self-declared over-speeding behaviour of young car-drivers compared to all other age groups?

2. Methodology

The ESRA project (E-Survey of Road users' Attitudes) is a joint initiative of road safety institutes, research organisations, public services and private sponsors, across 46 countries aiming at collecting comparable (inter)national data on road users' opinions, attitudes and behaviour with respect to road traffic risks. The initiative is funded by the partners' own resources.

ESRA is an extensive online panel survey, using a representative sample (at least N=1,000) of the national adult populations in each participating country. A jointly developed questionnaire is translated into national language versions. The themes covered include self-declared behaviour, attitudes and opinions on unsafe traffic behaviour, enforcement experiences and support for policy measures. The survey addresses different road safety topics (e.g., driving under the influence of alcohol, drugs and medicines, speeding, distraction) and targets all types of road users. The first edition of the ESRA survey (ESRA1) was carried out in three waves between 2015-2017. Data were gathered from almost 40,000 road users in 38 countries across 5 continents.

The present report is based on the first wave of the second edition of this global survey (ESRA2_2018). It was conducted in 32 countries in 2018. In total the ESRA2_2018 survey collected data from more than 35,000 road users. It will be further elaborated in a second wave in 2019 (ESRA2_2019). The participating countries in ESRA2_2018 were:

- **Europe:** Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom;
- **America:** Canada, USA;
- **Asia and Oceania:** Australia, India, Israel, Japan, Republic of Korea;
- **Africa:** Egypt, Kenya, Morocco, Nigeria, South Afrika.

The project has been initiated and is coordinated by the Vias institute (BE). Twelve institutes: BAST (DE), bfu (CH), CTL (IT), IATSS (JA), IFSTTAR (FR), ITS (PO), KfV (AT), NTUA (EL), PRP (PT), SWOV (NL), TIRF (CA) and Vias institute (BE) – combined their expertise and resources to analyse the common

data and to disseminate the results. The results of the ESRA2_2018 survey will be published in a Main Report and fifteen thematic reports (Table 1).

Table 1: ESRA2 thematic reports

Driving under influence	Child restraint systems	Cyclists
Speeding	Unsafety feeling & risk perception	Moped drivers & motorcyclists
Distraction (mobile phone use)	Enforcement	Young road users
Fatigue	Vehicle automation	Elderly road users
Seat belt	Pedestrians	Gender aspects

There are also country fact sheets in which the main results per country are compared with a regional average. An overview of the project and the results are available on www.esranet.eu.

The present report summarizes the ESRA2_2018-results with respect to young road users related to driving while impaired, drowsy or distracted using a mobile phone and exceeding the speed limit. An overview of the data collection method and the sample per country can be found in [ESRA2 Methodology](#).

Note that a weighting of the data was applied to the descriptive analyses. This weighting took into account small corrections with respect to national representativeness of the sample based on gender and six age groups: 18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65y+; based on population statistics from United Nations data (United Nations Statistics Division, 2019). For the regions, the weighting also took into account the relative size of the population of each country within the total set of countries from this region. IBM SPSS Statistics 19.0.0 and R 3.5.1 were used for the analyses.

The report includes the analysis of several aspects related to driving while impaired, driving while drowsy, driving while distracted using a mobile phone or exceeding the speed limit: self-declared behaviours, personal acceptability, attitudes (behaviour beliefs and attitudes, and perceived behaviour control), risk perception, support for policy measures and opinions of traffic rules and penalties.

Most of the questions of the survey were presented on Likert scales, which were dichotomized for the analysis. A description of the scales and the correspondent dichotomization are presented in the beginning of each section.

For the descriptive analysis, all the results are presented by region (Europe20, NorthAmerica2, AsiaOceania5 and Africa5) and age group. A weighting of the data was applied to the descriptive analyses. This weighting took into account small corrections with respect to national representativeness of the sample based on gender and six age groups: 18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65y+; based on population statistics from United Nations data (United Nations Statistics Division, 2019). For the regions, the weighting also took into account the population size of each country in the total set of countries from this region. More information about the weighting is available in Appendix 2: ESRA2 weights. Note that in the African countries a lower percentage of people has access to, and use, the internet (in Kenya and Nigeria less than 30%). Within the African countries the numbers of 65+ respondents who answered the ESRA2 survey were quite low (with the exception of South Africa), so that the answers of this particular age group in African countries cannot be considered to be representative.

Due to the nominal nature of the data, the Chi-square Test for Independence was used to assess if the observed differences are statistically significant. The strength of the association between variables was assessed through the Cramer's V coefficient.

Linear regression models were also estimated to explore the influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour of young car-drivers (aged 18-24) in comparison to car-drivers aged 25 years and older in Europe.

3. Results

3.1 Descriptive results

This section includes the descriptive statistics on questions about risky driving behaviours and attitudes focusing on driving while impaired (alcohol and drugs, driving while drowsy and driving while distracted, i.e. using a mobile phone) as well as exceeding the speed limit.

The description includes the results of 1) self-declared unsafe behaviours in traffic, 2) acceptability of unsafe traffic behaviours (personal), 3) attitudes towards unsafe traffic behaviours, 4) risk perception, 5) support for policy measures and 6) opinions of traffic rules and penalties.

The focus lies on the differences in response rates between young drivers (age group 18-24 years) and non-young drivers.

Statistical tests of differences between age groups have been performed: a Chi² Test for Independence was used to assess if the answers depend significantly on the age group. Due to the large number of survey respondents, a p-value of 0.01 or less was used as an indicator of statistical significance. However, within the African countries the numbers of 65+ respondents who answered the ESRA2 survey were quite low, 118 in total, so that the answers of this particular age group in African countries cannot be considered to be representative.

Moreover, pairwise comparisons were performed to identify the pairs of groups (age groups) that differ significantly. The strength of the association between variables was assessed through the Cramer's V coefficient. The classification of strength of associations expressed by the coefficients are found in Table 2 (Cohen, 1988).

Table 2: Thresholds used to indicate the strength of coefficients

	Small strength	Medium strength	Large strength
Cramer's V (association with age: 5 deg. of freedom)	0.05	0.13	0.22

3.1.1 Self-declared unsafe behaviours in traffic

To assess self-declared behaviours in traffic, car drivers were asked '*Over the last 30 days, how often did you as a car driver ...?*'. Nine items of interest were included:

- ...drive when you may have been over the legal limit for drinking and driving;
- ...drive 1 hour after using drugs (other than medication);
- ...drive faster than the speed limit inside built-up areas;
- ...drive faster than the speed limit outside built-up areas (except motorways/freeways);
- ...drive faster than the speed limit on motorways/freeways;
- ...drive when you were so sleepy that you had trouble keeping your eyes open;
- ...talk on a hand-held mobile phone while driving;
- ...talk on a hands-free mobile phone while driving;
- ...read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving.

All questions were answered on a Likert scale from 1 (never) to 5 (almost always) - The percentages of 'at least once' (answers 2 to 5) are presented in the results.

The results show that overall young drivers typically report higher or at least similar rates of risky behaviours than other age groups with the exception of Africa5, where rates of risky behaviours (except for driving while distracted) are nearly consistently highest for respondents of age group 65+ (see also section 3.4).

Figure 1 and statistical tests show that age is a significant factor in the reported rate of driving when potentially over the legal BAC limit for all regions ($p\text{-value} < 0.01$, Cramer's $V < 0.14$). In Europe20, NorthAmerica2 and AsiaOceania5 the rate for young drivers is the highest of all age groups. Between regions this rate is highest for AsiaOceania5 (23.2%), followed by Europe20 (17.1%) and North America (16.1%). The results for Africa5 differ in that – although the rate for young drivers (15.1%) is highest compared to the age groups 25-34 years, 35-44 years, 44-54 years and 55-64 years – the age group 65+ has the highest rate.

With regard to the reported rate of driving one hour after consuming drugs, age is also a significant factor in all regions ($p\text{-value} < 0.01$, Cramer's $V < 0.22$). In Europe20, the rate for young drivers is highest of all age groups, but lowest between all regions (10.8%). In Africa5 the rate for young drivers (19.9%) is higher than for all other age groups, except the age group 65+ years, and also the highest between all regions. In AsiaOceania5 (18.9%) and NorthAmerica2 (13.7%) the rate for young drivers is the third highest.

For speeding, age is a significant factor in all three environments (motorways, inside and outside built-up areas with $p\text{-value} < 0.1$) only in Europe, where also the rates of young drivers are mostly (one of the) highest of all age groups and also between regions (63.2 to 70.4%) although the strength of association with age is moderate (Cramer's $V < 0.11$). In NorthAmerica2, age is a significant factor for speeding on motorways/freeways, however young drivers reported the lowest rate of speeding (60.1%) of all age groups. In AsiaOceania5, age was a significant factor for speeding outside built-up areas (excluding motorways/freeways) and on motorways/freeways and young drivers reported the highest rates amongst age groups (51.6% and 53.7%, respectively) ($p\text{-value} < 0.01$, Cramer's $V < 0.09$). In Africa5, age was a significant factor for speeding inside built-up areas and on motorways/freeways and in both cases young drivers reported among the highest rate of speeding (42.9% and 52.4%, respectively) except for the age group of 65+ years and 25-34 years ($p\text{-value} < 0.01$, Cramer's $V < 0.10$). Across regions, Europe20 and NorthAmerica2 generally reported higher rates of speeding across all three environments and age groups than AsiaOceania5 and Africa5.

Regarding driving while drowsy, age was a significant factor in all regions ($p\text{-value} < 0.01$). In Europe20 and NorthAmerica2 young drivers reported the highest rates among age groups (29.4% and 35.1%, respectively) and also across regions, except for Africa5. Here, the strength of association was moderate (Cramer's V 0.17 and 0.21, respectively). In AsiaOceania5 young drivers reported the second highest rate (24.8%) slightly after the age group of 25-34 years (27.5%). In Africa5 young drivers also reported the second highest rate (26.3%), however, here, elderly drivers (65+ years) reported a much higher rate (46.0%) than all other age groups and regions.

For behaviours linked to distraction, age was a significant factor for talking on a hand-held mobile phone and for talking on a hand-free mobile phone while driving as well as for reading a text message/email or checking social media while driving in all regions ($p\text{-value} < 0.1$). For talking on a hand-held phone while driving, young drivers reported the highest rates amongst age groups in Europe20 (40.5%), NorthAmerica2 (51.7%) and AsiaOceania5 (40.7%). However, across regions young drivers reported the highest rate in Africa5 (52.7%), although for Africa5 this rate was the second lowest rate of all age groups. The strength of association with age is especially high in NorthAmerica2 (Cramer's V 0.21) and Europe20 (Cramer's V 0.21). For talking on a hand-free mobile phone while driving, young drivers reported the highest rate amongst age groups only in Europe20 (58.5%), while in NorthAmerica2 (58.4%), AsiaOceania5 (57.2%) and Africa5 (65.3%) they reported the third highest rates. Here, the strength of association with age was highest in NorthAmerica2 (Cramer's V 0.22). For reading a text message/email or checking social media while driving, young drivers reported the highest rate across regions in Africa5 (51.2%), however only in Europe20 young drivers reported the highest rate amongst age groups (43.0%). For NorthAmerica2 (50.8%), AsiaOceania5 (43.0%) as well as Africa5 the reported rates of young drivers were only second highest. A very strong association with age is observable for NorthAmerica2 (Cramer's V 0.33) and Europe20 (Cramer's V 0.32), whereas for AsiaOceania5 (Cramer's V 0.16) and Africa5 (Cramer's V 0.16) the association is only moderate.

SELF-DECLARED BEHAVIOUR AS A CAR DRIVER



Figure 1: Self-declared behaviours as a car driver in the past 30 days, by region and age.

3.1.2 Acceptability of unsafe traffic behaviours

For assessing the level of personal acceptability of behaviours, the respondents were asked to answer the question:

- How acceptable do you, personally, feel it is for a car driver to...?

The question was answered on a Likert scale from 1 (unacceptable) to 5 (acceptable). The percentages of acceptability (answers 4 or 5) are shown in the results. Here the results of the same nine items like in 3.1.1 are included.

Overall, results from Figure 2 show that the personal acceptability is very low towards driving while impaired by alcohol or drugs, driving while drowsy and driving while distracted, with the exception of talking on a hand-free mobile phone for which acceptability from participants is quite high. In addition, for these behaviours – except talking on a hand-held and hand-free mobile phone while driving – rates of acceptance in Europe20 and NorthAmerica2 are consistently lower than in AsiaOceania5 and Africa5 ($p\text{-value}<0.01$). For speeding, the rate of acceptance is higher than for driving while impaired, driving while drowsy or driving while distracted (except for talking on a hand-free mobile phone) especially in Europe20 and NorthAmerica2, but a majority of respondents still indicate speeding is personally unacceptable. The level of personal acceptability is lowest for speeding in built-up areas with greater acceptance for speeding outside built-up areas (excluding motorways/freeways) and even greater acceptance for speeding on motorways and freeways.

Results from Figure 2 also indicate that overall percentages of personal acceptability are much lower than the percentages of the correspondent self-declared behaviours (Figure 1), showing that a significant number of drivers engage in risky behaviours related to driving while potentially impaired, drowsy or distracted or speeding even if they consider the behaviour personally unacceptable.

Age is a significant factor in the reported personal acceptance of driving when potentially over the legal limit for drink-driving for all regions ($p\text{-value}<0.01$, Cramer's $V<0.11$). In Europe20 and NorthAmerica2, the rate for young drivers is highest of all age groups (4.5% and 3.8%, respectively). In AsiaOceania5 young drivers reported the second highest rate at 6.9%, which is the highest rate amongst regions for young drivers. The results for Africa5 differ in that young drivers have the second highest reported rate (5.2%), but the rate is highest for age group 65+ (12.4%).

