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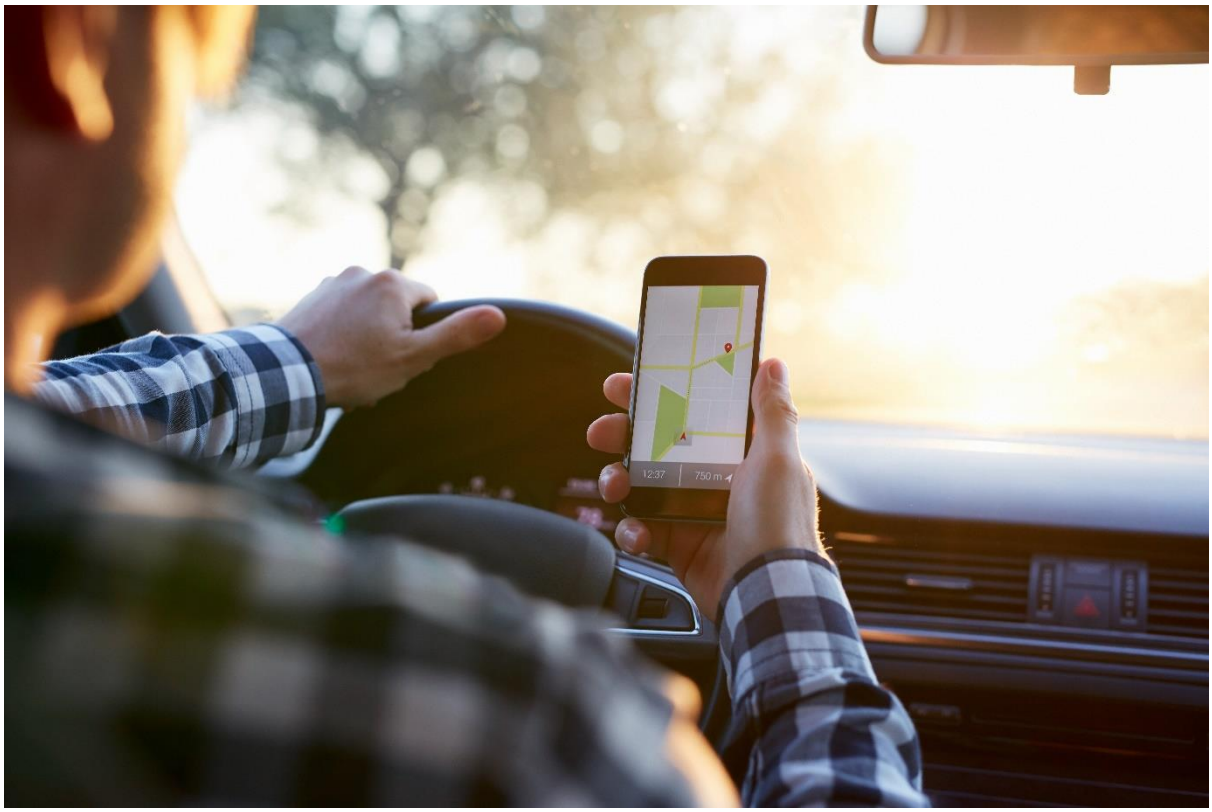
E-Survey of Road users' Attitudes



Distraction (mobile phone use)

ESRA2 Thematic report Nr. 3

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ESRA2 Thematic report Nr. 3

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List of Abbreviations

Region codes

Europe20	Region that includes Austria, Belgium, Switzerland, Czech Republic, Germany, Denmark, Greece, Spain, Finland, France, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Serbia, Sweden, Slovenia and United Kingdom
NorthAmerica2	Region that includes Canada and United States
AsiaOceania5	Region that includes Australia, Israel, India, Japan and Republic of Korea
Africa5	Region that includes Egypt, Kenya, Morocco, Nigeria and South Africa

Other abbreviations

CI99%	99% Confidence Interval
ESRA	E-Survey of Road Users' Attitudes
ETSC	European Transport Safety Council
EU	European Union
ICT	Information Communication Technology
ICW	Individual country weight used in ESRA2
NHTSA	National Highway Traffic Safety Administration
OR	Odds Ratio
R	Pearson Correlation Coefficient
RSO	Road Safety Observatory
SDS	Social Desirability Scale
WHO	World Health Organization

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 distraction (mobile phone use) focuses on the use of the mobile phone to talk (hand-held and hands-free) and to text (read a text message/email or check social media) while driving. It includes the analysis of aspects related to self-declared unsafe behaviours in traffic, acceptability of unsafe traffic behaviours (personal and social), attitudes towards the use of the mobile phone, risk perception of using the mobile phone, support for policy measures, opinions of traffic rules and penalties, and perception of enforcement. Results are presented separately for the four regions: Europe20, NorthAmerica2, AsiaOceania5, Africa5. The report includes comparisons amongst the regions as well as results of the association with age and gender, and the identification of factors that influence the self-declared behaviour of talking on a hand-held mobile phone and texting while driving a car.

Key results

Self-declared unsafe behaviours in traffic (past 30 days)

The use of the mobile phone while driving a car is more frequent in Africa5 region: 66.8% of car drivers declared having talked on a hands-free mobile phone while driving a car, 54.1% talked on a hand-held mobile phone, and 46.9% read a text message/email or checked social media.

Europe20 is the region where the use of the mobile phone while driving a car is less prevalent: 47.7% used hands-free devices, 28.6% talked on a hand-held mobile phone, and 24.2% read a text message/email or checked social media.

NorthAmerica2 and AsiaOceania5 have similar percentages of car drivers declaring the use of the mobile phone while driving, respectively: 50.5% and 54.5%% of drivers used hands-free devices; 37.7% and 38.2% of drivers talked on hand-held phone; and texting was declared by 35.7% and by 36.9% of drivers.

The use of the mobile phone while driving a car is more frequent among women in Europe20 and Africa5 regions, but no significant differences were found neither in America2 nor in AsiaOceania5.

Age increase is generally associated with a decrease in the self-declared behaviours, except for Africa5 car drivers. The effect of the age is stronger for talking on a held mobile phone and for texting than for using hands-free devices.

Texting while driving is more frequent for car drivers than for moped drivers/motorcyclists and cyclists.

Acceptability of unsafe traffic behaviours

The percentages of personal acceptability were lower than the percentages of the correspondent self-declared behaviours – there are many drivers that consider the behaviours unacceptable but do it anyway.

Overall, respondents believe that behaviours related to using mobile phones while driving are more acceptable by 'others', than by themselves.

Respondents consider more acceptable using hands-free devices to talk while driving than talking on hand-held phones in all regions.

Risk perception

The percentage of respondents who declared that talking on a hand-held mobile phone is often/frequently the cause of a road crash (75.8% in Europe20, 70.8% in NorthAmerica2, 61.9% in Africa5 and 52.6% in AsiaOceania5) is higher than the self-declared behaviour, suggesting that many drivers consider the behaviour risky but do it anyway.

Using hands-free devices to talk while driving is considered less risky than talking on a hand-held mobile phone.

Enforcement, support for policy measures, traffic rules and penalties

More than half of the respondents support zero tolerance for using any type of mobile phone while driving for all drivers in all regions: 67.1% in AsiaOceania5, 56.2% in Africa5, 54.0% in Europe20, and 51.8% in NorthAmerica2.

Most respondents (more than 2 out of 3) from Europe20, NorthAmerica2 and AsiaOceania5 agree that traffic rules/penalties should be stricter and are not being checked sufficiently. A minority agree that traffic rules/penalties are too severe: 22.6% in Europe20; 20.1% in NorthAmerica2; 34.2% in AsiaOceania5.

Africa5 is the region with the highest level of enforcement perception: 31.7% of car drivers stated that is likely to be checked by the police for using a hand-held mobile phone while driving – 25.2% in AsiaOceania5, 18.9% in Europe20 and 12.7% in NorthAmerica2.

The enforcement and the current traffic penalties concerning the use of the mobile phone while driving do not influence the self-declared behaviours.

Factors that influence the use of mobile phone while driving a car

Personal acceptability and perceived behaviour control of using the mobile phone while driving (talking on a hand-held mobile phone and texting) are the factors that most increase the likelihood of talking on a hand-held mobile phone and texting while driving.

The likelihood of using a mobile phone while driving decreases with the increase of the risk perception.

Drivers who have a professional occupation are more likely to use the phone while driving than drivers who have no occupation.

Drivers who support legal obligation to have zero tolerance for using any type of mobile phone while driving are less likely to engage in the behaviour.

Countries with restrictions concerning the use of hands-free devices to talk while driving have lower prevalence of this behaviour.

Countries whose population spend more time a day using mobile internet and on social media have higher percentages of drivers declaring texting while driving.

Key recommendations

Policy recommendations at national and regional level

- Define distraction related indicators and set targets at regional level, such as the prevalence of distracted driving, the number of controls for mobile phone use, and the number of traffic casualties attributable to distraction.
- Conduct awareness-raising campaigns on the risks of distracted driving.
- Incorporate information on risks associated with distraction in educational programmes and in driver license training.
- Increase enforcement (and enforcement perception) and find new methods of enforcement in relation to the mobile phone use while driving. Ensure that penalties are applied to drivers who infringe the law.