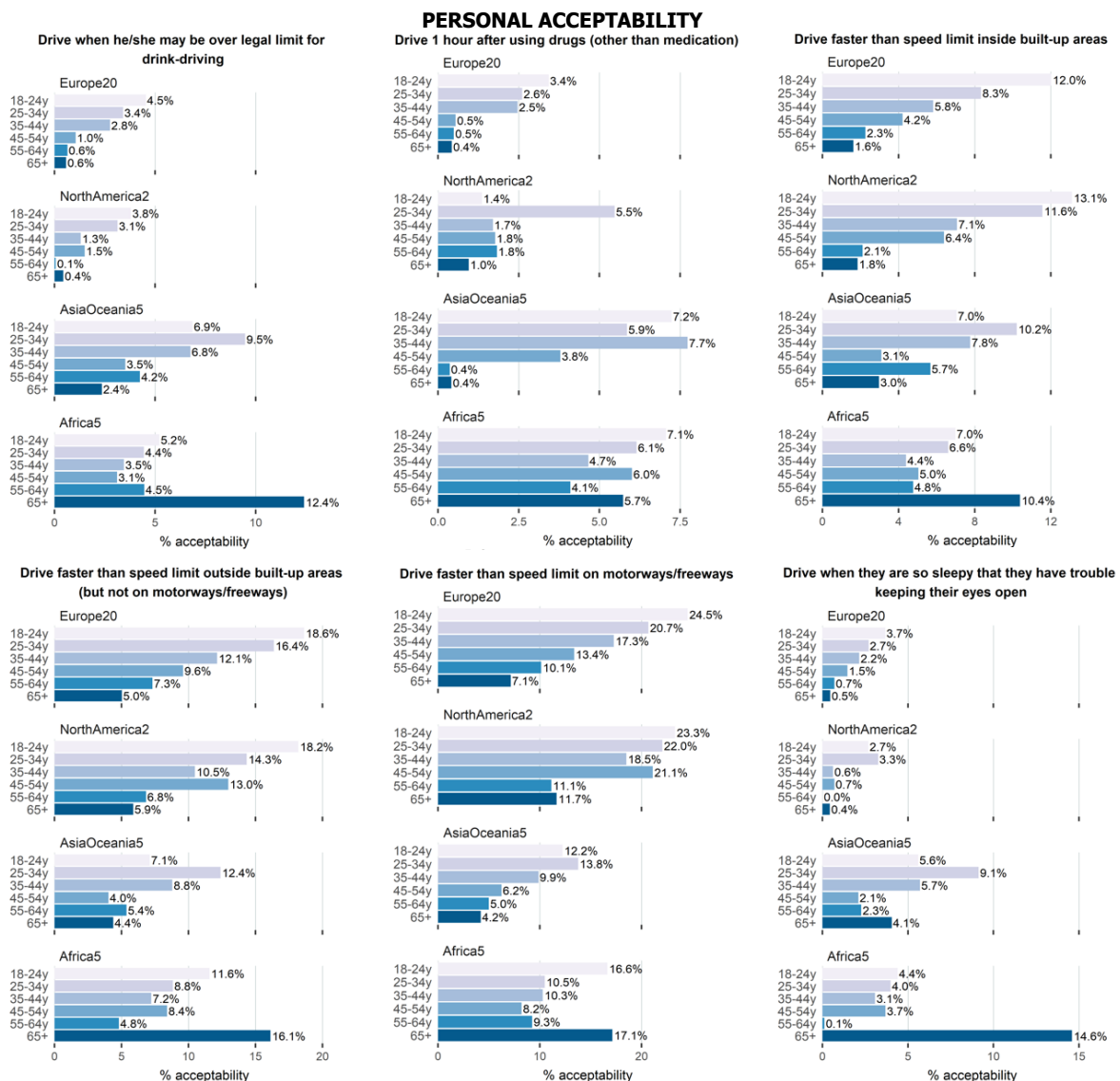
With regard to the personal acceptance of driving within one hour after consuming drugs, age was a significant factor in Europe20, NorthAmerica2 and AsiaOceania5 ($p\text{-value}<0.01$, Cramer's $V<0.13$). In Europe20 young drivers reported the highest rate (3.4%) of all age groups and in AsiaOceania5 young drivers reported the second highest rate (7.2%) of all age groups, but the highest across regions. However, in NorthAmerica2 the reported rate of young drivers (1.4%) was the second lowest. Like in Europe20, also in Africa5 young road users reported the highest rate (7.1%) of all age groups.

With regard to speeding behaviours, age was a significant factor across all regions and in all three environments (motorways, inside and outside built-up areas with $p\text{-value}<0.01$, Cramer's $V<0.15$). In all three environments young drivers reported the highest level of acceptance of all age groups in Europe20 and NorthAmerica2. For driving faster than the speed limit outside built-up areas and for driving faster than the speed limit on motorways/freeways, the reported rates from young drivers in Europe20 were also the highest across regions (18.6% and 24.5%, respectively). For driving faster than the speed limit inside built-up areas, the highest rate of young drivers across regions was reported in NorthAmerica2 (13.1%). For all three environments young drivers reported the second or third highest rates of all age groups in AsiaOceania5 (7.0% to 12.2%). In Africa5 young drivers reported the highest rates of all age groups (7.0% to 16.6%), except the age group of 65+ years. Overall, the lowest levels of acceptance for speeding amongst young drivers is inside built-up areas (7.0% to 13.1%), whereas the highest level of acceptance for speeding amongst young drivers is on motorways/freeways (12.2% to 24.5%).

For driving while drowsy, age was a significant factor in all regions ($p\text{-value}<0.01$, Cramer's $V<0.15$). In Europe20 young drivers reported the highest rate amongst age groups (3.7%), however the highest reported rate by young drivers across regions was reported in AsiaOceania5 (5.6%) although it was

only the third highest rate amongst age groups in this region. In NorthAmerica2 and Africa5 young drivers reported the second highest rate amongst age groups at 2.7% and 4.4%, respectively.

For behaviours with regard to distraction, age was a significant factor for talking on a hand-held mobile phone while driving, for talking on a hand-free mobile phone while driving as well as for reading a text message/email or checking social media while driving in all regions ($p\text{-value} < 0.1$). For all three behaviours, young drivers reported the highest rates amongst age groups in Europe20. For talking on a hand-held phone while driving, young drivers reported the highest rate amongst age groups also for NorthAmerica2 (16.6%) which was also the highest reported rate of young drivers across all regions. For NorthAmerica2, also the strength of association with age (Cramer's $V=0.21$) was highest across all regions. In Africa5 the reported rate of young drivers for talking on a hand-held phone while driving was the third highest amongst age groups (8.6%), with especially age group of 65+ reporting higher levels of acceptance for talking on a hand-held phone while driving. With respect to talking on a hand-free mobile phone while driving, besides Europe20, where young drivers reported the highest rate amongst age groups and across regions (43.7%), also young drivers in Africa5 (32.5%) reported the highest rate amongst age groups. In AsiaOceania5 they reported the second highest rate (18.4%) and in NorthAmerica2 they reported the third highest rate amongst age groups (42.0%). For reading a text message/email or checking social media while driving, besides Europe20 (4.9%), young drivers reported the highest rate amongst age groups also in NorthAmerica2 (5.3%) and AsiaOceania5 (9.7%). In Africa5 the reported rate of young drivers was fourth highest at 6.7%.



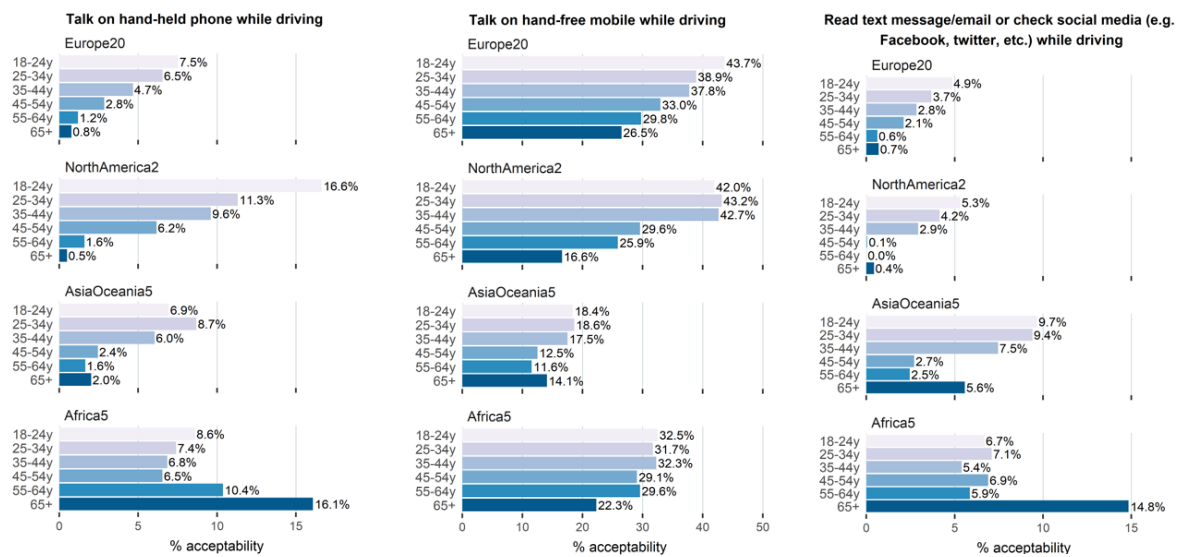


Figure 2: Acceptability of unsafe traffic behaviour, by region and age.

3.1.3 Attitudes towards unsafe behaviour in traffic

Attitudes towards unsafe behaviours concerning driving while impaired, driving while distracted or exceeding the speed limit were assessed by asking the level of agreement with statements related to 1) normative beliefs¹ and subjective norms², 2) behaviour beliefs and attitudes and 3) perceived behaviour control:

- Normative beliefs and subjective norms
 - 'Most of my friends would drive after having drunk alcohol'
 - 'Most of my friends would drive 20 km/h over the speed limit in a residential area'
- Behaviour Beliefs and attitudes
 - 'For short trips, one can risk driving under the influence of alcohol'
 - 'I have to drive fast; otherwise, I have the impression of losing time'
 - 'Respecting speed limits is boring or dull'
 - 'I use a mobile phone while driving, because I always want to be available'
 - 'To save time, I often use a mobile phone while driving'
- Perceived behavioural control (Self-efficacy)
 - 'I trust myself driving after having a glass of alcohol'
 - 'I have the ability to drive when I am a little drunk after a party'
 - 'I am able to drive after drinking a large amount of alcohol (e.g. a litre of beer or half a litre of wine)'
 - 'I trust myself when I drive significantly faster than the speed limit'
 - 'I am able to drive fast through a sharp curve'
 - 'I trust myself when I check my messages on the mobile phone while driving'
 - 'I have the ability to write a message on the mobile phone while driving'
 - 'I am able to talk on a hand-held mobile phone while driving'

¹ extent to which other people who are important to oneself think they should not perform a particular behaviour

² belief that an important person or group will approve a particular behaviour

Normative beliefs and subjective norms

With regard to the percentage of respondents who reported most of their friends would drive after drinking alcohol, age is a significant factor in Europe20 and AsiaOceania5 (p -value<0.01, Cramer's V <0.11), but not in NorthAmerica2 or Africa5. In Europe20 (12.6%), NorthAmerica2 (13.8%) and AsiaOceania5 (12.0%) the rate for young drivers is the highest of all age groups. In contrast, in Africa5 the reported rate for young drivers is second lowest of all age groups (9.4%).

Age is a significant factor in the percentage of respondents who reported most of their friends would drive 20 km/h over the speed limit in a residential area in all regions with the exception of Africa5 (p -value<0.01, Cramer's V <0.11). In Europe20 young drivers reported the highest rate amongst age groups (21.1%). In all other regions the reported rates of young drivers were second highest amongst age groups with a rate of 22.0% in NorthAmerica2, 16.7% in Africa5 and 27.0% in AsiaOceania5 and the latter being the highest reported rate of young drivers across all regions.

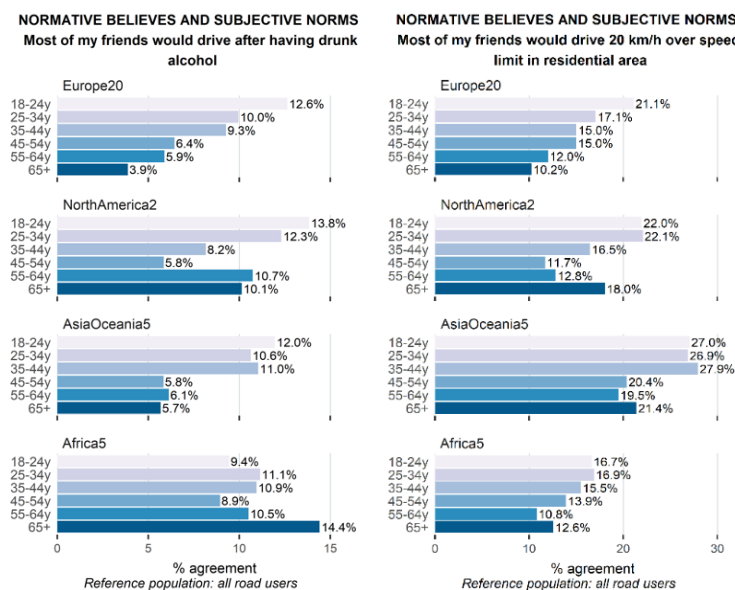


Figure 3: Normative beliefs and subjective norms, by region and age

Behaviour beliefs and attitudes

With respect to the percentage of respondents who declared one can risk driving under the influence of alcohol for short trips, age was a significant factor in all regions except Africa5 (p -value<0.01). In Europe20 (7.5%), NorthAmerica2 (6.8%) and AsiaOceania5 (9.9%) young drivers reported the highest rates of agreement amongst all age groups; with the latter being the highest reported rate of young drivers across all regions. In Africa5 young drivers reported the second highest rate of agreement amongst all age groups (7.5%). The strength of association with age was highest for NorthAmerica2 (Cramer's V =0.14) and Europe20 (Cramer's V =0.12).

Regarding exceeding the speed limit, the percentage of respondents who declared they have to drive fast to avoid the impression of losing time was significantly dependent on age in all regions (p -value<0.01, Cramer's V <0.20). In Europe20 and NorthAmerica2 young drivers reported the highest level of agreement with rates at 10.5% and 14.7%, respectively, with the latter rate being the highest rate of agreement across all regions. In AsiaOceania5 (9.2%) and Africa5 (11.5%) young drivers reported the second highest level of agreement.

With regard to the percentage of respondents who reported respecting speed limits boring or dull, age was a significant factor in Europe20, AsiaOceania5 and Africa5 but not in NorthAmerica2 (p -value<0.01, Cramer's V <0.11). Again, young drivers reported the highest level of agreement amongst age groups and also across regions in Europe20 (17.1%) and NorthAmerica2 (11.1%). In AsiaOceania5 and Africa5 young drivers reported the third highest rate amongst age groups (10.4% and 9.8%, respectively).

Regarding the percentage of respondents who reported using a mobile phone while driving because they always want to be available, age was a significant factor in Europe20 and NorthAmerica2, but not in AsiaOceania5 and Africa5 (p -value<0.01). Young drivers reported the highest level of agreement amongst age groups only in Europe20 (7.9%). In NorthAmerica2 young drivers reported the second highest rate (8.3%), although the strength of association with age was highest across regions (Cramer's $V=0.14$). In Africa5 young drivers reported the third highest rate (10.0%) amongst age groups and in AsiaOceania5 young drivers even reported the lowest level of agreement amongst age groups (5.6%).

Age was a significant factor in the percentage of respondents who declared often using a mobile phone while driving to save time in all regions (p -value<0.01). Europe20 is the only region where young drivers reported the highest level of agreement amongst all age groups (7.6%). In NorthAmerica2 and AsiaOceania5 young drivers reported the third highest rates amongst age groups (8.5% and 7.5%, respectively). In Africa5 young drivers reported the fourth highest rates amongst age groups (8.5%), however together with NorthAmerica2, this was the highest level of agreement reported from young drivers across regions.

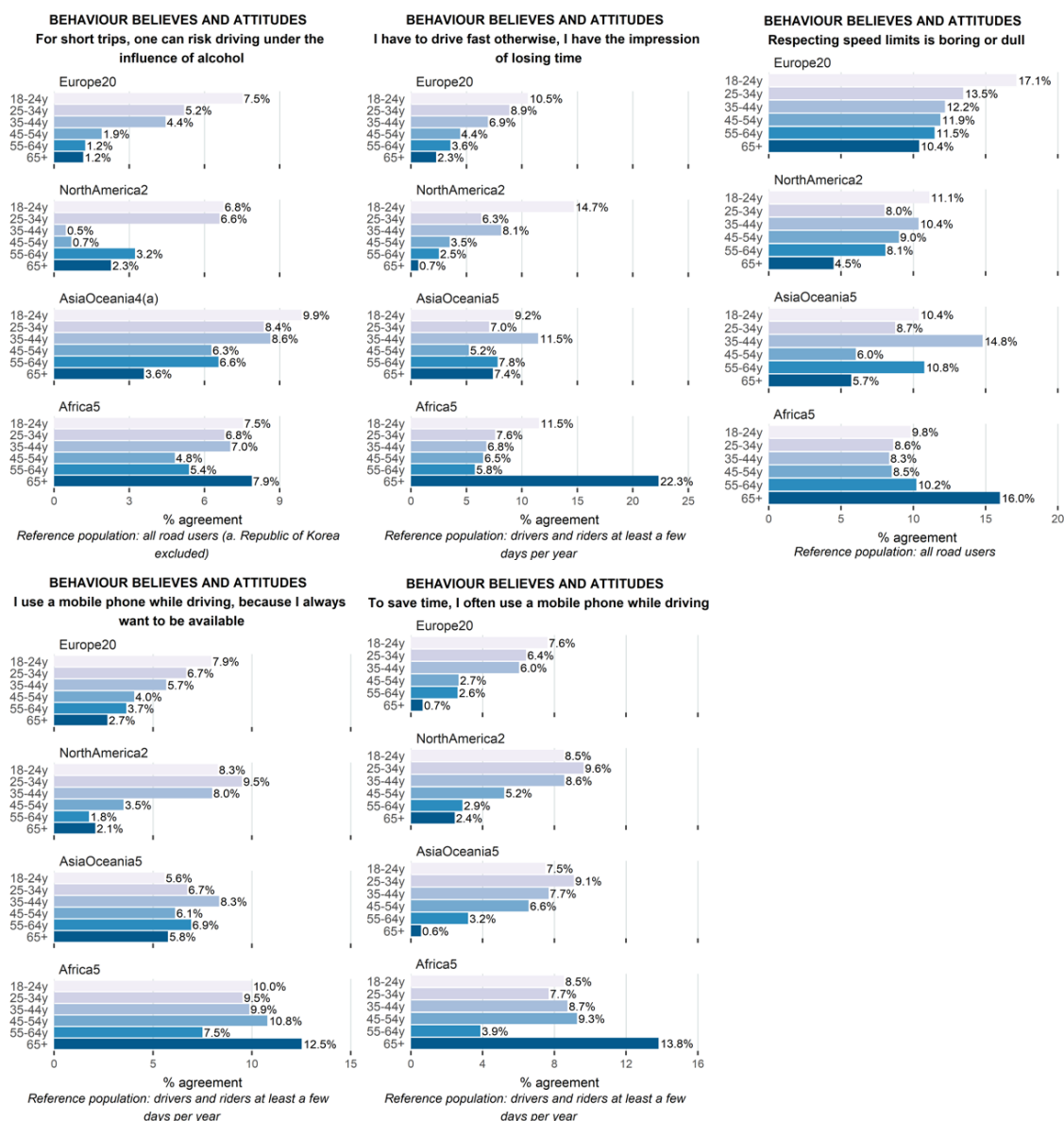


Figure 4: Behaviour beliefs and attitudes, by region and age.

Perceived behavioural control (Self-efficacy)

With regard to the percentage of respondents who declared trusting themselves when driving after drinking alcohol, age was a significant factor in Europe20 and Africa5 ($p\text{-value}<0.01$, Cramer's $V<0.07$). In Europe20 young drivers reported the highest level of agreement amongst age groups and also across regions (16.1%). In AsiaOceania5 young drivers reported the third highest rate amongst age groups (7.5%), but the lowest across regions. However, in NorthAmerica2 (13.7%) and Africa5 (9.7%) young drivers reported the lowest and second lowest level of agreement amongst age groups.

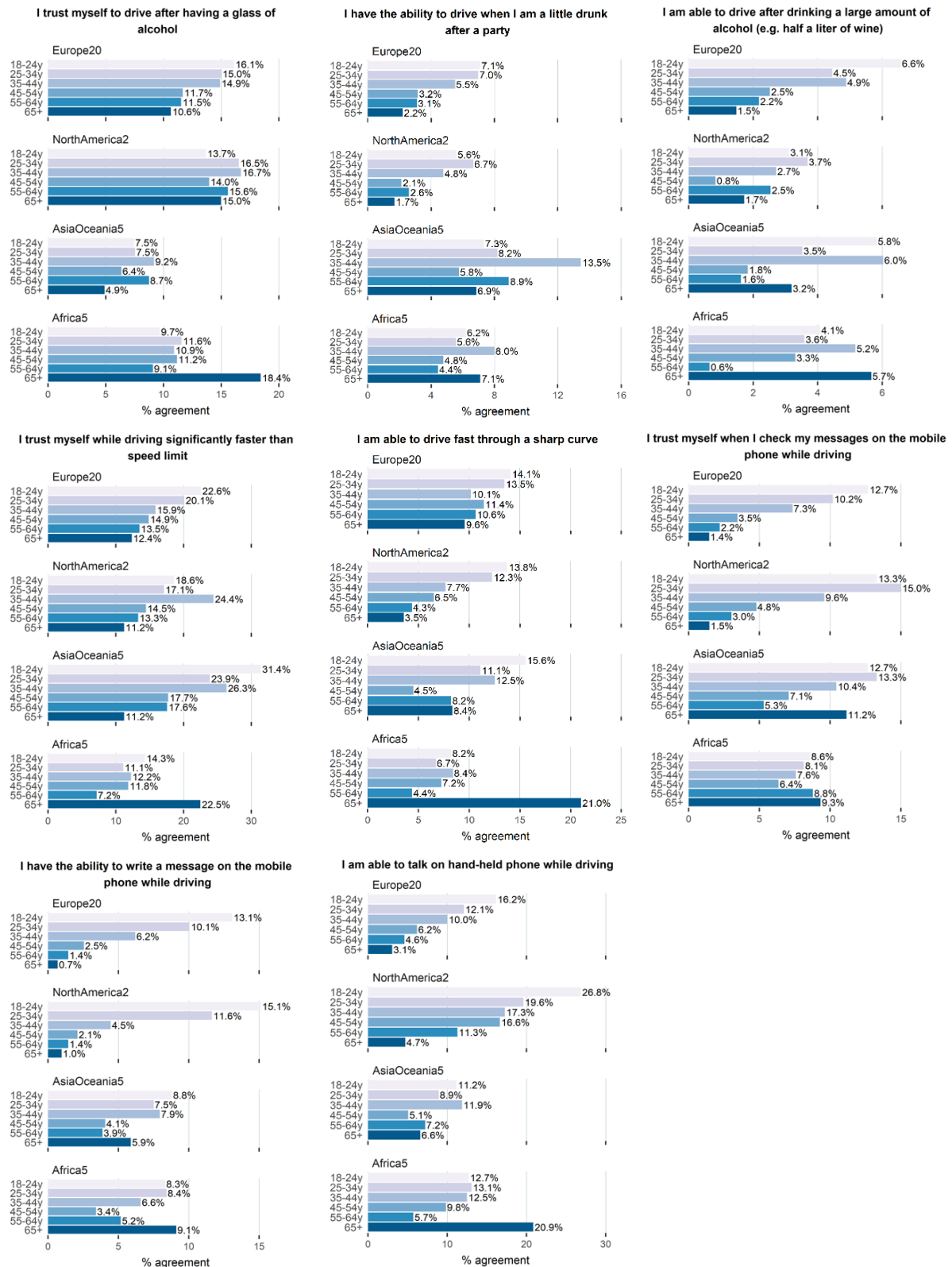
Regarding driving when a little drunk after a party, age was a significant factor in all regions except Africa5 ($p\text{-value}<0.01$, Cramer's $V<0.10$). In Europe20 young drivers reported the highest level of agreement amongst age groups (7.1%), in NorthAmerica2 they reported the second highest rate amongst age groups (5.6%). In AsiaOceania5 young drivers reported the highest rate across regions (7.3%), however this was only the fourth highest rate amongst age groups in this region. The reported rate of young drivers in Africa5 was the third highest amongst age groups (6.2%).

For the ability to drive after drinking a large amount of alcohol, age was a significant factor in all regions, except NorthAmerica2 ($p\text{-value}<0.01$, Cramer's $V<0.10$). Young drivers reported the highest rate amongst age groups and across regions in Europe20 (6.6%) and the second highest amongst age groups in AsiaOceania5 (5.6%) and NorthAmerica2 (3.1%). In Africa5 young drivers reported the third highest level of agreement amongst age groups (4.1%).

With regard to the speeding related behaviours, age was a significant factor in all regions for the declaration of trust in the ability for exceeding the speed limit ($p\text{-value}<0.01$, Cramer's $V<0.15$) and for the ability of driving fast through a sharp curve ($p\text{-value}<0.01$, Cramer's $V<0.14$). Regarding the declaration of trust in the ability for exceeding the speed limit, young drivers reported the highest rate amongst age groups in Europe20 (22.6%) and AsiaOceania5 (31.4%), with the latter being also the highest rate across regions. In NorthAmerica2 (18.6%) and Africa5 (14.3%) young drivers reported the second highest level of agreement. For the ability of driving fast through a sharp curve, young drivers reported the highest level of agreement amongst age groups in Europe20 (14.1%), NorthAmerica2 (13.8%) and AsiaOceania5 (15.6%), with the latter again being the highest level of agreement across regions. In Africa5 young drivers reported the third highest rate amongst age groups (8.2%).