Specific recommendations to particular stakeholders

- *[To Non-Governmental Organizations (NGOs)]* Contribute to education and awareness raising campaigns and events against distracted driving.
- *[To vehicle manufacturers, other companies and research organisations]* Develop low cost solutions to be incorporated in vehicles that can detect or prevent distracted driving.
- *[To private and public companies]* Develop road safety plans that include policies concerning the use of the mobile phone while driving.

The ESRA initiative has demonstrated the feasibility and the added value of joint data collection on road safety performance by partner organizations all over the world. The intention is to repeat this initiative on a triennial basis, retaining a core set of questions in every wave. In this way, ESRA produces consistent and comparable road safety performance indicators that can serve as an input for national road safety policies and for international monitoring systems on road safety performance.

1 Introduction

Driver distraction is generally considered a central issue in road safety, and one of the basic risk factors in traffic, together with speeding, DUI and fatigue. It is estimated that road users' distraction contributes to about 10 to 30% of road crashes in the European Union (DG MOVE, 2015). The massive use of the mobile phone while driving, the major source of distraction, and its negative effects on driving behaviour make driver distraction one of the most serious and growing threats to road safety (WHO, 2015).

Distraction can be defined as a diversion of attention away from activities critical for safe driving toward a competing activity (Lee et al., 2008). Distracted drivers are still alert, but their attention is focussed on other activities than driving. Activities like talking on the mobile phone, reading/typing messages, operating a GPS, talking to a passenger, eating, and drinking are all potentially distracting activities. These activities can affect the essential aspects of driving a vehicle and increase the risk of having an accident. Distracted drivers swerve more, which indicates diminished control over the vehicle; have longer reaction times; miss information from the road environment; and make more errors while driving (SWOV, 2018).

The use of the mobile phone while driving is one of the most important sources of road traffic distraction. Talking, dialling a number, reading or sending text messages or emails, and performing other tasks like searching on the web or social media networking have negative effects on driving behaviour and increase the risk of accident (RSO, 2018; DG MOVE, 2015). Drivers talking on a hand-held mobile phone are about four times more likely to have an accident while driving (WHO, 2015).

Using a hand-held mobile phone while driving involves four types of distraction: visual (looking at something other than the road), auditory (hearing something not related to driving), manual (manipulating something other than the steering wheel) and cognitive (when drivers focus their attention away from the driving task). Often, different types of distraction occur simultaneously. Using a hands-free mobile phone has no significant advantages because it also causes cognitive distraction – the most dangerous type of distraction. Like drivers using hand-held mobile phones, drivers using hands-free devices also tend to 'look at' but not 'see' and are more likely to fail relevant information from the road. Drivers talking on the phone focus on a smaller area of the road and fail to see hazards, even when they look directly at them (Briggs *et al.*, 2016). They tend to miss exits, go through red lights and stop signs, and miss other important information from the road. Furthermore, the reaction time, which involves attention resources and information processing, is longer during phone conversations while driving (NSC, 2012). Reading or sending text messages or emails while driving, which also requires visual, manual, and cognitive attention from the driver, is becoming an increasing source of distraction, mainly among young drivers. While texting, drivers spend long periods without looking to the road, which has a huge impact on the visual distraction and increases the risk of being in an accident (Olson et al., 2009).

Results from ESRA-1 survey on distraction in 17 European countries (Trigoso et al., 2016) showed that 38% of car drivers talked on a hand-held mobile phone while driving at least once in the 12 months previous to the survey, 51% talked on a hands-free mobile phone, 36% read text messages or emails, and 27% sent text messages or emails. In the National Survey on Distracted Driving Attitudes and Behaviours in the United States (Schroeder et al., 2018) 42% of drivers reported answering their cell phones while driving at least some of the time (21% do it rarely and 37% reported never answering). Concerning texting, 9% declared sending text messages or e-mails while driving at least sometimes and 11% do it rarely. Studies that involve observing behaviours in traffic allow to estimate the percentage of drivers using the mobile phone in each moment. An observational count of mobile phone use in England and Scotland, found that 1.6% of drivers were using the mobile phone (DfT, 2015). In France, an observational study of 16,985 drivers inside built up areas, estimated that 12.7% of drivers stopped in traffic and 6.9% of drivers of vehicles on the move were using the mobile phone (APR, 2017). In the United States, the National Highway Traffic Safety Administration estimates that 5.3% of drivers were using some type of phone, either hand-held or hands-free, at a typical daylight moment in 2017: 2.9% were handling cell phones, 0.4%% were using headsets and 2.0% were manipulating hand-held devices (NHTSA, 2019a).

It is consensual that distraction has an important contribution to road crashes. A report from the European Commission (DG MOVE, 2015) estimates that distracted driving is an influencing factor in

10% to 30% of road crashes in the European Union. Crash data from the United States, show that, in 2017, 9% of all fatal crashes on US roadways involved distraction (NHTSA, 2019b). However, these figures are likely to be an underrepresentation as the impact of driver distraction on road crashes is difficult to estimate due to the difficulties in coding distraction as a contributory factor after the event.

Research has identified several factors that influence the decision of using the mobile phone while driving. Several studies report that men and younger people are more likely to engage in several risky driving behaviours, including using mobile phone while driving (Ivers et al., 2009; Nurullah, 2013; CDC, 2013). A positive attitude towards the use of the mobile phone while driving, the perceived behaviour control, and the perception of others' approval increase the likelihood of its use while driving (Ajzen, 1991; Sullman et al., 2018). Personality traits that lead drivers to take risks while driving (Zhao et al., 2013), the social expectation to return calls or answer text messages immediately, professional reasons, or perceived practical, social, and psychological benefits were associated with a higher risk of using the mobile phone while driving (Nurullah, 2013). Other factors like income, education and frequency of driving were also related with a higher probability of talking on the phone while driving (Shi et al., 2016). On the other hand, the risk perception is associated with a lower likelihood of using the mobile phone while driving (Becker, 1974, Shi et al., 2016; Oviedo-Trespalacios et al, 2017, Trigoso et al., 2016).

Concerning countermeasures to tackle the problem of distracted driving, legislation, certification, public awareness campaigns and education during the licensing acquisition process (as well as for professional drivers) were seen, by the European Commission, as the most effective non-technology-based approaches (DG MOVE, 2015). From several technologies that can be used to reduce distraction through real-time prevention, real-time mitigation, or warning of collisions, the most promising are voice recognition, biometry, head up displays, artificial intelligence, and (especially from researcher feedback) vehicle automation. In terms of costs and benefits, the European Commission identified collision warning systems (forward collision warning and lane departure warning) and education about distraction during driver licence acquisition (and for professional drivers) as the most promising approaches to dealing with distracted driving (DG MOVE, 2015). Another countermeasure that proved to be effective is the High Visibility Enforcement, which combines dedicated law enforcement with media supporting the enforcement activity (Goodwin et al., 2013).

This thematic ESRA report aims at describing self-declared behaviours and attitudes related to the use of the mobile phone in traffic in a sample from 32 countries worldwide. Factors that influence the self-declared behaviour of using a mobile phone while driving a car are also identified within each of the four regions: Europe20, NorthAmerica2, AsiaOceania5, Africa5.

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

- What is the prevalence of using a mobile phone while driving?
- What is the level of self-declared acceptability of using a mobile phone while driving?
- How common is the perception that using a mobile phone while driving is the cause of a road crash?
- How common is the perception that as a driver, you will be checked by the police for using a mobile phone while driving?
- What are the opinions on traffic rules, penalties and support for policy measures concerning the use of a mobile phone while driving?
- Which factors are related to the prevalence of the self-declared use of a mobile phone while driving a car?

2 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.

ESRA data is collected through online panel surveys, using a representative sample of the national adult populations in each participating country (at least N = 1000 per country). At the heart of this survey is a jointly developed questionnaire, 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.

The participating countries in ESRA2_2018 were:

- Europe: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the 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.

Vias institute in Brussels (Belgium) initiated and coordinates ESRA, in cooperation with eleven core group partners (BASt (Germany), BFU (Switzerland), CTL (Italy), IATSS (Japan), IFSTTAR (France), ITS (Poland), KFV (Austria), NTUA (Greece), PRP (Portugal), SWOV (the Netherlands), TIRF (Canada)). The common results of the ESRA2_2018 survey will be published in a Main Report, a Methodology Report and at least fifteen Thematic Reports (Table 1). Furthermore, 32 country fact sheets were produced, in which national key results are compared to a regional mean (benchmark) and scientific articles, national reports and many conference presentations are currently in progress. An overview of the results and news on the ESRA initiative is available on: www.esranet.eu

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

The present report summarizes the ESRA2_2018-results with respect to Distraction (mobile phone use). An overview of the data collection method and the sample per country can be found in (Meesmann & Torfs, 2019. ESRA2 methodology).