For behaviours with regard to distraction, age was a significant factor in all regions for the ability to write a message on the mobile phone while driving ($p\text{-value}<0.01$, Cramer's $V<0.24$), for the ability to talk on a hand-held mobile phone while driving ($p\text{-value}<0.01$, Cramer's $V<0.19$) and – except for Africa5 – for the declaration of self-trust when checking messages on the mobile phone while driving ($p\text{-value}<0.01$, Cramer's $V<0.20$). For the ability to write a message on the mobile phone while driving, young drivers reported the highest rates amongst age groups in Europe20 (13.1%), AsiaOceania5 (8.8%) and NorthAmerica2 (15.1%), with the latter being also the highest level of agreement across regions. In Africa5 young drivers reported the third highest rate amongst age groups (8.3%). For the ability to talk on a hand-held mobile phone while driving, young drivers reported the highest level of agreement across regions in NorthAmerica2 (26.8%), which was also the highest level of agreement amongst age groups in this region. In Europe20 the level of agreement of young drivers was also highest amongst age groups (16.2%); in AsiaOceania5 (11.2%) it was the second highest and in Africa5 (12.7%) it was the third highest. For the declaration of self-trust when checking messages on the mobile phone while driving, Europe20 is the only region where the level of agreement of young drivers was highest amongst age groups (12.7%). In NorthAmerica2 (13.3%) and AsiaOceania5 (12.7%) young drivers reported the second highest rates amongst age groups, in Africa5 (8.6%) they reported the third highest level of agreement amongst age groups.

PERCEIVED BEHAVIOUR CONTROL (SELF-EFFICACY)



Reference population: drivers and riders at least a few days per year

Figure 5: Perceived behavioural control, by region and age

3.1.4 Risk perception

For assessing the risk perception of driving while impaired, drowsy or distracted and speeding, participants were asked *'How often do you think each of the following factors is the cause of a road crash involving a car?'* Several items related to risky behaviours while driving a car were included:

- 'driving after drinking alcohol'
- 'driving after taking drugs (other than medication)'
- 'driving faster than the speed limit'
- 'driving while tired'
- 'using a hand-held mobile phone while driving'
- 'using a hands-free mobile phone while driving'

The scale of answer ranged from 1 (never) to 6 ((almost) always). The percentages of often/frequently (answers 4 to 6) are shown in the results.

Results from Figure 6 overall indicate that all of the six respective items (except using a hand-free mobile phone while driving) are more likely reported as factors in road car crashes by respondents from Europe20 and NorthAmerica2 than by respondents from AsiaOceania5 and Africa5 (p-value<0.01, Cramer's V ranging from 0.04 (using a hand-free mobile phone while driving) to 0.22 (driving after drinking alcohol)).

With regard to alcohol, age was a significant factor in all regions with the exception of Africa5 (p-value<0.01, Cramer's V<0.12). In Europe20 young drivers reported the lowest rate of agreement amongst age groups (74.4%) and in NorthAmerica2 young drivers reported the second lowest agreement amongst age groups (69.3%). However, in AsiaOceania5 young drivers reported the highest rate of agreement amongst age groups (58.8%), but the lowest across regions.

For driving after taking drugs, age was a significant factor in all regions with the exception of AsiaOceania5 (p-value<0.01, Cramer's V<0.16). In Europe20 and NorthAmerica2 young drivers reported the lowest rate of agreement amongst age groups (63.5% and 57.8%, respectively), while in AsiaOceania5 young drivers again reported the highest rate amongst age groups (53.2%), but the lowest across regions. In Africa5 young drivers reported the second lowest rate of agreement amongst age groups (60.3%).

Regarding driving faster than the speed limit, age was again a significant factor in all regions except of AsiaOceania5 (p-value<0.01, Cramer's V<0.12). In Europe20 and NorthAmerica2 young drivers reported the lowest rates of agreement amongst age groups (66.9% and 64.8%, respectively). In Africa5 young drivers reported the third lowest rate amongst age groups (65.7%). However, in AsiaOceania5 young drivers reported the third highest rate amongst age groups (57.1%), but the lowest across regions.

For driving while tired, age was a significant factor in all regions (p-value<0.01, Cramer's V<0.13). In Europe20 and NorthAmerica2 young drivers reported the lowest rate of agreement amongst age groups (65.4% and 60.2%, respectively). In Africa5 and AsiaOceania5 young drivers reported the second lowest rate amongst age groups (60.8% and 51.5%, respectively).

Regarding using a hand-held mobile phone while driving, age was also a significant factor in all regions (p-value<0.01, Cramer's V<0.14). Europe20 is the only region in which young drivers reported the lowest rate of agreement amongst age groups (66.3%). In NorthAmerica2 (66.4%) and Africa5 (56.4%) young drivers reported the second lowest rates amongst age groups. In AsiaOceania5 however, young drivers reported the highest level of agreement amongst age groups (57.7%), but the lowest across regions.

For using a hand-free mobile phone while driving, age was a significant factor in Europe20, NorthAmerica2 and Africa5, but not in AsiaOceania5 (p-value<0.01, Cramer's V<0.21). In Europe20 (39.2%), Africa5 (43.8%) and NorthAmerica2 (30.7%) young drivers reported the lowest rate of agreement amongst age groups, with the latter being also the lowest rate across regions. In AsiaOceania5 young drivers reported the third lowest level of agreement amongst age groups (48.2%).

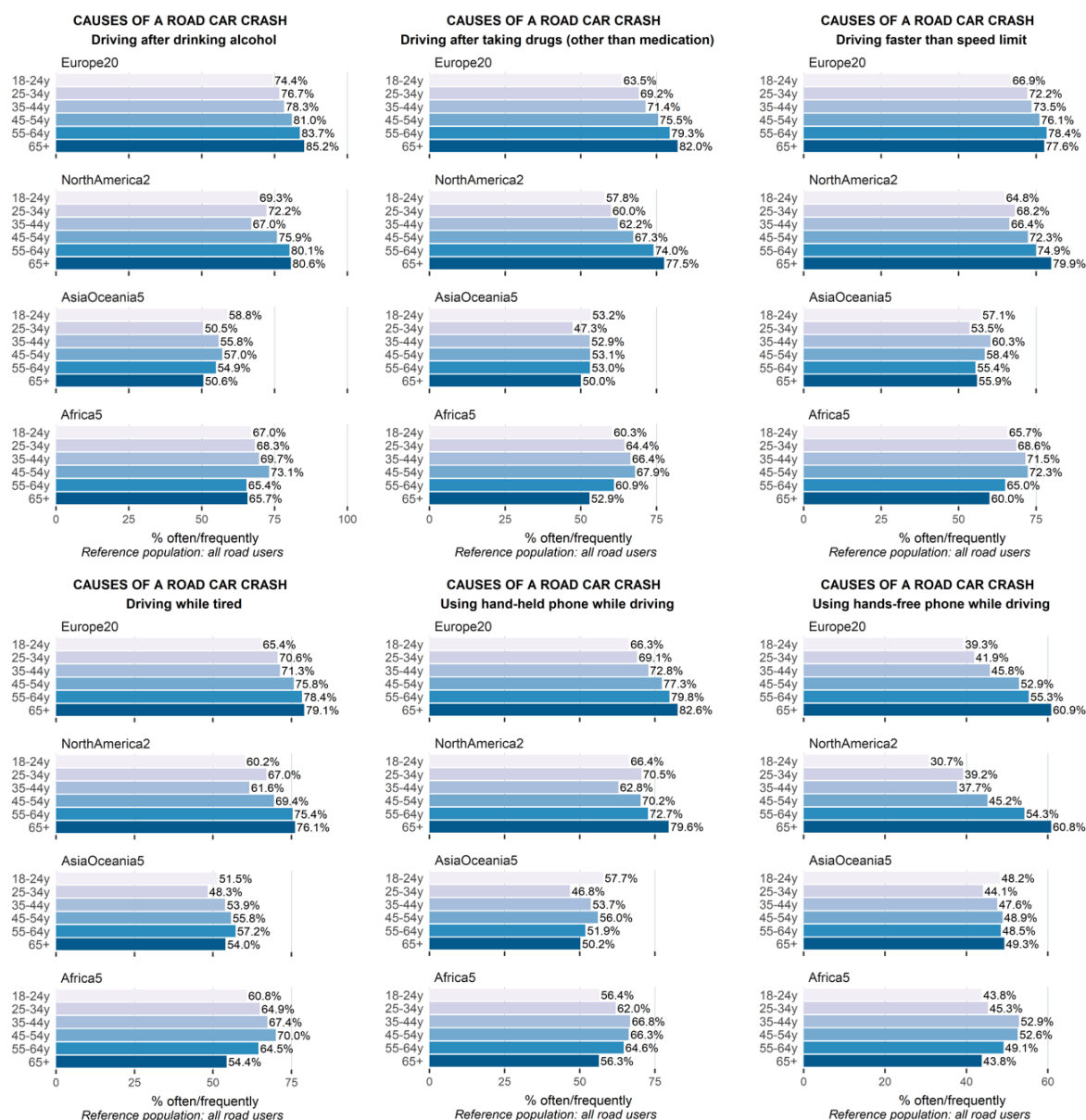


Figure 6: Risk perception of driving, by region and age.

3.1.5 Support for policy measures

The support for policy measures was assessed by asking 'Do you oppose or support a legal obligation to ...?' Six items concerning impaired or distracted driving, or exceeding the speed limit were included:

- ...install an alcohol "interlock" for drivers who have been caught drunk driving on more than one occasion (technology that won't let the car start if the driver's alcohol level is over the legal limit);
- ...have zero tolerance for alcohol for novice drivers (licence obtained less than 2 years);
- ...have zero tolerance for alcohol for all drivers;
- ...install intelligent Speed Assistance (ISA) in new cars (which automatically limits the maximum speed of the vehicle and can be turned off manually);
- ...install Dynamic Speed Warning signs (traffic control devices that are programmed to provide a message to drivers exceeding a certain speed threshold).

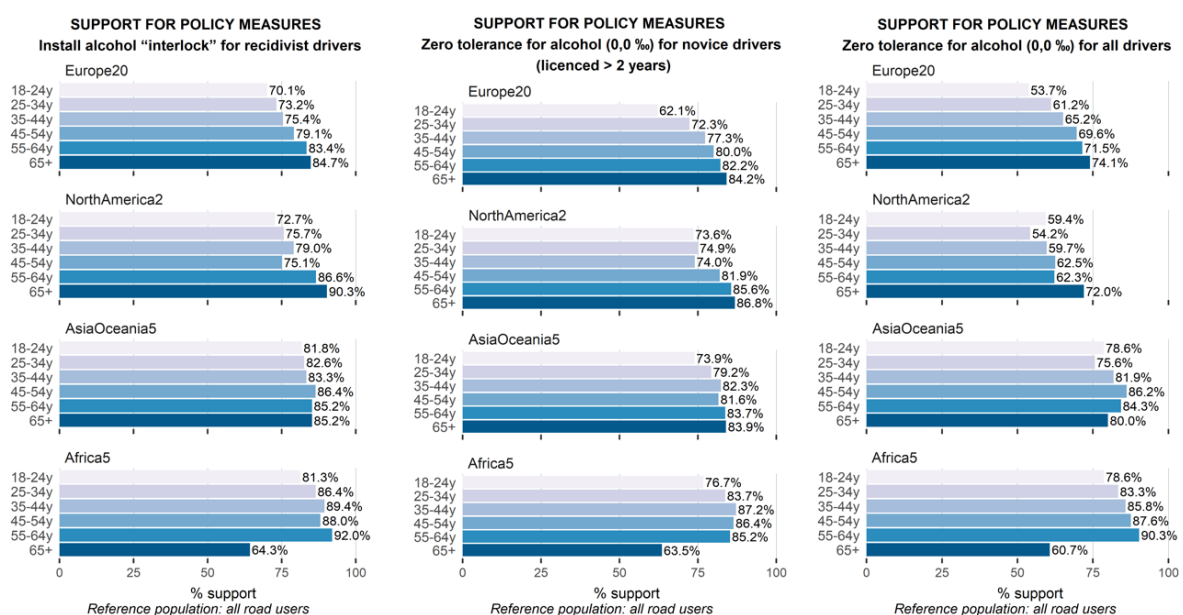
- ...have zero tolerance for using any type of mobile phone while driving (hand-held or hands-free) for all drivers?

All questions were answered on a Likert scale from 0 (oppose) to 5 (support) – the percentages of 'support' (answers 4 to 5) are presented in the results.

Results from Figure 7 overall show a high level of support for policy measures aimed at reducing alcohol related impaired driving. However, there is a general trend in Europe20, NorthAmerica2 and AsiaOceania5 in lower rates of support the younger the age groups, with young drivers being among the least if not the least supportive: Whereas in all three regions young drivers reported the lowest support rates amongst age groups for installing alcohol 'interlocks' for recidivist drivers and for zero tolerance for alcohol for novice drivers, with regard to zero tolerance for alcohol for all drivers, only in Europe20 young drivers reported the lowest rate (53.7%), while in NorthAmerica2 (59.4%) and AsiaOceania5 (78.6%) young drivers reported the second lowest rates. In Africa5 young drivers reported the lowest support rates except for elderly drivers (65+) whose rates are much lower than those of the other age groups for all three alcohol related policy measures. Age was a significant factor for all three alcohol related policy measures and regions, except for the support of alcohol interlock devices in AsiaOceania5 (p -value<0.01, Cramer's V <0.18).

With regard to policy measures aimed at speeding, age was a significant factor in all regions except NorthAmerica2 (p -value<0.01, Cramer's V <0.19). For the installation of dynamic speed warning signs, young drivers reported the lowest support rates amongst age groups in AsiaOceania5 (75.6%) and the second lowest in Europe20 (59.9%), Africa5 (80.6%) and NorthAmerica2 (52.8%), with the latter being the lowest across regions. Regarding the installation of Intelligent Speed Assistance (ISA) in new cars, again in AsiaOceania5 young drivers reported the lowest rates of support amongst age groups (74.2%) and the second lowest in Europe20 (53.3%) and Africa5 (74.6%). However, in NorthAmerica2 young drivers reported the third highest rate of support (45.8%), but the lowest across regions.

Regarding zero tolerance for using any type of mobile phone while driving, age was a significant factor in all regions (p -value<0.01, Cramer's V <0.18). In Europe20 and AsiaOceania5 young drivers reported the lowest rate of support amongst age groups (41.1% and 61.6%, respectively). In NorthAmerica2 (43.9%) and Africa5 (49.6%) young drivers reported the second lowest rate amongst age groups, with elderly drivers (65+) in Africa5 – as also for all other policy measures – reporting by far the lowest support amongst age groups.



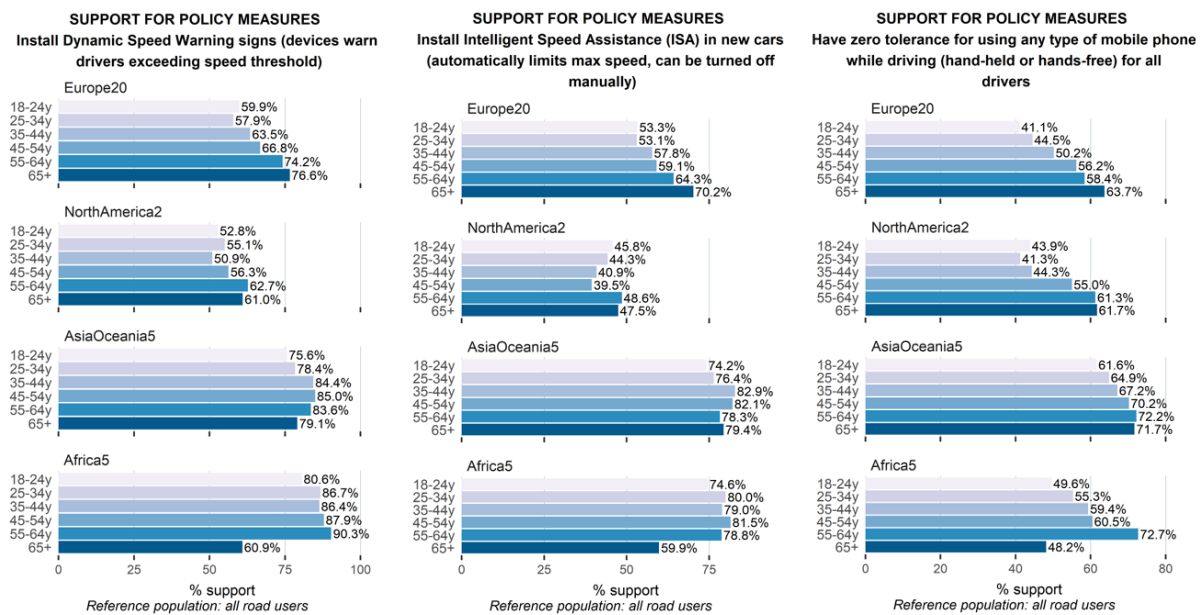


Figure 7: Support for policy measures, by region and age.

3.1.6 Traffic rules and penalties

Opinions on rules and penalties concerning the use of driving under the influence of alcohol, driving while distracted (using a mobile phone) and driving faster than the speed limit were assessed by asking if participants agree/disagree with three statements:

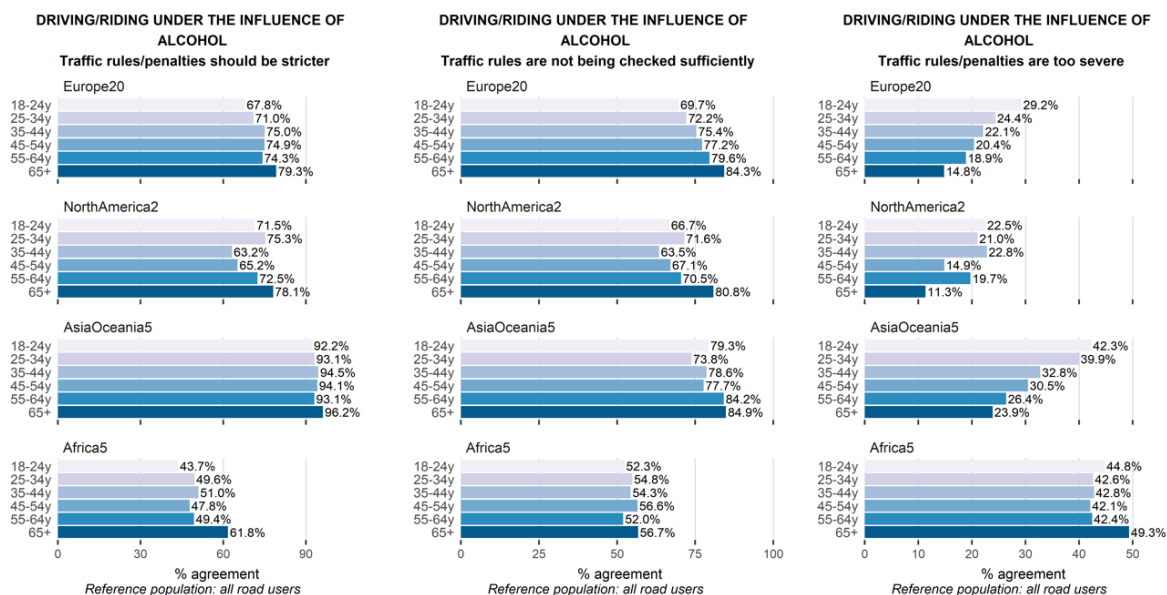
- 'traffic rule/penalties should be stricter'
- 'traffic rules/penalties are too severe'
- 'traffic rules are not being checked sufficiently'

Results from Figure 8 show that with regard to driving under the influence of alcohol, the majority of respondents in all regions agree that especially traffic rules should be stricter, and that they are not being checked sufficiently. Young drivers are less likely to be in agreement (p -value<0.01, Cramer's V <0.13), with the exception of AsiaOceania5 and the question pertaining to rules should be stricter, where the age differences – although young drivers reported the lowest agreement amongst age groups – were not statistically significant, and Africa5 and the question pertaining to the traffic rules not being checked sufficiently. Rates of agreement for young drivers ranged from 43.7% to 92.2% with the lowest rates of agreement from Africa5. On the other hand, only a minority agree that traffic penalties related to alcohol are too severe and respondents from Europe20 and NorthAmerica2 are less likely to agree with this statement (p -value<0.01, Cramer's V <0.20). Here, age is a significant factor in all regions except Africa5 and young drivers had the highest rate of agreement amongst age groups in Europe20 (29.2%) and AsiaOceania5 (42.3%), and the second highest rate in NorthAmerica2 (22.5%) and Africa5 (44.8%).

With regard to speeding, overall, a very high majority of respondents in AsiaOceania5 (90.6% overall) reported that traffic rules and penalties with respect to speeding should be stricter; while in Europe20 (57.4% overall), NorthAmerica2 (47.6% overall) and Africa5 (47.0% overall) only a much lower share of respondents agreed. Age was a significant factor in Europe20 and Africa5 (p -value<0.01, Cramer's V <0.08) and young drivers reported the lowest level of agreement amongst age groups with rates of 50.5% and 42.5%, respectively. Moreover, a majority of drivers in all regions reported that the rules with regard to speeding are not being checked sufficiently. Here, age was a significant factor in Europe20, AsiaOceania5 and NorthAmerica2, but young drivers reported the lowest rate of agreement

amongst age groups only in Europe20 (58.6%) and Africa5 (48.6%), while they reported the second lowest rate amongst age groups in AsiaOceania5 (73.9%) and the third lowest rate in NorthAmerica2 (60.1%). On the other hand, only a minority in all regions agreed that traffic penalties related to speeding are too severe, however in Europe20 and NorthAmerica2 the percentage of respondents that agreed was higher than for traffic rules with respect to alcohol and the use of the mobile phone while driving. Here, age was a significant factor in all regions and young drivers reported the highest rates of agreement amongst age groups in Europe20 (40.6%) and NorthAmerica2 (37.3%) and the second highest rates amongst age groups in AsiaOceania5 (40.4%) and Africa5 (48.6%).

For using a mobile phone while driving, the majority of respondents in all regions agree that traffic rules should be stricter, and that they are not being checked sufficiently. Regarding the question pertaining rules to be stricter, overall higher levels of agreement are observable for Europe20, AsiaOceania5 and NorthAmerica2 than for Africa5 (p -value<0.01, Cramer's V <0.27) and especially in AsiaOceania5 a very high majority of respondents (92.0% overall) reported that traffic rules and penalties with respect to using a mobile phone while driving should be stricter. Age was a significant factor in all regions except for AsiaOceania5 (p -value<0.01, Cramer's V <0.15) and young drivers reported the lowest levels of agreements in Europe20 (63.5%), NorthAmerica2 (57.3%) and Africa5 (46.5%). With respect to the question pertaining to the traffic rules not being checked sufficiently, similarly, overall higher levels of agreement are observable for Europe20, AsiaOceania5 and NorthAmerica2 than for Africa5 (p -value<0.01, Cramer's V <0.21). Age was a significant factor in all regions except for Africa5 (p -value<0.01, Cramer's V <0.18), but young drivers reported the lowest level of agreement amongst age groups only in Europe20 (72.3%). In NorthAmerica2 (72.2%), AsiaOceania5 (79.1%) and Africa5 (52.3%) they reported the third lowest rate. On the other hand, only a minority of respondents in all regions – but especially in Europe20 (22.6% overall) and NorthAmerica2 (20.1% overall) – agreed that the traffic rules on mobile phone use while driving are too severe. Here, age was a significant factor in all regions (p -value<0.01, Cramer's V <0.12) and young drivers reported the highest rates of agreement amongst age groups in Europe20 (30.6%), NorthAmerica2 (28.9%) and AsiaOceania5 (41.3%) and the second highest rate in Africa5 (49.5%).



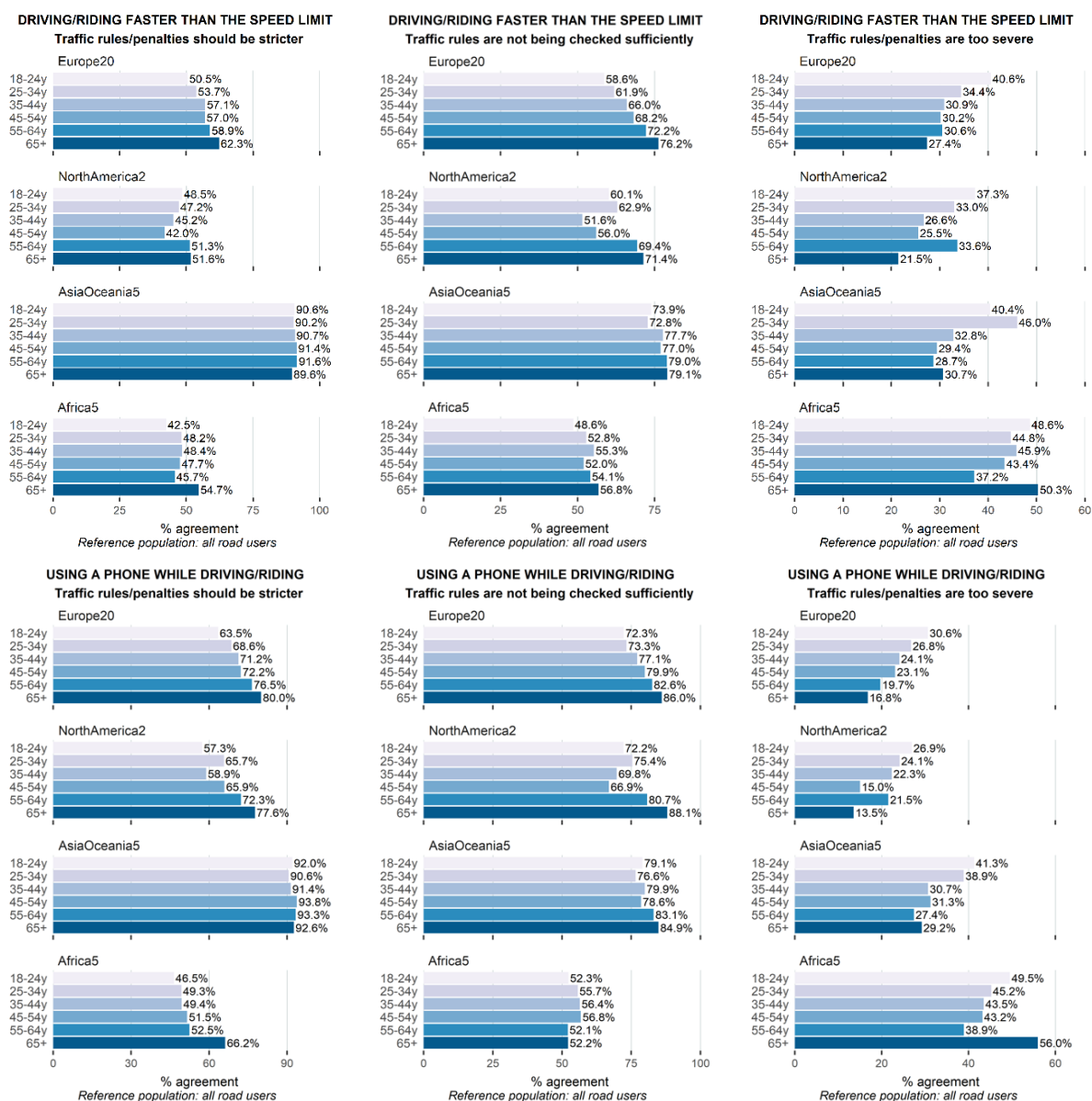


Figure 8: Opinions on traffic rules and penalties, by region and age.

3.2 Advanced analyses

To further investigate possible differences between young road users and the age group of 25 years and older 1) differences in the perception of the interaction between road users between young road users and all other age groups and 2) differences regarding the influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour of young car-drivers compared to all other age groups were analyzed.