Three risky behaviours concerning the use of the mobile phone while driving are explored in this report: talking on a hand-held mobile phone, talking on a hands-free mobile phone, and reading a text message/email or checking social media (texting). It focuses on car drivers, but results of moped drivers/motorcyclists, cyclists and pedestrians are also presented. For these road users, results are shortly mentioned as there are specific ESRA reports where more detailed results are available.

The report includes the analysis of several aspects related to the use of mobile phone in traffic: self-declared behaviours, acceptability (personal and social), attitudes (behaviour believes and attitudes,

and perceived behaviour control), risk perception, support for policy measures, opinions of traffic rules and penalties, and perception of enforcement.

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

All the results are presented separately for the four regions: Europe20, NorthAmerica2, AsiaOceania5, Africa5. The report also includes results by country, by gender and by 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 answers depend significantly on the region, on the gender and on the age group. Pairwise comparisons were used to identify the pairs of groups (region, gender, age groups) that differ significantly. The strength of the association between variables was assessed through the Cramer's V coefficient. The following thresholds were considered to classify the strength of associations (Cohen, 1988): association with region (3 degrees of freedom) – small=0.06, medium=0.17, large=0.29; association with gender (1 degree of freedom) – small=0.10, medium=0.30, large=0.50; association with age group (5 degrees of freedom) – small=0.05, medium=0.13, large=0.22.

Logistic regression models were carried out to identify the factors that influence the self-declared behaviour of talking on a hand-held mobile phone and texting while driving a car. Odds ratios (OR), and the respective 99% Confidence Intervals (CI99%), were used to measure the strength of association between the variables. Pearson Correlation Coefficient (R) was used to assess the association between variables at a country level.

Due to the large sample size, a significance level of 1% was considered. SPSS 25.0 and R 3.6.0 were used for the analyses.

3 Results & discussion

3.1 Descriptive results

This section includes the descriptive statistics of questions related to the use of the mobile phone in traffic: talking on a hand-held mobile phone, talking on a hands-free mobile phone, and reading a text message/email or checking social media (texting). It focuses on car drivers, but results of moped drivers/motorcyclists, cyclists and pedestrians are also presented. Includes the results of self-declared unsafe behaviours in traffic, acceptability of unsafe traffic behaviours (personal and social), attitudes towards unsafe traffic behaviours, risk perception of using the mobile phone, support for policy measures, opinions of traffic rules and penalties, and perception of enforcement.

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 …?*'. Three items concerning the use of mobile phone while driving were included:

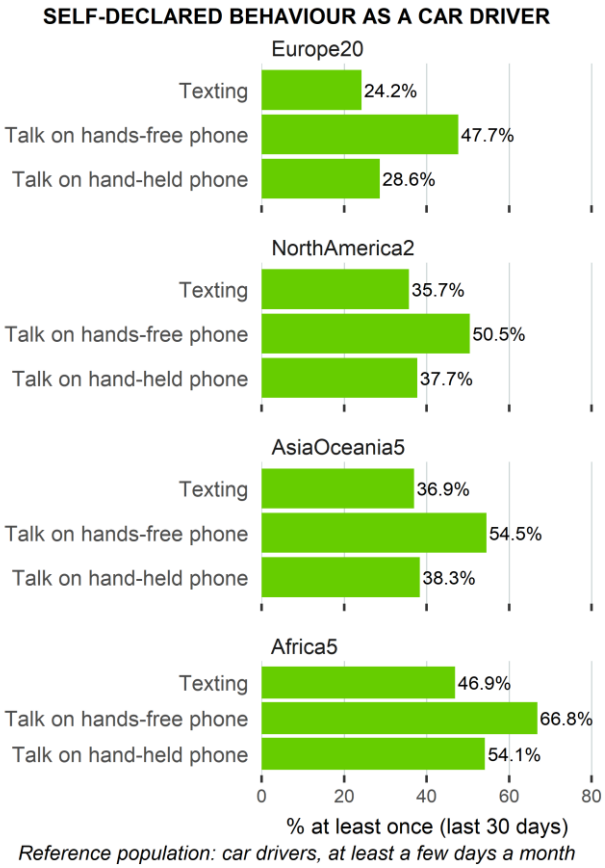
- …talk on a hand-held mobile phone while driving;
- …talk on a hands-free mobile phone while driving;
- …read a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving – texting.

For moped drivers/motorcyclists, cyclists and pedestrians only the third question (texting) was asked. 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.

Car drivers

Figure 1 shows that talking on a hands-free mobile phone was the behaviour more prevalent as a car driver in the 4 regions. It was followed by talking on a hand-held mobile phone and by texting – the prevalence of these behaviours was similar, mainly in NorthAmerica2 and in AsiaOceania5. The risk of using a mobile phone while driving is often only associated to physical and visual distraction. Cognitive distraction, which is similar when using a hand-held or a hands-free mobile phone (NSC, 2012), is underestimated by many road users. This fact, together with being legal in almost all countries, explain the higher percentages of drivers using hands-free devices.

Africa5 stood out as the region where the three behaviours were more frequent – significantly higher than in the other three regions (p-value < 0.01): about 2 out of 3 (66.8%) car drivers talked on a hands-free mobile phone while driving at least once in the past 30 days, more than half (54.1%) talked on hand-held mobile phone, and almost half (46.9%) used the mobile phone to read a text message/email or check social media while driving. Egypt and Kenya were the African countries with the highest prevalence on the three behaviours (Figure 2).



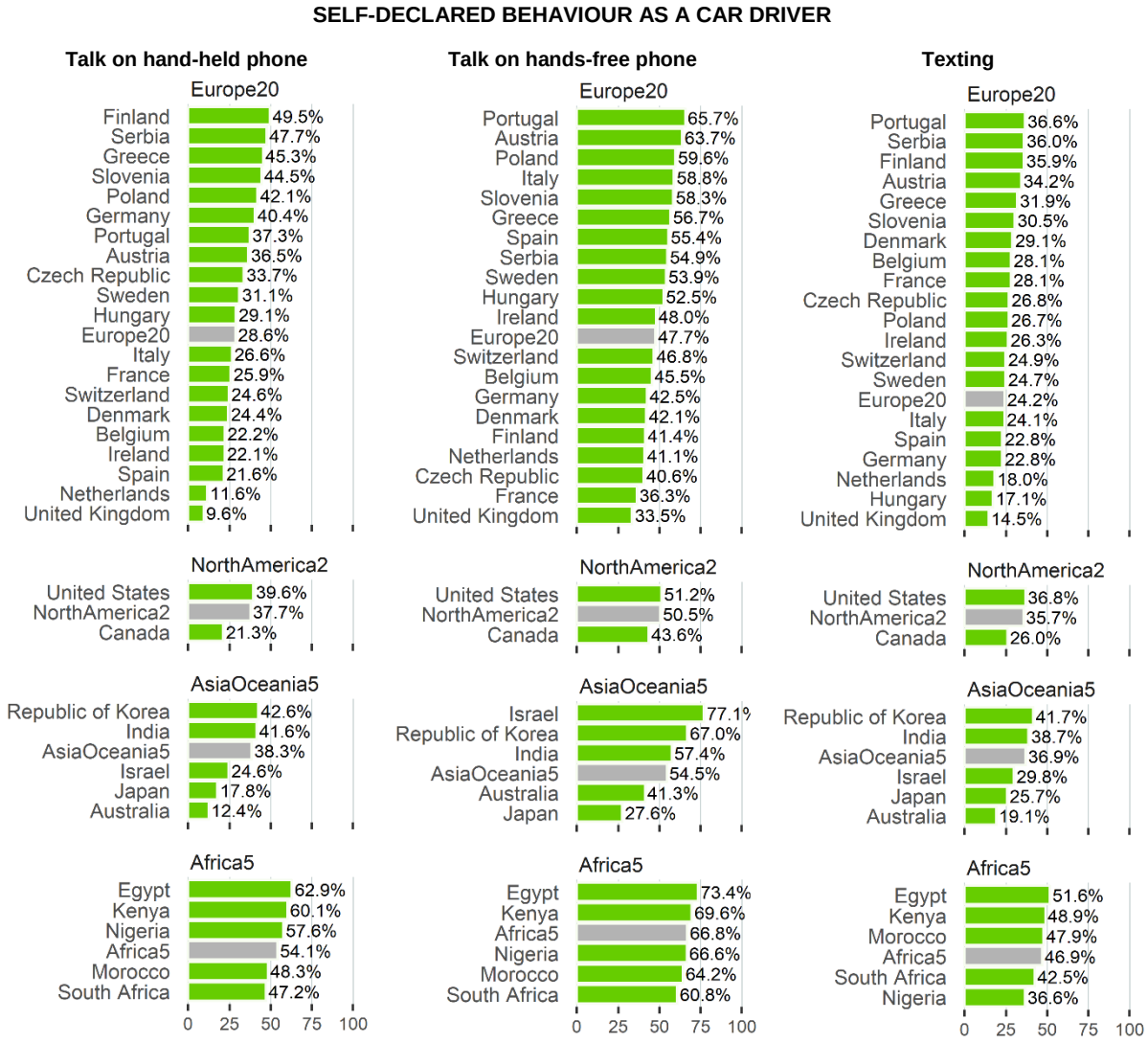
Reference population: car drivers, at least a few days a month

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

In opposition, Europe20 was the region where a fewer percentage of car drivers reported the use of the mobile phone while driving: 47.7% talked on a hands-free mobile phone, 28.6% talked on hand-held mobile phone, and 24.2% texted – percentages significantly lower than in the other regions (p-value < 0.01). Among the 20 European countries, the United Kingdom stood out with the lowest percentage in the three behaviours (Figure 2).

The prevalence of the self-declared behaviours was similar in NorthAmerica2 and AsiaOceania5 – in between Europa20 and Africa5. The two regions did not differ significantly (p-value > 0.01) concerning talking on hand-held mobile phone (37.7% in NorthAmerica2 and 38.2% in AsiaOceania5) neither on texting (35.7% in NorthAmerica2 and 36.9% in AsiaOceania5). However, the percentage of car drivers who reported having talked on a hands-free mobile phone was significantly higher in AsiaOceania5 (54.5%) than in NorthAmerica2 (50.5%). Results by country (Figure 2) show that, in NorthAmerica2 region, the prevalence is always higher in United States than in Canada. Among AsiaOceania5 countries, Japan and Australia are the ones with the lowest percentages.

The strength of the association of region and self-declared behaviours was medium, with Cramer's V ranging from 0.132 for the association with using hands-free devices to 0.187 and 0.184 for the association with talking on a hand-held phone and with texting, respectively.

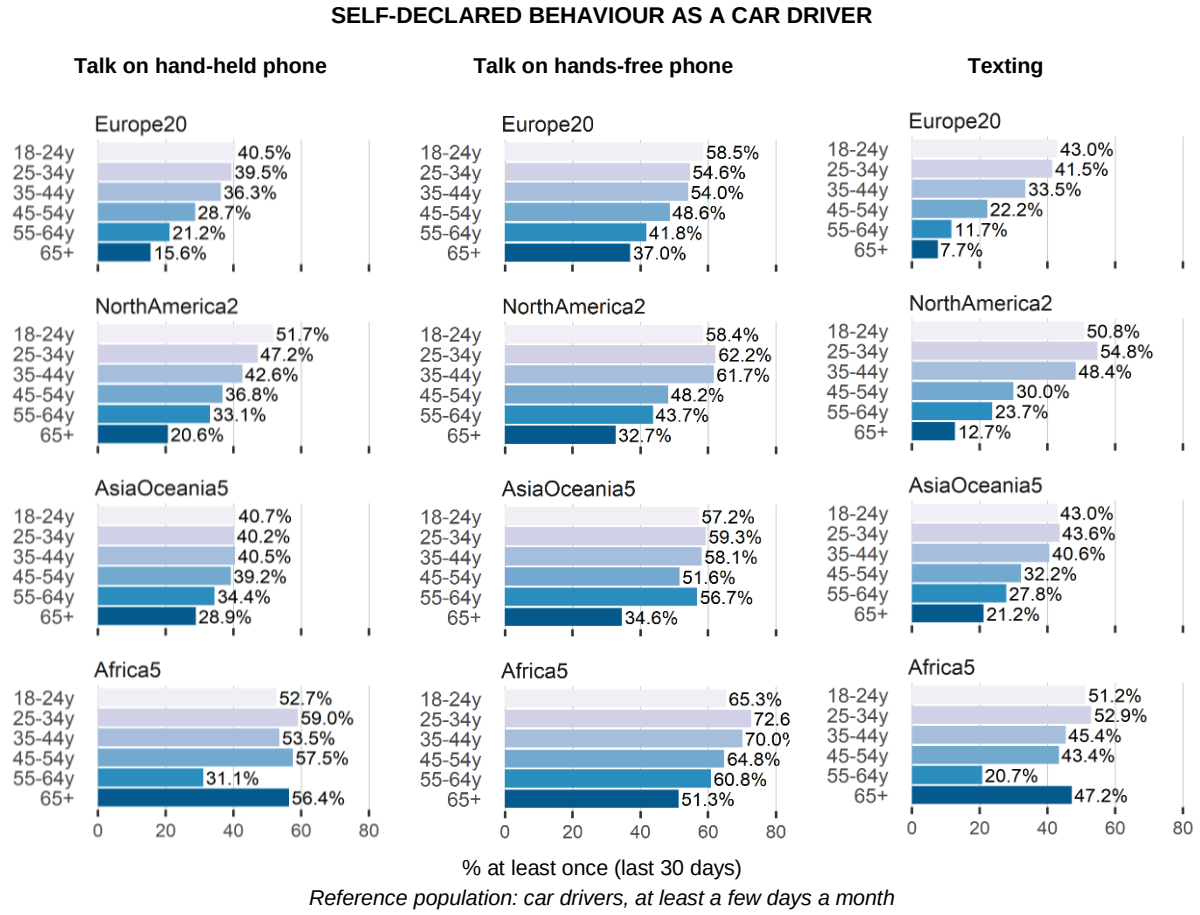


Reference population: car drivers, at least a few days a month

Figure 2: Self-declared behaviours as a car driver in the past 30 days, by region and country.

Overall, the percentage of car drivers who declared the use of mobile phone while driving was higher among the younger drivers and lower among the older ones, except for handling the mobile phone (to talk or to text) in the Africa5 region (Figure 3). In this region there was no significant differences between car drivers aged 65 or over and the ones until 54 years old (p-value > 0.01) – drivers aged from 55 to 64 years had the lowest percentages in both behaviours.

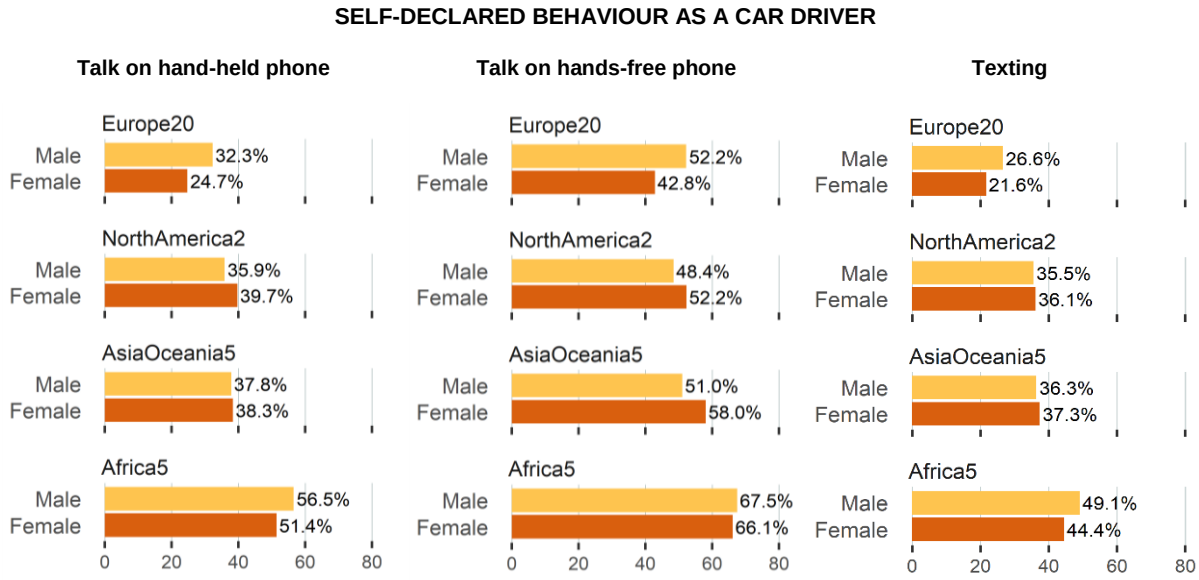
The association of the age with the prevalence of the behaviours was similar in Europe20 and NorthAmerica2: no significant differences, or small differences, until the age of 44 years old and, for older drivers, a steady decrease with the increase of the age group. The strength of the association was particularly strong for texting: Cramer's V > 0.30 in both regions. In AsiaOceania5 a similar, but weaker, association was found concerning texting (Cramer's V = 0.160), but for talking on a mobile phone (hand-held or hands-free) there were no significant differences among drivers until 64 years old (p-value > 0.01).



Reference population: car drivers, at least a few days a month

Figure 3: Self-declared behaviours as a car driver in the past 30 days, by region and age group.

Results by gender (Figure 4) show different patterns in the different regions. In Europe20 and Africa5 regions, the percentage of car drivers who reported the use of mobile phone while driving was significantly higher (p-value < 0.01) among men than among women – except for talking on a hands-free mobile phone in Africa5. These results are in line with other studies that report that men and younger drivers are more likely to engage in risky driving behaviours, including using mobile phone (Ivers et al., 2009; Nurullah, 2013; CDC, 2013; Trigoso et al., 2016). However, the association with gender is different in the other regions. In NorthAmerica2 the percentages were higher among women than men, but the differences were not statistically significant (p-value > 0.01). In AsiaOceania5 there was no significant differences neither on talking on a hand-held mobile phone nor on texting (p-value > 0.01), but the percentage of women who declared having talked on a hands-free mobile phone was significantly higher than the percentage of men (p-value < 0.01). The strength of the association with gender was small for all regions (Cramer's V < 0.10).