Regarding differences in the perception of the interaction between road users between young road users and all other age groups, we analyse whether people perceive the interaction between road users as aggressive, helpful, harsh or considerate. These questions were posed as bonus questions by nine European countries, i.e., Austria, Switzerland, Germany, Denmark, Greece, Finland, Ireland, Italy and Hungary. The exact wording of the bonus question is "I perceive the interaction between road users in general as – aggressive/helpful/harsh/considerate". Answers can be given on a Likert scale from 1 to 5, where 1 means "strongly disagree" and 5 means "strongly agree".

In order to compare the perception of young road users between 18 and 24 years to the remaining age group, i.e., 25 years and older, we calculate the arithmetic mean of each of these 4 variables, separately for both age groups and for each country. We weighted the data set using a weighting factor based on the gender and age distribution in the respective country retrieved from the UN population statistics (variable IndividualCountryWeight, see Appendix 2). The means are plotted in Figure 9.

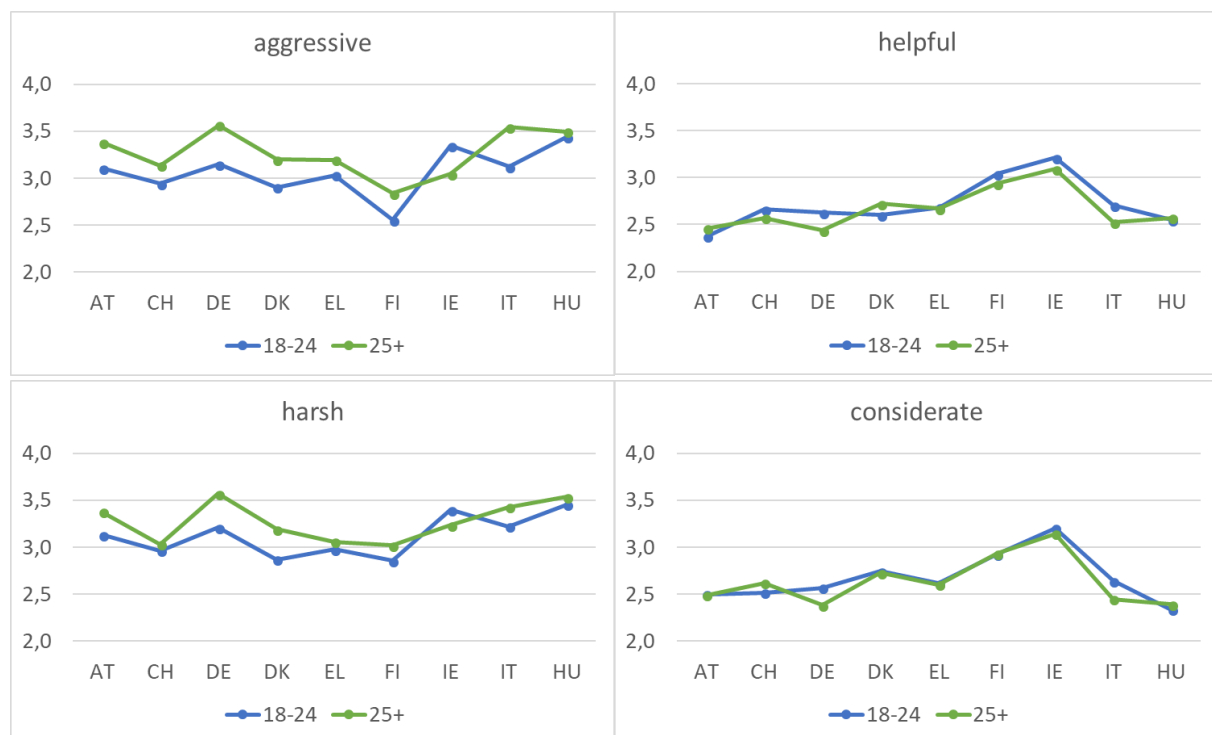


Figure 9: perception of interaction between European road users, means of different age groups, separately for each country.

The figure shows that road users aged 25 and older typically perceive the interaction between road users as more aggressive and harsher than young road users. The situation for the remaining two

features is not as distinct, the means are very similar throughout. Only in Germany (DE) and Italy (IT), young road users perceive the interaction as more helpful and more considerate.

We compared the arithmetic means of the two age groups in each country for all the 4 different variables using a t-test with Welch correction and a level of significance of 0,05. To adjust for multiple testing, p-values are corrected using Bonferroni-Holm. The results are shown in Table 3 up to Table 6.

We see in Table 3 that the difference in means is significant on the level 0.05 for Austria, Germany and Italy. In these three countries, road users in the age group '25+' perceive the interaction between road users as more aggressive than young road users. Road users in Austria, Germany and Denmark being 25 and older additionally perceive the interaction as more harsh than young road users (see Table 5). Road users in Germany in the age group '25+' perceive the interaction as less helpful and less considerate (the difference being significant as shown in Table 4 and Table 6). These findings show that road users in Germany being 25 and older perceive the interaction more negative than young road users (all the four means are significantly different).

Table 3: Perception of interaction between European road users being aggressive: comparison of means for different age groups. separately for each country.

Country	Age	N	Mean	Std. Deviation	p-value	Adj. p-value
AT	18-24	196	3.1071	1.09252	0.001	0.004
	25+	1351	3.3812	1.11776		
CH	18-24	103	2.9417	1.07398	0.091	0.364
	25+	723	3.1355	1.13049		
DE	18-24	183	3.1475	1.10696	0.000	0.000
	25+	1307	3.5662	1.09399		
DK	18-24	113	2.9027	1.29535	0.024	0.072
	25+	633	3.1991	1.14386		
EL	18-24	91	3.0330	1.15903	0.207	0.828
	25+	893	3.1948	1.15021		
FI	18-24	103	2.5534	1.10016	0.015	0.060
	25+	636	2.8396	1.05266		
IE	18-24	118	3.3475	1.24980	0.014	0.056
	25+	797	3.0439	1.12278		
IT	18-24	81	3.1235	1.35446	0.009	0.036
	25+	638	3.5423	1.21887		
HU	18-24	104	3.4423	1.10451	0.634	1.000
	25+	691	3.4978	1.12980		

Table 4: Perception of interaction between European road users being helpful: comparison of means for different age groups, separately for each country.

Country	Age	N	Mean	Std. Deviation	p-value	Adj. p-value
AT	18-24	196	2.3724	.96026	0.235	0.470
	25+	1351	2.4597	.94734		

CH	18-24	103	2.6602	1.02473	0.400	1.000
	25+	723	2.5698	.95699		
DE	18-24	183	2.6284	.93976	0.011	0.022
	25+	1307	2.4392	.93834		
DK	18-24	113	2.6018	1.08183	0.271	0.542
	25+	633	2.7220	.96215		
EL	18-24	91	2.6813	1.08402	0.922	1.000
	25+	893	2.6697	1.01753		
FI	18-24	103	3.0388	1.05647	0.367	0.734
	25+	636	2.9387	.95291		
IE	18-24	118	3.2119	1.25304	0.317	0.634
	25+	797	3.0903	1.02328		
IT	18-24	81	2.7037	1.21906	0.207	0.368
	25+	638	2.5219	1.15868		
HU	18-24	104	2.5481	1.02284	0.826	1.000
	25+	691	2.5716	.98482		

Table 5: Perception of interaction between European road users being harsh: comparison of means for different age groups, separately for each country.

Country	Age	N	Mean	Std. Deviation	p-value	Adj. p-value
AT	18-24	196	3.1328	1.08734	0.004	0.012
	25+	1351	3.3745	1.09290		
CH	18-24	103	2.9612	1.00900	0.515	1.000
	25+	723	3.0318	1.15806		
DE	18-24	183	3.2077	1.04332	0.000	0.000
	25+	1307	3.5677	1.05904		
DK	18-24	113	2.8673	1.15345	0.006	0.024
	25+	633	3.1927	1.10127		
EL	18-24	91	2.9780	1.18301	0.533	1.000
	25+	893	3.0594	1.16366		
FI	18-24	103	2.8544	1.03287	0.132	0.396
	25+	636	3.0204	1.03386		
IE	18-24	118	3.3983	1.22048	0.168	0.504
	25+	797	3.2346	1.02059		
IT	18-24	81	3.2222	1.11803	0.122	0.366
	25+	638	3.4295	1.19676		
HU	18-24	104	3.4519	1.15649	0.483	1.000
	25+	691	3.5369	1.10454		

Table 6: Perception of interaction between European road users being considerate: comparison of means for different age groups, separately for each country.

Country	Age	N	Mean	Std. Deviation	p-value	Adj. p-value
AT	18-24	196	2.5000	.99486	0.873	0.873
	25+	1351	2.4878	1.01527		
CH	18-24	103	2.5146	1.02770	0.338	1
	25+	723	2.6183	.99070		
DE	18-24	183	2.5683	1.01877	0.022	0.022
	25+	1307	2.3803	1.02272		
DK	18-24	113	2.7434	1.11627	0.871	0.871
	25+	633	2.7251	.97449		
EL	18-24	91	2.6154	.97490	0.897	1
	25+	893	2.6013	1.05567		
FI	18-24	103	2.9223	1.12624	0.943	0.943
	25+	636	2.9308	.99365		
IE	18-24	118	3.2034	1.20227	0.598	0.634
	25+	797	3.1418	1.03517		
IT	18-24	81	2.6420	1.25806	0.184	0.368
	25+	638	2.4451	1.16973		
HU	18-24	104	2.3365	.95135	0.581	1
	25+	691	2.3922	.98593		

Additionally, we analysed if there is an influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour of car-drivers in Europe. And if the type of influence is different between young European car drivers and the remaining group. We weighted the dataset according to the weighting variable Europe20.

To tackle this task, we fitted linear models. The dependent variable was the self-declared behaviour described in chapter '3.1.1 Self-declared unsafe behaviours in traffic'. We focused on fast driving and used the variables 'drive faster than the speed limit inside built-up areas', 'drive faster than the speed limit outside built-up areas (except motorways/freeways)' and 'drive faster than the speed limit on motorways/freeways. These variables are measured on a Likert scale from 1 (never) to 5 (almost always) and are highly correlated. To not fit three separate models, we used the mean of these variables as dependent variable.

For the independent variables, we used some of the variables described in chapter '3.1.3 Attitudes towards unsafe behaviour in traffic'. We used the variables:

- 'Respecting speed limits is boring or dull.'
- 'Most of my friends would drive 20 km/h over the speed limit in a residential area.'
- 'I have to drive fast; otherwise, I have the impression of losing time.'
- 'I am able to drive fast through a sharp curve.'
- 'I often drive faster than the speed limit.'

These variables are measured on a Likert scale from 1 to 5, where 1 means 'disagree' and 5 means 'agree'.

The result of the linear model for young car drivers is shown in Table 7, whereas the result for the age group being 25 years and older is shown in Table 8.

Table 7: Results of linear regression model for speeding; European car drivers between 18 and 24 years

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.598	.055		10.823	.000
Respecting speed limits is boring or dull.	.160	.020	.185	7.975	.000
Most of my friends would drive 20 km/h over the speed limit in a residential area.	.032	.016	.039	2.040	.042
I have to drive fast; otherwise. I have the impression of losing time.	.036	.022	.037	1.620	.105
I am able to drive fast through a sharp curve.	.097	.019	.109	4.984	.000
I often drive faster than the speed limit.	.449	.020	.531	22.031	.000

a. Dependent Variable: speeding

Table 8: Results of linear regression model for speeding; European car drivers being 25 years and older

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.649	.018		36.160	.000
Respecting speed limits is boring or dull.	.090	.006	.112	14.146	.000
Most of my friends would drive 20 km/h over the speed limit in a residential area.	.037	.006	.046	6.722	.000
I have to drive fast; otherwise, I have the impression of losing time.	.070	.008	.070	8.718	.000
I am able to drive fast through a sharp curve.	.023	.006	.028	3.774	.000
I often drive faster than the speed limit.	.510	.007	.608	70.900	.000

a. Dependent Variable: speeding

For both age groups, the direction of influence is positive, i.e., the more they agree on the independent variables, the more often they reported that they had driven faster than the speed limit over the last 30 days. For young car drivers aged 18 up to 24, only the variable 'I have to drive fast; otherwise, I have the impression of losing time.' is not significant on the level 0,05. This indicates that young car drivers do not drive faster than the speed limit because they have the impression of losing time. On the other hand, all the other variables have an influence on the speeding behaviour. For car drivers aged 25 and older, the coefficients of all variables are significantly different to zero showing that all the variables have an influence on the reported speeding behaviour.

3.3 Contextual data and comparison with other findings

This section includes the analysis of external data and its association with some results of the ESRA2_2018 survey.

Figure 9 shows the percentage of road users aged 18-24 years killed in road accidents of all road users killed in road accidents and the percentage of the population that is 18-24 years for 2016 where both of these data sets were available for ESRA2 countries. In nearly all of these countries, road users aged 18-24 years are overrepresented in the population being killed in a road accident. Note that these data do not distinguish between killed as vehicle driver, vehicle passenger or being killed while outside of a vehicle. In correspondence with the findings from the ESRA2 survey, that young drivers in general report higher rates of risk-taking behaviours and attitudes, they are also overrepresented in traffic fatalities in these countries.