Reference population: car drivers, at least a few days a month

Figure 4: Self-declared behaviours as a car driver in the past 30 days, by region and gender.

Moped drivers/motorcyclists, cyclists and pedestrians

Figure 5 shows the percentage of road users who declared having read a text message/email or checked social media (texting) at least once in the 30 days prior to the study, by road user.

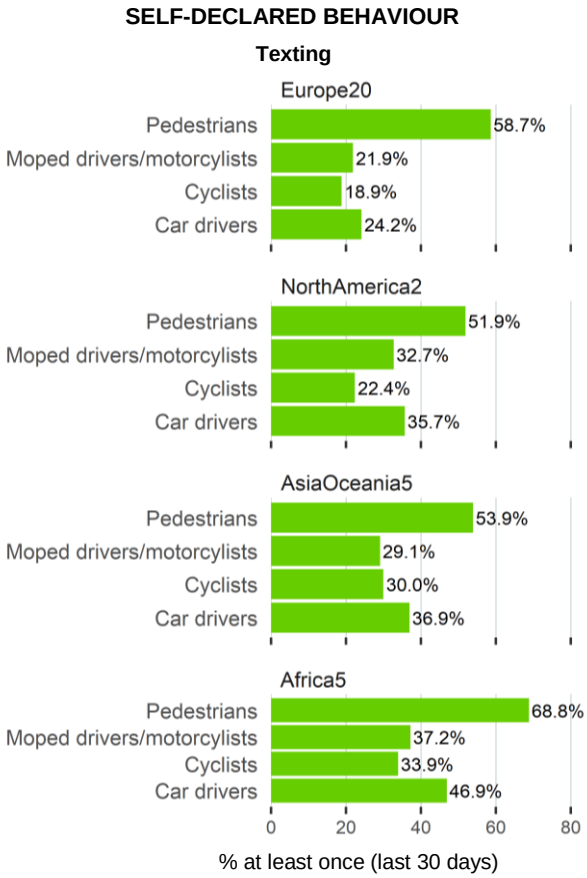
The percentage of respondents who declared having texted was significantly higher in pedestrians than in the other road users, in all the four regions. More than two-thirds of the African respondents (68.8%) declared this behaviour – 58.7% in Europe20, 53.9% in AsiaOceania5 and 51.9% in NorthAmerica2.

The prevalence of texting while riding a moped/motorcycle and while cycling in Africa5 and in AsiaOceania5 regions was similar, but smaller than while driving a car.

In Europe20 region the prevalence of texting while riding a moped/motorcycle (21.9%) and while cycling (18.9%) were close to the prevalence of texting while driving a car (24.2%).

The major differences between drivers/ motorcyclists and cyclists were found in NorthAmerica2: the percentage was smaller among cyclists (22.4%) than among drivers/motorcyclists (32.7%) and car drivers (35.7%).

Association with gender and with age group were similar to association observed for car drivers (results not shown).



Reference population: drivers (pedestrians) of each transport mode, at least a few days a month

Figure 5: Self-declared behaviour of texting in the past 30 days, by region and road user.

3.1.2 Acceptability of unsafe traffic behaviours

To assess the level of acceptability (personal and social) of behaviours concerning the use of mobile phone while driving, the respondents were asked to answer to the questions:

- Where you live, how acceptable would most other people say it is for a car driver to….?
- How acceptable do you, personally, feel it is for a car driver to…?

Both questions were answered on a Likert scale from 1 (unacceptable) to 5 (acceptable). The percentages of acceptability (answers 4 or 5) are shown in the results.

Results from Figure 6 show that the respondents consider that 'the others' accept more readily the use of mobile phones while driving a car, than they do themselves. This applies to all regions and to both the use of the hand-held and the hands-free mobile phone, and also to texting.

Percentages of personal acceptability are much lower than the percentages of the correspondent self-declared behaviours (Figure 1), showing that many drivers use the mobile phone while driving even if they consider the behaviour unacceptable.

The level of personal acceptability of the use of the hands-free mobile phone was higher than the percentage of using a hand-held mobile phone in the four regions, but in different degrees – much higher in Europe20 than in other regions: 9.7 times higher in Europe20, 4.6 in NorthAmerica2, 3.0 in AsiaOceania5 and 3.7 in Africa5. AsiaOceania5 was the region with the lowest percentage of personal acceptability of using hands-free systems – 16.1% (significantly lower than the other regions: $p < 0.01$).

The percentage of personal acceptability of texting was significantly higher in AsiaOceania5 (6.8%) and Africa5 (7.1%) than in Europe20 (2.0%) and NorthAmerica2 (2.2%) (p-value < 0.01, Cramer's V = 0.136). Texting was considered the least acceptable in Africa5, Europe20 and NorthAmerica2, but not in AsiaOceania5. In this region, talking on a hand-held mobile phone while driving is less acceptable than texting.

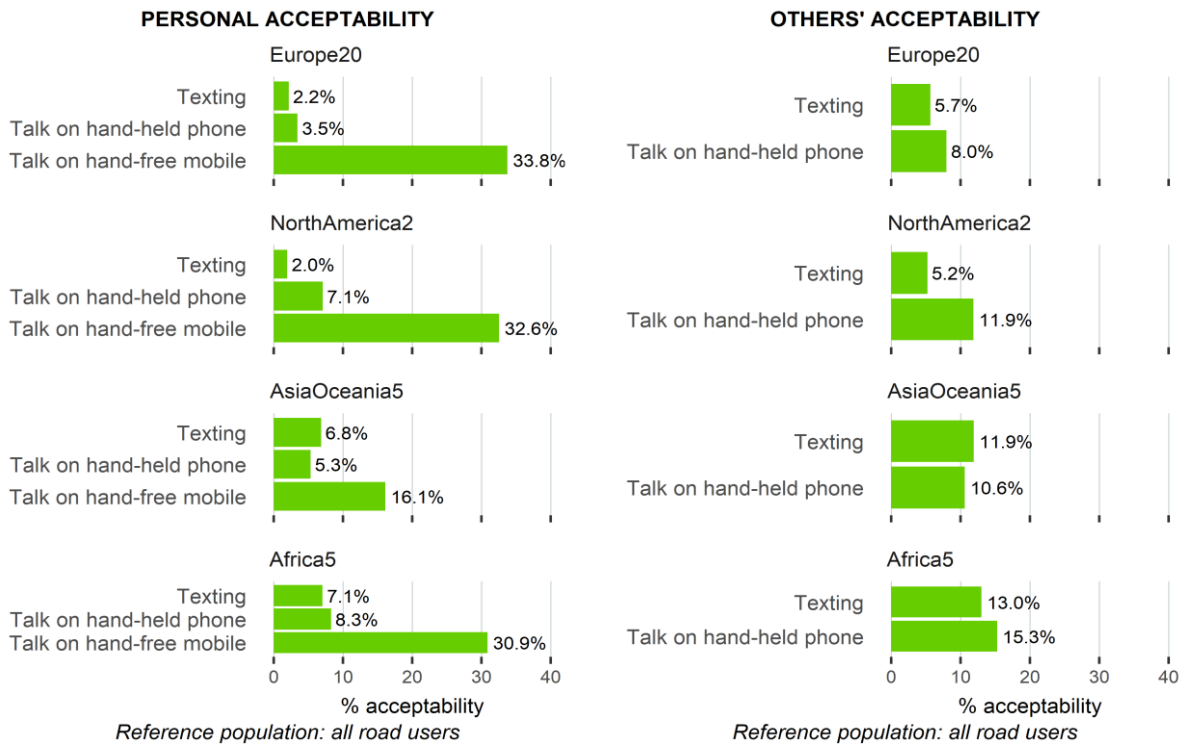


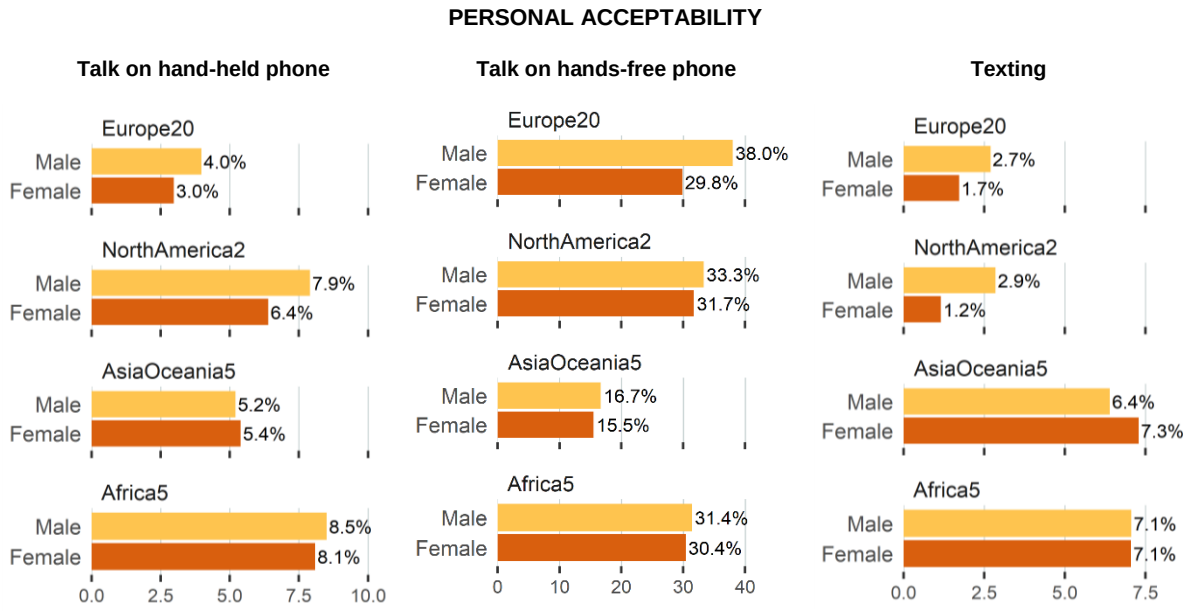
Figure 6: Acceptability of unsafe traffic behaviours related to the use of mobile phone while driving, by region.

Results of personal and social acceptability of behaviours concerning the use of mobile phone while driving by country are presented in the Appendix 3 (figures Figure A1 and Figure A2).

The analysis of declared personal acceptability by gender (Figure 7) shows that in Europe20, women, who have lower percentages of self-declared behaviour, also have significantly lower rates of acceptability for all three behaviours (p-value < 0.01), however the strength of the association is small. In NorthAmerica2 region, the percentages of personal acceptability were also lower among women, but only statistically significant for texting (p-value < 0.01). There were no significant differences between men and women neither in AsiaOceania5 nor in Africa5. The strength of the association with gender was small in all regions (Cramer's V < 0.10).

Overall, the increase of the age is associated with a decrease in personal acceptability rates in Europe20 and in NorthAmerica2 regions (Figure 8). The strength of the association is large for talking on a hand-held mobile phone (Cramer's V = 0.209) and for using hands-free devices (Cramer's V = 0.220) and medium in the other cases. However, in NorthAmerica2 region there was no significant differences in the acceptability of using hands-free devices until 44 years (p > 0.01) old and the rates of acceptability of texting was close to zero among participants aged 45 years old or older.

In the other regions the association between age and personal acceptability is weaker (Cramer's V < 0.12) and the trend of decreasing acceptability with the increase of the age is not so clear as in Europe20 and in NorthAmerica2. In AsiaOceania5 it's possible to distinguish two age groups with different levels of acceptability: road users until 44 years old have higher rates of acceptability than road users aged 45 years old or higher (there was no significant differences within each group: p > 0.01). In Africa5, older road users (65 years old or more) have significantly higher rates of personal acceptability of handling the mobile phone (to talk or to text) and lower rates of acceptability on using hands-free devices. There were no significant differences among participants younger than 65 years old in none of the three behaviours.



Reference population: all road users

Figure 7: Personal acceptability of unsafe traffic behaviours related to the use of mobile phone while driving, by region and gender.

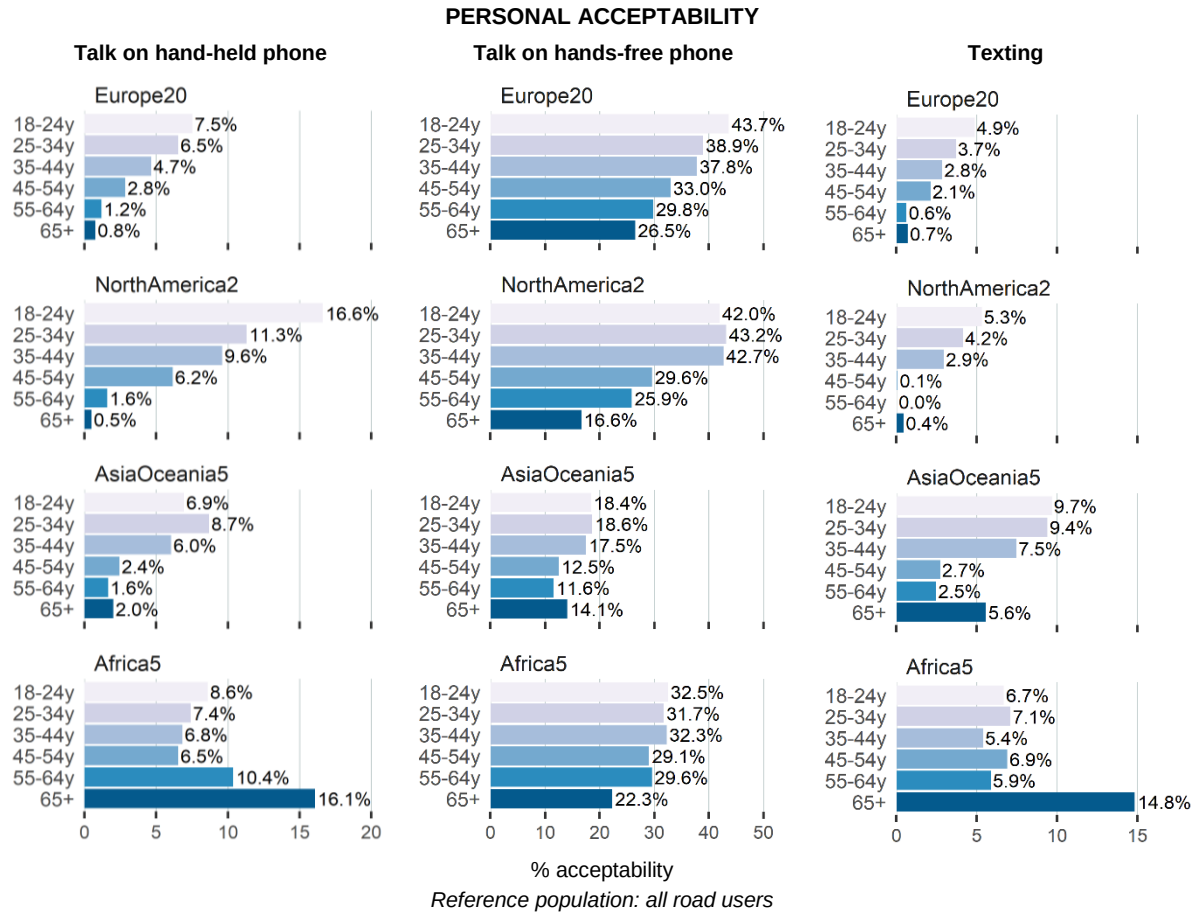


Figure 8: Personal acceptability of unsafe traffic behaviours related to the use of mobile phone while driving, by region and age group.

3.1.3 Attitudes towards unsafe behaviour in traffic

Attitudes towards unsafe behaviours concerning to the use of mobile while driving phone were assessed by asking the level of agreement with statements related to behaviour believes and attitudes:

- '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')

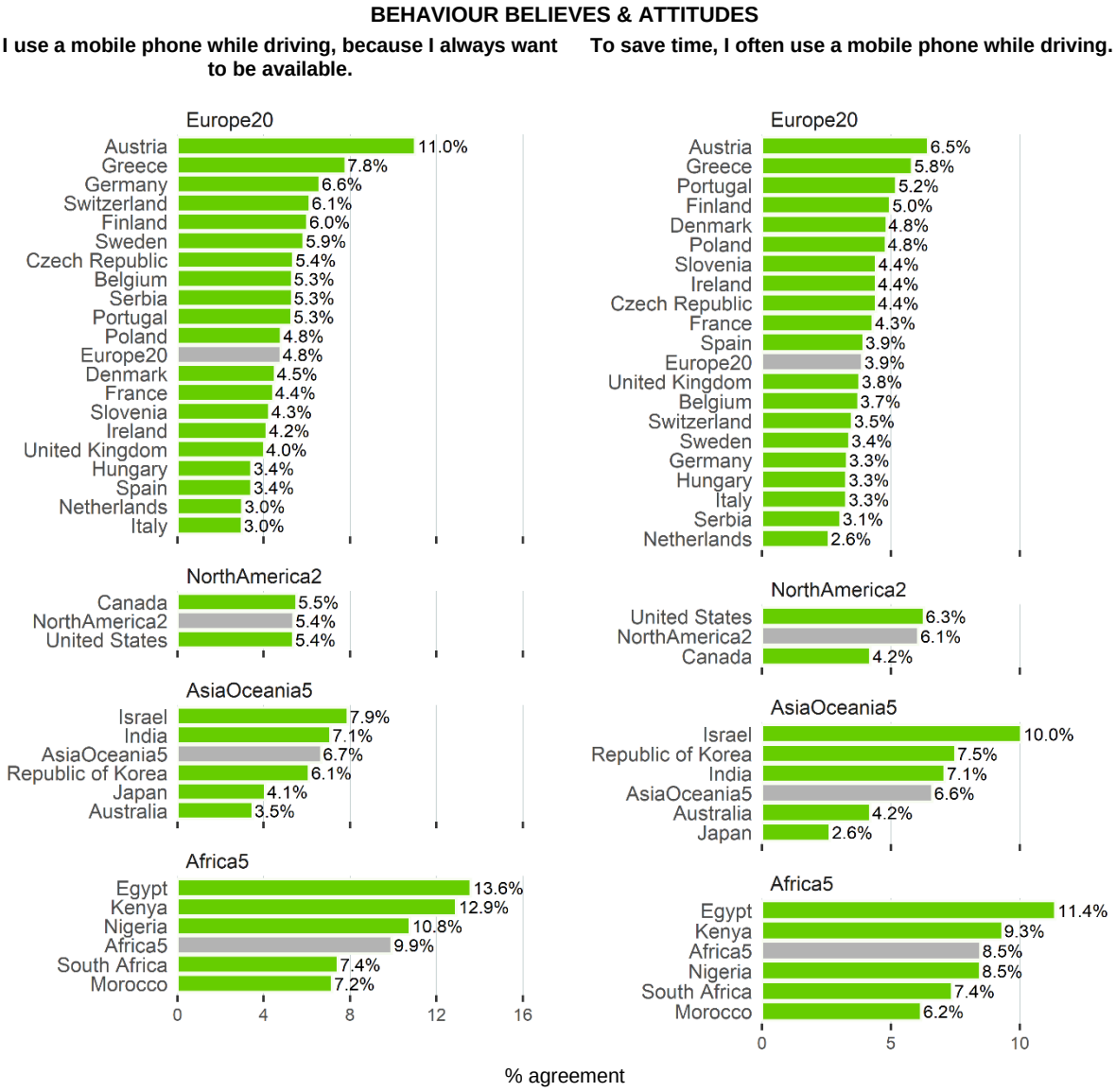
and perceived behaviour control:

- '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'

All questions were answered by drivers and riders (at least a few days a year) on a Likert scale from 1 (disagree) to 5 (agree). The percentages of agreement (answers 4 or 5) are shown in the results.

Behaviour beliefs and attitudes

The percentage of respondents who declared using a mobile phone while driving because they always want to be available, or to save time was higher in Africa5 (9.9% and 8.5%, respectively) and lower in Europe20 (4.8% and 3.9%) – differences were statistically significant between the two regions and when comparing with the other regions (p-value < 0.01). There were no significant differences between NorthAmerica2 and AsiaOceania5 (p-value > 0.01): 5.4% of NorthAmerica2 drivers and 6.7% of AsiaOceania5 drivers declared using a mobile phone while driving because they always want to be available; 6.1% of NorthAmerica2 drivers and 6.6% of AsiaOceania5 drivers declared that they often use a mobile phone while driving to save time (Figure 9).

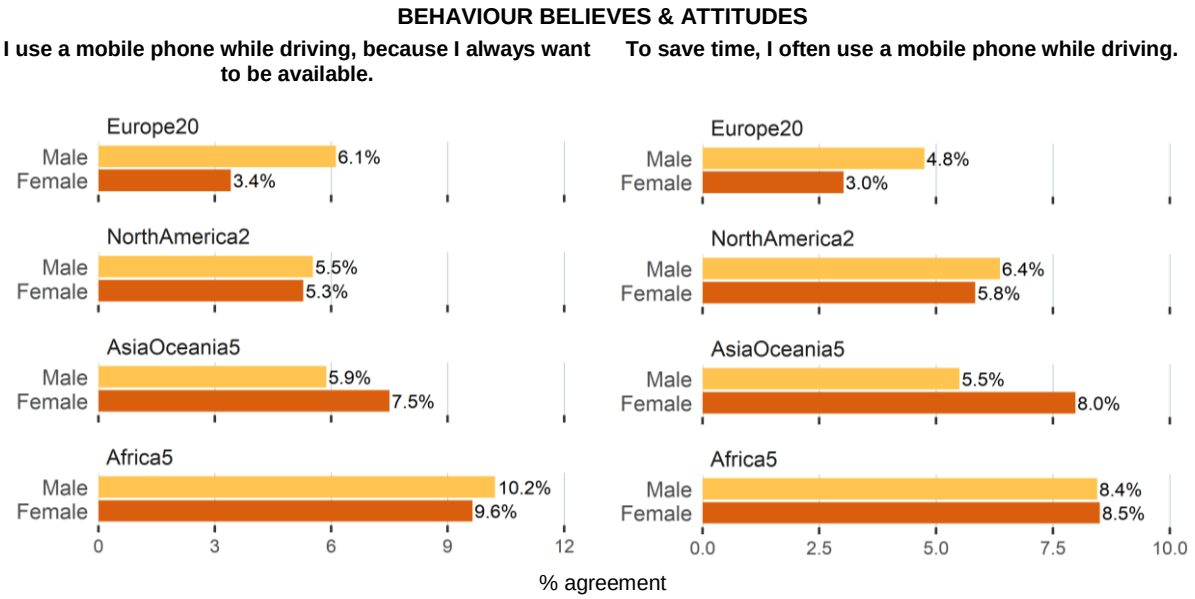


Reference population: drivers and riders at least a few days per year

Figure 9: Behaviour beliefs and attitudes concernig the use of mobile of mobile phone while driving, by region and country.

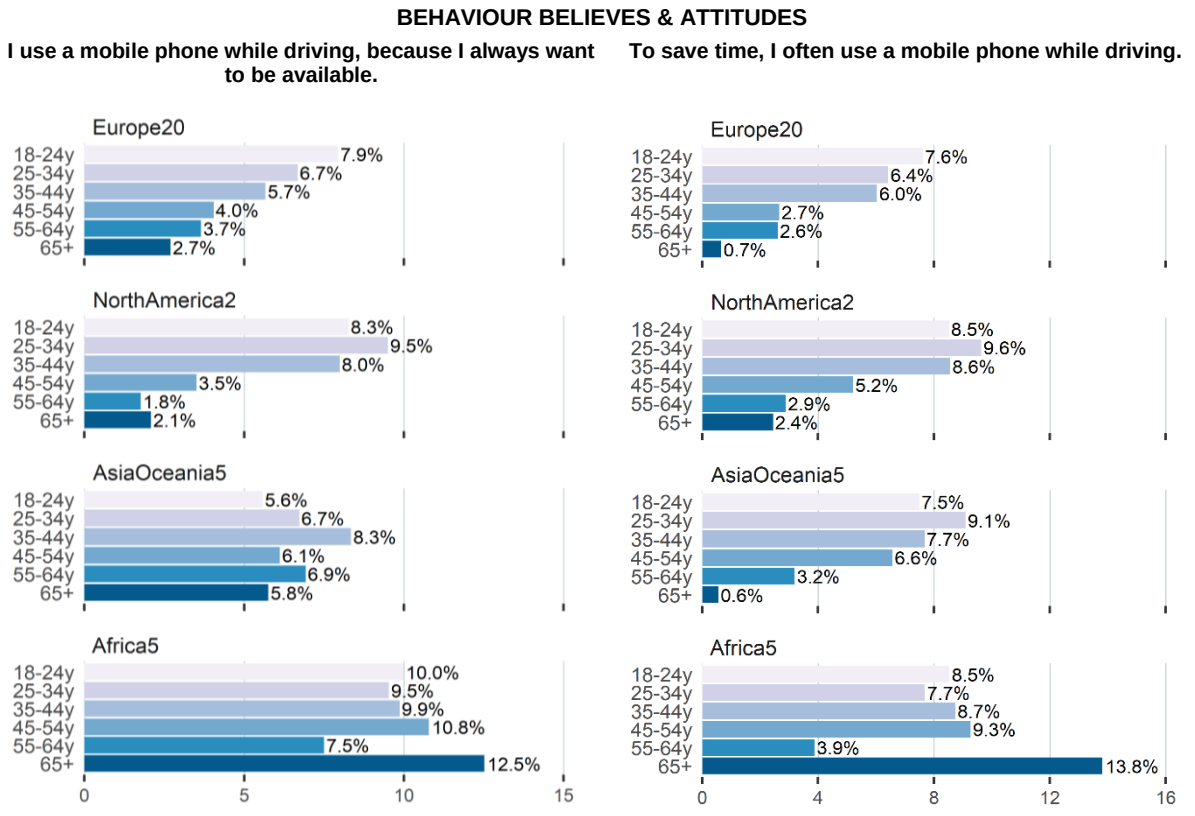
Analysis by gender (Figure 10) shows that the percentages of agreement are significantly higher in men than women in Europe20 region (p-value < 0.01). On the contrary, in AsiaOceania5 region a significantly higher percentage of women declared using a mobile phone while driving because they always want to be available (p-value = 0.029), or to save time (p-value < 0.01). There were no significant differences between males and females neither in NorthAmerica2 nor in Africa5 (p > 0.05). Despite some associations being significant, all were weak (Cramer's V < 0.07).

In Europe20 and NorthAmerica2 the percentages of agreement with both statements depend significantly on the age (p-value < 0.001): overall, percentages of agreement were higher among the younger drivers and lower among older drivers. A similar result was found in AsiaOceania5 concerning using a mobile phone while driving to save time (p-value < 0.01). In this region, using a mobile phone while driving to always be available does not depend on the age (p-value > 0.01). Results from Africa5 show that percentages of agreement were higher within drivers aged 65 or higher and lower within drivers aged 55-64 years old – differences were statistically significant for using a mobile phone while driving to save time (p-value < 0.01), but not because drivers always want to be available (p-value > 0.01) (Figure 11).