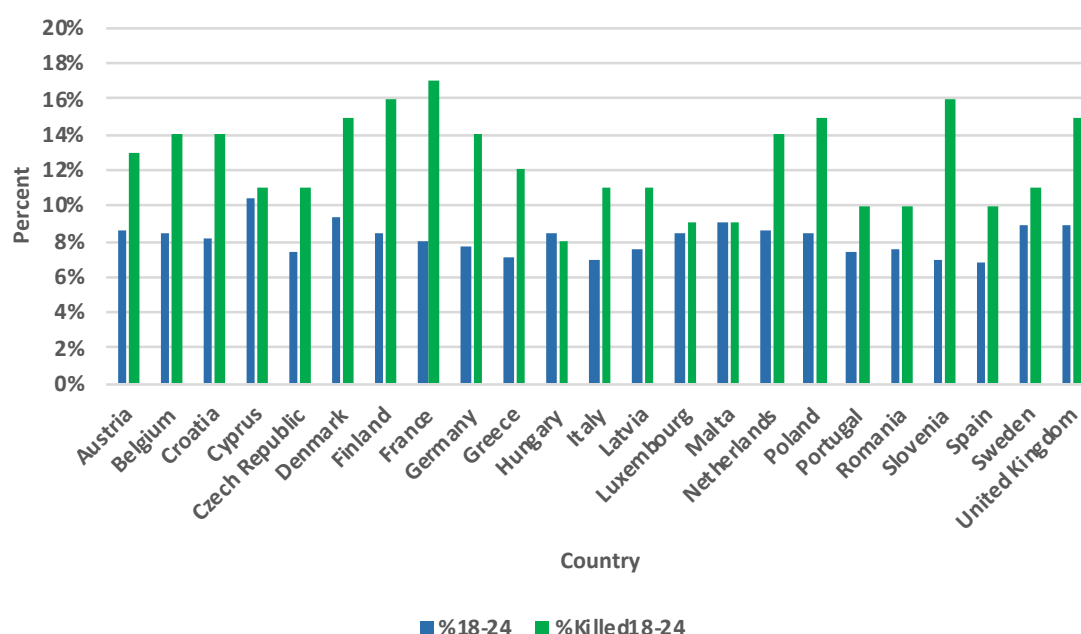


Figure 10: Percentage of population killed in road accidents aged 18-24 (2016) vs. Percentage of population aged 18-24 (2016)

3.4 Limitations of the data

Some limitations have to be acknowledged, both for the surveying method and the data analysis. First of all, in general, self-reported data are vulnerable to a number of biases, like (Choi & Pak, 2005; Krosnick & Presser, 2010): desirability bias – the tendency of respondents to provide answers which present a favourable image of themselves, e.g. individuals may over-report good behaviour or under-report bad, or undesirable behaviour; bias through misunderstanding of questions (e.g. questions with difficult words, long questions); or recall error – unintentional faulty answers due to memory errors.

Moreover, despite the advantages of online surveys, the representativeness of the surveyed populations may be a problem, mainly for countries with low rates of internet use. That is the case for some of the countries of the ESRA2 survey where the percentage of population using the internet is low, e.g. Kenya and Nigeria (lower than 30%) or India and Egypt (lower than 50%).

Furthermore, the number of African respondents aged 65 or older was quite low, so that the answers of this particular age group in African countries should be interpreted with caution.

4. Discussion/Conclusions

This thematic ESRA report on young road users focuses on two road safety issues: 1) driver impairment due to alcohol, drugs, driving while drowsy or driving while distracted (using a mobile phone) and 2) driving over the speed limit. In the descriptive analyses, the focus is on differences between young drivers (18-24 years) and other age groups. In addition, further analyses investigate the differences between young road users (aged 18-24) and the age group of 25 years and older in Europe with regard to a) the perception of the interaction between road users and b) the influence of norm variables, attitude, behaviour and behavioural control on the self-declared over-speeding behaviour of car-drivers.

The results show that young drivers typically report higher or at least similar rates of risky behaviours than other age groups with the exception of Africa5, where rates of risky behaviours (except for driving while distracted) are nearly consistently highest for respondents of age group 65+. However, the numbers of 65+ respondents who answered the ESRA2 survey within the African countries were quite low, 118 in total, so that the answers of this particular age group in African countries cannot be considered to be representative. The report of higher or at least similar rates of risky behaviours of young drivers compared to other age groups corresponds very much with the results of the first edition of ESRA with participants from 17 European countries, where risky behaviours like drink-driving and drug-driving (Achermann Stürmer, 2016), driving while tired and the use of the mobile phone to talk or to read/send text messages while driving (Trigoso et al., 2016) were more prevalent among the youngest age group (18-34 years) than the oldest age group (55 years or older). In addition, results are also in line with Mathijssen & Houwing (2005) who report that the age group of drivers between 18 and 24 had the highest prevalence of illicit drug driving amongst all age groups in the Netherlands as well as NHTSA (2019) reporting higher percentages of drivers visibly manipulating hand-held devices while driving for drivers aged 16-24 years compared to older age groups (25-69 years and 70+ years) in the US.

Moreover, overall, attitudes of personal acceptability are very low towards driving while impaired by alcohol or drugs, driving while drowsy and driving while distracted (with the exception of talking on a hand-free mobile phone while driving for which acceptability from participants is quite high), while for speeding, the rate of acceptance is higher, but a majority of respondents still indicate speeding is personally unacceptable. The level of personal acceptability is lowest for speeding in built-up areas with greater acceptance for speeding outside built-up areas (excluding motorways/freeways) and even greater acceptance for speeding on motorways/freeways; this applies also to young drivers in particular. Moreover, percentages of personal acceptability are much lower than the percentages of the correspondent self-declared behaviours, showing that a significant number of drivers engage in risky behaviours related to driving while potentially impaired, drowsy or distracted or speeding even if they consider the behaviour unacceptable. Young drivers again typically report higher or at least similar levels of acceptance of risky behaviours – with especially high rates of acceptance for speeding behaviours – than other age groups, except for Africa5, where levels of acceptance for risky behaviours is mostly consistently highest for respondents of age group 65+. This is in line with results of the first edition of ESRA in 2015 – with participants from 17 European countries – that also indicated that the acceptability of speeding behaviours (Yannis et al., 2016) as well as the acceptability for drink-driving and drug-driving (Achermann Stürmer, 2016) was higher for younger age groups compared to older people.

Furthermore, risky behaviours like drink-driving, drug-driving, driving while drowsy, driving while distracted (using a mobile phone) and speeding were more likely reported as factors in road car crashes by respondents from Europe20 and NorthAmerica2 than by respondents from AsiaOceania5 and Africa5. But, especially in the former regions – Europe20 and NorthAmerica2 – young drivers less likely reported these risky behaviours as factors in road crashes than other age groups, which corresponds very much with results of the first edition of ESRA – with participants from 17 European countries – where the youngest age group also less likely reported different risk factors (especially the use of mobile phone, sending text messages and driving too fast) to have contributed to crashes than the oldest age group (Furian et al., 2016).

The further analyses showed that – focusing on nine European countries – overall, young road users perceive the interaction between road users as less aggressive and less harsh than road users aged 25

and older, whereas with regard to a perception of the interaction between road users as helpful or considerate, nearly no differences were observable between the two age groups. This is in line with Alonso et al. (2019) who reports that young drivers (<29 years) tended to evaluate specific possibly aggressive driving behaviours less aggressive than drivers over 29 years old (Alonso et al. 2019).

Moreover, – focusing on car drivers in Europe – the analysis on the influence of variables on norms, attitudes and behavioural control towards the speeding behaviour showed that in contrast to car drivers aged 25 years or older, young car drivers do not drive faster than the speed limit because they have the impression of losing time.

In correspondence with the findings from the ESRA2 survey, that young drivers in general report higher rates of risk-taking behaviours and attitudes, an analysis, where data were available of the percentage of the population killed in road accidents that are 18-24 years versus the percentage of the population being 18-24 years found they are also overrepresented in traffic fatalities in these countries, a finding that is consistent with the literature as discussed in the Introduction.

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Appendix 1: ESRA2_2018 Questionnaire

Introduction

In this questionnaire, we ask you some questions about your experience with, and your attitudes towards traffic and road safety. When responding to a question, please answer in relation to the traffic and road safety situation in [COUNTRY]. There are no right or wrong answers; what matters is your own experience and perception.

Thank you for your contribution!

Socio-demographic information

Q1) In which country do you live? _____

Q2) Are you ... male – female – other (only in country who officially recognizes another gender)

Q3a) In which year were you born? Dropdown menu

Q3b) In which month were you born? Dropdown menu

Q4_1) What is the highest qualification or educational certificate that you have obtained?

none - primary education - secondary education - bachelor's degree or similar - master's degree or higher

Q4_2) What is the highest qualification or educational certificate that your mother has obtained? none - primary education - secondary education - bachelor's degree or similar - master's degree or higher - I don't know

Q5a) Which of the following terms best describes your current professional occupation? white collar or office worker (excluding executive)/ employee (public or private sector) → Q5b - blue collar or manual worker/worker → Q5b - executive → Q5b - self-employed/independent professional → Q5b - currently no professional occupation → Q5c

Q5b) Do you have to drive or ride a vehicle for work? (Please indicate the job category that is most appropriate for you) yes, I work as a taxi, bus, truck driver, ... - yes, I work as a courier, mailman, visiting patients, food delivery, salesperson, ... - no

Q5c) You stated that you currently have no professional occupation. Which of the following terms best describes your current situation? I am ... a student - unemployed, looking for a job – retired - not fit to work - a stay-at-home spouse or parent - other

Q6) What is the postal code of the municipality in which you live? _____

Q7) In which region do you live? Drop down menu

Q8a) How far do you live from the nearest bus stop, light rail stop, or metro/underground station? less than 500 metres → Q8b - between 500 metres and 1 kilometre → Q8b - more than 1 kilometre → skip Q8b

Q8b) What is the frequency of your nearest bus stop, light rail stop, or metro/underground station? at least 3 times per hour - 1 or 2 times per hour - less than 1 time per hour

Mobility & exposure

Q9) Do you have a car driving licence or permit (including learner's permit)? yes - no

Q10) During the past 12 months, how often did you use each of the following transport modes in [country]? How often did you ...? at least 4 days a week - 1 to 3 days a week - a few days a month - a few days a year - never

Items (random): walk minimum 100m (pedestrian; including jogging, inline skate, skateboard, ...) - cycle (non-electric) - cycle on an electric bicycle/e-bike/pedelec - drive a moped (≤ 50 cc or ≤ 4 kW; non-electric) - drive a motorcycle (> 50 cc and > 4 kW non-electric) - drive an electric moped (≤ 4 kW) - drive an electric motorcycle (> 4 kW) - drive a powered personal transport device such as an electric step, hoverboard, solowheel,... - drive a car (non-electric or non-hybrid) - drive a taxi - drive a bus as a driver - drive a truck/lorry - drive a hybrid or electric car - take a taxi or use a ride-hail service (e.g. Uber, Lyft) - take the train - take the bus - take the tram/streetcar - take the subway - take the aeroplane - take a ship/boat or ferry - be a passenger in a car - use another transport mode

Q11) Over the last 30 days, have you transported a child (<18 years of age) in a car? yes - no

Items: below 150cm - above 150cm

Self-declared safe and unsafe behaviour in traffic

Q12_1a) Over the last 12 months, how often did you as a CAR DRIVER ...?

You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always".

The numbers in between can be used to refine your response.

Binary variable for all items: at least once (2-5) - never (1)

Items (random):

- drive after drinking alcohol
- drive faster than the speed limit outside built-up areas (but not on motorways/freeways)
- read a text message or email while driving

Q12_1b) Over the last 30 days, how often did you as a CAR DRIVER ...?

You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always".

The numbers in between can be used to refine your response.

Binary variable for all items: at least once (2-5) - never (1)

Items (random):

- drive when you may have been over the legal limit for drinking and driving
- drive after drinking alcohol
- drive 1 hour after using drugs (other than medication)
- drive after taking medication that carries a warning that it may influence your driving ability
- drive faster than the speed limit inside built-up areas
- drive faster than the speed limit outside built-up areas (but not on motorways/freeways)
- drive faster than the speed limit on motorways/freeways
- drive without wearing your seatbelt
- transport children under 150cm without using child restraint systems (e.g. child safety seat, cushion)
- transport children over 150cm without wearing their seatbelts
- talk on a hand-held mobile phone while driving
- talk on a hands-free mobile phone while driving
- read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving
- drive when you were so sleepy that you had trouble keeping your eyes open

Q12_2) Over the last 30 days, how often did you as a CAR PASSENGER ...? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.

Binary variable for all items: at least once (2-5) - never (1)

Item:

- travel without wearing your seatbelt in the back seat

Q12_3) Over the last 30 days, how often did you as a MOPED DRIVER OR MOTORCYCLIST

...? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.

Binary variable for all items: at least once (2-5) - never (1)

Items (random):

- ride when you may have been over the legal limit for drinking and driving
- ride faster than the speed limit outside built-up areas (but not on motorways/freeways)
- ride a moped or motorcycle without a helmet
- read a text message/email or check social media (e.g. Facebook, twitter, etc.) while riding a moped or motorcycle

Q12_4) Over the last 30 days, how often did you as a CYCLIST ...? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.

Binary variable for all items: at least once (2-5) - never (1)

Items (random):

- cycle when you think you may have had too much to drink
- cycle without a helmet
- cycle while listening to music through headphones
- read a text message/email or check social media (e.g. Facebook, twitter, etc.) while cycling
- cycle on the road next to the cycle lane

Q12_5) Over the last 30 days, how often did you as a PEDESTRIAN ...? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.

Binary variable for all items: at least once (2-5) - never (1)

Items (random):

- listen to music through headphones as a pedestrian while walking in the streets
- read a text message/email or check social media (e.g. Facebook, twitter, etc.) while walking in the streets
- cross the road when a pedestrian light is red
- cross the road at places other than at a nearby (distance less than 30m) pedestrian crossing

Acceptability of safe and unsafe traffic behaviour

Q13_1) Where you live, how acceptable would most other people say it is for a CAR DRIVER to....? You can indicate your answer on a scale from 1 to 5, where 1 is "unacceptable" and 5 is "acceptable". The numbers in between can be used to refine your response.

Binary variable: acceptable (4-5) – unacceptable/neutral (1-3)

Items (random):

- drive when he/she may be over the legal limit for drinking and driving
- drive 1 hour after using drugs (other than medication)
- drive faster than the speed limit outside built-up areas (but not on motorways/freeways)
- not wear a seatbelt while driving
- transport children in the car without securing them (child's car seat, seatbelt, etc.)
- talk on a hand-held mobile phone while driving
- read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving

Q14_1) How acceptable do you, personally, feel it is for a CAR DRIVER to...? You can indicate your answer on a scale from 1 to 5, where 1 is "unacceptable" and 5 is "acceptable". The numbers in between can be used to refine your response.

Binary variable: acceptable (4-5) – unacceptable/neutral (1-3)

Items (random)

- drive when he/she may be over the legal limit for drinking and driving
- drive 1 hour after using drugs (other than medication)
- drive after taking a medication that may influence the ability to drive
- drive faster than the speed limit inside built-up areas
- drive faster than the speed limit outside built-up areas (but not on motorways/freeways)
- drive faster than the speed limit on motorways/freeways
- not wear a seatbelt while driving
- transport children in the car without securing them (child's car seat, seatbelt, etc.)
- talk on a hand-held mobile phone while driving
- talk on a hand-free mobile phone while driving
- read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving
- drive when they're so sleepy that they have trouble keeping their eyes open

Attitudes towards safe and unsafe behaviour in traffic

Q15) To what extent do you agree with each of the following statements? You can indicate your answer on a scale from 1 to 5, where 1 is "disagree" and 5 is "agree". The numbers in between can be used to refine your response.

Binary variable: agree (4-5) – disagree/neutral (1-3)

Items (random):

Normative beliefs & subjective norms (including injunctive norms from Q13)

- Most of my friends would drive after having drunk alcohol.
- Most of my friends would drive 20 km/h over the speed limit in a residential area.

Behaviour beliefs & attitudes

- For short trips, one can risk driving under the influence of alcohol.
- I have to drive fast; otherwise, I have the impression of losing time.
- Respecting speed limits is boring or dull.
- For short trips, it is not really necessary to use the appropriate child restraint.
- I use a mobile phone while driving, because I always want to be available.
- To save time, I often use a mobile phone while driving.

Perceived behaviour control (here: self-efficacy)

- I trust myself to drive after having a glass of alcohol.
- I have the ability to drive when I am a little drunk after a party
- I am able to drive after drinking a large amount of alcohol (e.g. half a liter of wine).
- I trust myself when I drive significantly faster than the speed limit.
- I am able to drive fast through a sharp curve.
- I trust myself when I check my messages on the mobile phone while driving.
- I have the ability to write a message on the mobile phone while driving.
- I am able to talk on a hand-held mobile phone while driving.

Habits

- I often drive after drinking alcohol.
- Even when I am a little drunk after a party, I drive.
- It sometimes happens that I drive after consuming a large amount of alcohol (e.g. a liter of beer or half a liter of wine).
- I often drive faster than the speed limit.
- I like to drive in a sporty fast manner through a sharp curve.
- It happens sometimes that I write a message on the mobile phone while driving.
- I often talk on a hand-held mobile phone while driving.
- I often check my messages on the mobile phone while driving.

Intentions

- I will do my best not to drive after drinking alcohol in the next 30 days.
- I will do my best to respect speed limits in the next 30 days.
- I will do my best not to use my mobile phone while driving in the next 30 days.

Quality control items

- Indicate number 1 on the answering scale.
- Indicate number 4 on the answering scale.

Subjective safety & risk perception

Q16) How safe or unsafe do you feel when using the following transport modes in

[country]? You can indicate your answer on a scale from 0 to 10, where 0 is "very unsafe" and 10 is "very safe". The numbers in between can be used to refine your response.

Items (random) = Items indicated by the respondent in Q10 are displayed.

Q17) How often do you think each of the following factors is the cause of a road crash involving a car?

You can indicate your answer on a scale from 1 to 6, where 1 is "never" and 6 is "(almost) always". The numbers in between can be used to refine your response.

Binary variable: often/frequently (4-6) - not that often/not frequently (1-3)

Items (random)

- driving after drinking alcohol
- driving after taking drugs (other than medication)
- driving faster than the speed limit
- using a hand-held mobile phone while driving
- using a hands-free mobile phone while driving
- inattentiveness or day-dreaming while driving
- driving while tired

Support for policy measures

Q18) Do you oppose or support a legal obligation to ...? You can indicate your answer on a scale from 1 to 5, where 1 is "oppose" and 5 is "support". The numbers in between can be used to refine your response.

Binary variable: support (4-5) – oppose/neutral (1-3)

Items (random)

- install an alcohol "interlock" for drivers who have been caught drunk driving on more than one occasion (technology that won't let the car start if the driver's alcohol level is over the legal limit)
- have zero tolerance for alcohol (0,0 ‰) for novice drivers (licence obtained less than 2 years)
- have zero tolerance for alcohol (0,0 ‰) for all drivers
- install Intelligent Speed Assistance (ISA) in new cars (which automatically limits the maximum speed of the vehicle and can be turned off manually)
- install Dynamic Speed Warning signs (traffic control devices that are programmed to provide a message to drivers exceeding a certain speed threshold)
- have a seatbelt reminder system for the front and back seats in new cars
- require all cyclists to wear a helmet
- require cyclists under the age of 12 to wear a helmet
- require all moped drivers and motorcyclists to wear a helmet
- require pedestrians to wear reflective material when walking in the streets in the dark
- require cyclists to wear reflective material when cycling in the dark
- require moped drivers and motorcyclists to wear reflective material when driving in the dark
- have zero tolerance for using any type of mobile phone while driving (hand-held or hands-free) for all drivers
- not using headphones (or earbuds) while walking in the streets
- not using headphones (or earbuds) while riding a bicycle

Q19_1) What do you think about the current traffic rules and penalties in your country for driving or riding under the influence of alcohol? agree – disagree

Items:

- The traffic rules should be stricter.
- The traffic rules are not being checked sufficiently.
- The penalties are too severe.

Q19_2) What do you think about the current traffic rules and penalties in your country for driving or riding faster than the speed limit? agree – disagree

Items: Q19_1

Q19_3) What do you think about the current traffic rules and penalties in your country for using a mobile phone while driving or riding? agree – disagree

Items: Q19_1

Enforcement

Q20_1) On a typical journey, how likely is it that you (as a CAR DRIVER) will be checked by the police for... You can indicate your answer on a scale from 1 to 7, where 1 is "very unlikely" and 7 is "very likely". The numbers in between can be used to refine your response.

Binary variable: likely (5-7) – unlikely/neutral (1-4)

Items (random)

- ... alcohol, in other words, being subjected to a Breathalyser test
- ... the use of illegal drugs
- ... respecting the speed limits (including checks by a police car with a camera, fixed cameras, mobile cameras, and section control systems)
- ... wearing your seatbelt
- ... the use of hand-held mobile phone to talk or text while driving

Q21_1) In the past 12 months, how many times have you been checked by the police for using alcohol while DRIVING A CAR (i.e., being subjected to a Breathalyser test)? never – 1 time – at least 2 times - I prefer not to respond to this question

Binary variable: at least once - never (removing "I prefer not to respond to this Q")

Q22_1) In the past 12 months, how many times have you been checked by the police for the use of drugs (other than medication) while DRIVING A CAR? never – 1 time – at least 2 times - I prefer not to respond to this question

Binary variable: at least once - never (removing "I prefer not to respond to this Q")

Involvement in road crashes

Introduction: The following questions focus on road crashes. With road crashes, we mean any collision involving at least one road vehicle (e.g., car, motorcycle, or bicycle) in motion on a public or private road to which the public has right of access. Furthermore, these crashes result in material damage, injury, or death. Collisions include those between road vehicles, road vehicles and pedestrians, road vehicles and animals or fixed obstacles, road and rail vehicles, and one road vehicle alone.

Q23_1a) In the past 12 months, how many times have you personally been involved in road crashes in which you or somebody else had to be taken to the hospital? ____ times

(number; max. 10) if 0 → Q23_2a; if >0 → Q23_1b → Q23_2a

Binary variable: at least once - never

Q23_1b) Please indicate the transport modes you were using at the time of these crashes.

Items indicated by the respondent in Q10 are displayed; Threshold = 'at least a few days a year'.

Number to be indicated after each transport mode; note the sum should be equal to the number indicated in Q23_1a

Q23_2a) In the past 12 months, how many times have you personally been involved in road crashes with only minor injuries (no need for hospitalisation) for you or other people? ____ times (number; max. 10) if 0 → Q23_3a; if >0 → Q23_2b → Q23_3a

Binary variable: at least once - never

Q23_2b) = Q23_1b

Q23_3a) In the past 12 months, how many times have you personally been involved in road crashes with only material damage?

____ times (number; max. number 10) if 0 → skip Q23_3b; if >0 → Q23_3b → next Q

Binary variable: at least once - never

Q23_3b) = Q23_1b

Vehicle automation

I2) Introduction: The following questions focus on your opinion about automated passenger cars. We talk about two different levels of vehicle automation:

Semi-automated passenger cars: Drivers can choose to have the vehicle control all critical driving functions, including monitoring the road, steering, and accelerating or braking in certain traffic and environmental conditions. These vehicles will monitor roadways and prompt drivers when they need to resume control of the vehicle.

Fully-automated passenger cars: The vehicle controls all critical driving functions and monitoring all traffic situations. Drivers do not take control of the vehicle at any time.

Q24) How interested would you be in using the following types of automated passenger car? You can indicate your answer on a scale from 1 to 7, where 1 is "not at all interested" and 7 is "very interested". The numbers in between can be used to refine your response.

Binary variable: interested (5-7) - not interested/neutral (1-4)

Items:

- semi-automated passenger car
- fully-automated passenger car

Q25_1) How likely do you think it is that the following benefits will occur if everyone would use a semi-automated passenger car? You can indicate your answer on a scale from 1 to 7, where 1 is "very unlikely" and 7 is "very likely". The numbers in between can be used to refine your response.

Binary variable: likely (5-7) – unlikely/neutral (1-4)

Items (random):

- fewer crashes
- reduced severity of crash
- less traffic congestion
- shorter travel time
- lower vehicle emissions
- better fuel economy
- time for functional activities, not related to driving (e.g. working)
- time for recreative activities, not related to driving (e.g. reading, sleeping, eating)

Q25_2) How likely do you think it is that the following benefits will occur if everyone would use a fully-automated passenger car? You can indicate your answer on a scale from 1 to 7, where 1 is "very unlikely" and 7 is "very likely". The numbers in between can be used to refine your response.

7, where 1 is "very unlikely" and 7 is "very likely". The numbers in between can be used to refine your response.

Items (random) = Q25_1

Bonus question to be filled in by national partner

Q26)? You can indicate your answer on a scale from 1 to 5, where 1 is "..." and 5 is "...". The numbers in between can be used to refine your response.

Items (random; 4 items)

Q27)? You can indicate your answer on a scale from 1 to 5, where 1 is "..." and 5 is "...". The numbers in between can be used to refine your response.

Items (random; 4 items)

Social desirability scale

Introduction: The survey is almost finished. The following questions have nothing to do with road safety, but they are important background information. There are no good or bad answers.

Q28) To what extent are the following statements true? You can indicate your answer on a scale from 1 to 5, where 1 is "very untrue" and 5 is "very true". The numbers in between can be used to refine your response.

Items (random):

- I always respect the highway code, even if the risk of getting caught is very low.
- I would still respect speed limits at all times, even if there were no police checks.
- I have never driven through a traffic light that had just turned red.
- I do not care what other drivers think about me.
- I always remain calm and rational in traffic. (if needed pop-up: rational = non-emotional)
- I am always confident of how to react in traffic situations.

Appendix 2: ESRA2 weights

The following weights are used to calculate representative means on national and regional level. They are based on UN population statistics (United Nations Statistics Division, 2019). The weighting took into account small corrections with respect to national representativeness of the sample based on gender and six age groups (18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65y+). For the regions, the weighting also took into account the population size of each country in the total set of countries from this region.

Individual country weight	Individual country weight is a weighting factor based on the gender*6 age groups (18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65y) distribution in a country as retrieved from the UN population statistics.
Europe20 weight	European weighting factor based on all 20 European countries participating in ESRA2_2018, considering individual country weight and population size of the country as retrieved from the UN population statistics.
NorthAmerica2 weight	North American weighting factor based on all 2 North American countries participating in ESRA2_2018, considering individual country weight and population size of the country as retrieved from the UN population statistics.
AsiaOceania5 weight	Asian and Oceanian weighting factor based on all 5 Asian and Oceanian countries participating in ESRA2_2018, considering individual country weight and population size of the country as retrieved from the UN population statistics.
Africa5 weight	African weighting factor based on all 5 African countries participating in ESRA2_2018, considering individual country weight and population size of the country as retrieved from the UN population statistics.
ESRA32 weight	ESRA32 weighting factor based on all 32 countries participating in ESRA2_2018, considered individual country weight and population size of the country as retrieved from the UN population statistics.
ESRA32_sample weight	ESRA32-sample weighting factor based on all 32 countries participating in ESRA2_2018, considered individual country weight with N=1000 in all countries.