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

Figure 10: Behaviour beliefs and attitudes concernig the use of mobile of mobile phone while driving, by region and gender.

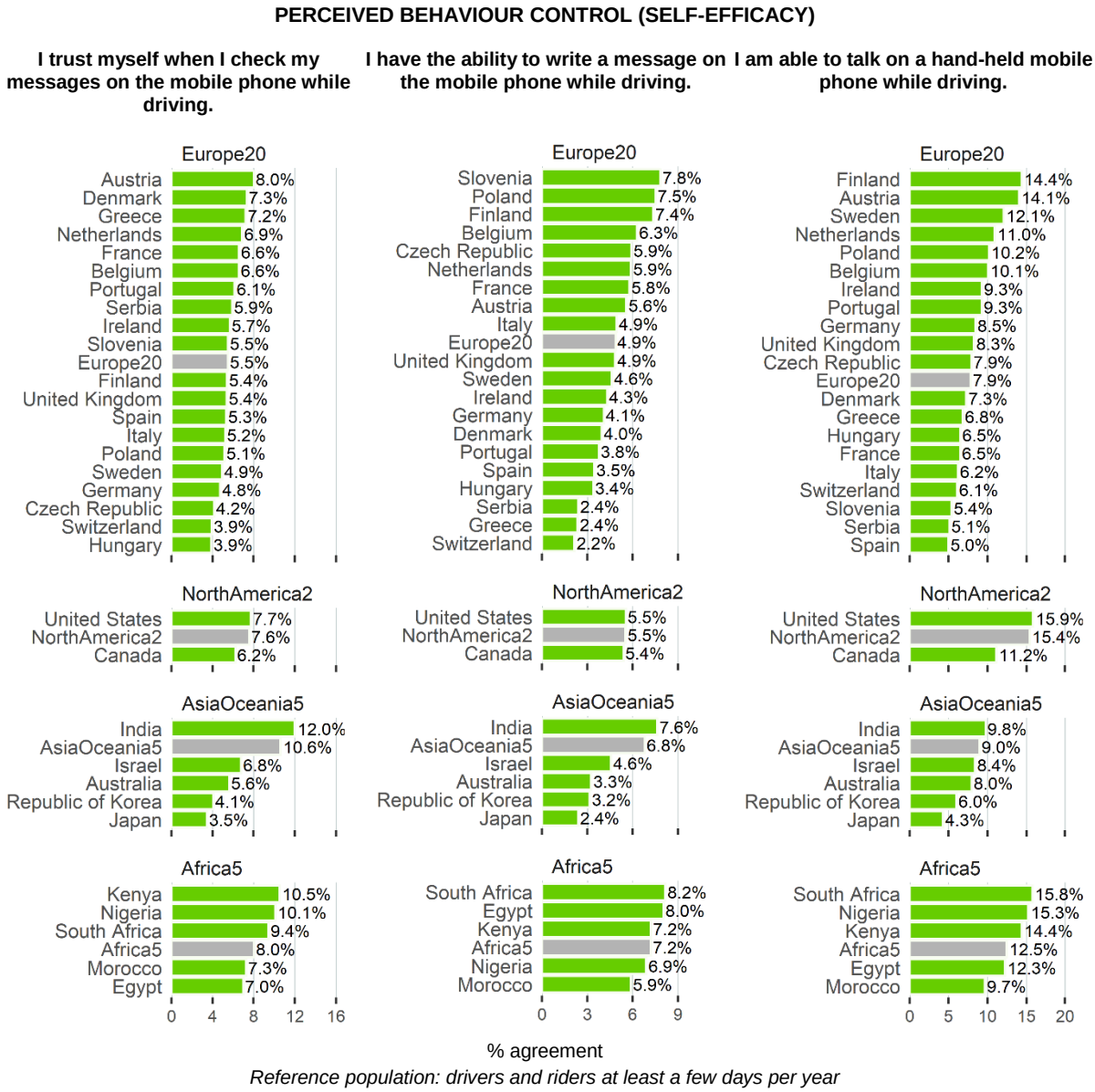


Reference population: drivers and riders at least a few days per year

Figure 11: Behaviour beliefs and attitudes concernig the use of mobile of mobile phone while driving, by region and age group.

Perceived behaviour control (Self-efficacy)

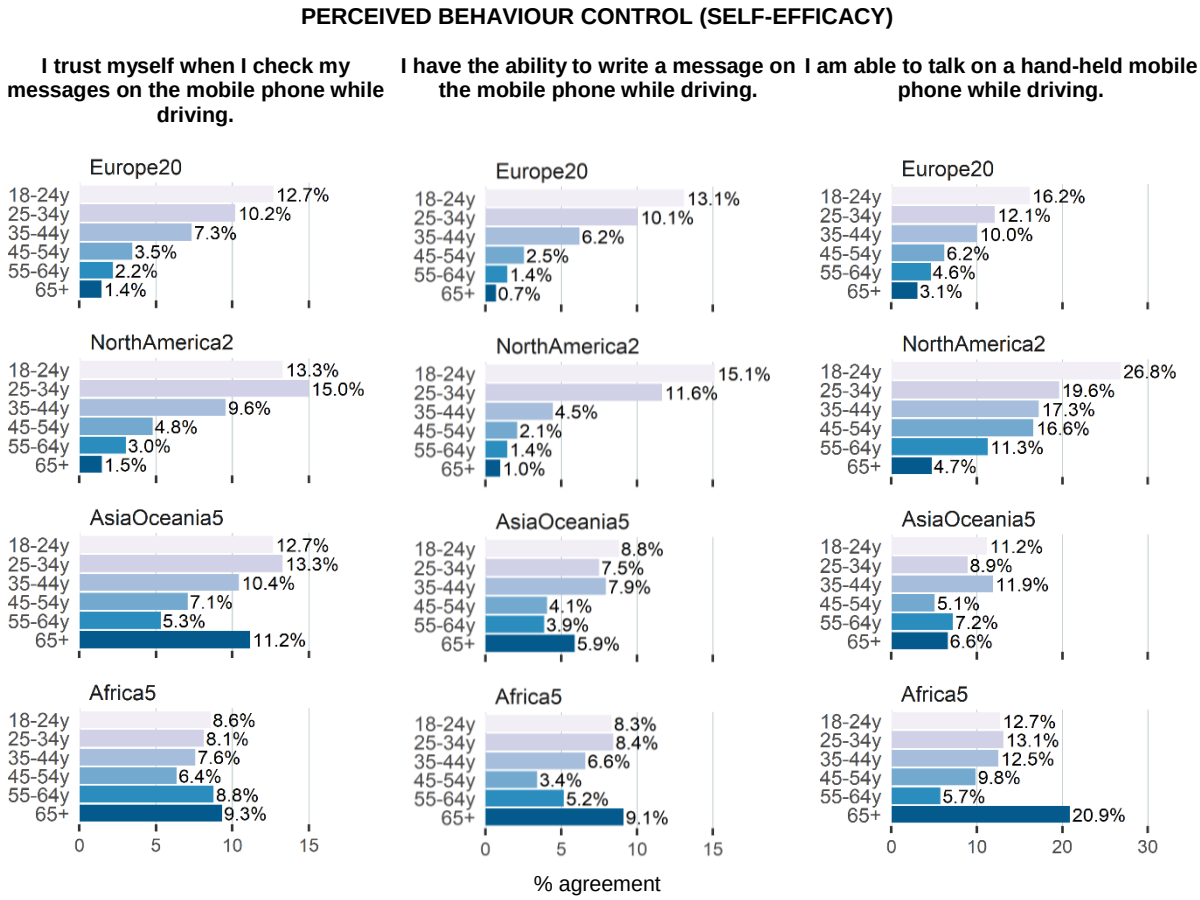
Results from Figure 12 show that 15.4% of drivers/riders from NorthAmerica2, 12.5% from Africa5, 9.0% from AsiaOceania5 and 7.9% from Europe20 believe that they are able to talk on a hand-held mobile phone while driving (differences were statistically significant between all pairs of regions, except between Europe20 and AsiaOceania5). The percentages of those who declared having the ability to write a message on the mobile phone while driving is lower in all regions: 5.5% in NorthAmerica2, 7.2% in Africa5, 6.8% in AsiaOceania5 and 4.9% in Europe20 (differences were only statistically significant ($p < 0.01$) between Europe20 and AsiaOceania5, and between Europe20 and Africa5). The rate of drivers/riders who declared trusting themselves when they check messages on the mobile phone while driving also depend significantly on region (p-value < 0.01): 10.6% in AsiaOceania5, 8.0% in Africa5, 7.6% in NorthAmerica2 and 5.5% in Europe20 – differences were statistically significant between all pairs of regions, except between NorthAmerica2 and Africa5.



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

Figure 12: Perceived behaviour control (self-eficacy) concernig the use of mobile of mobile phone while driving, by region and country.

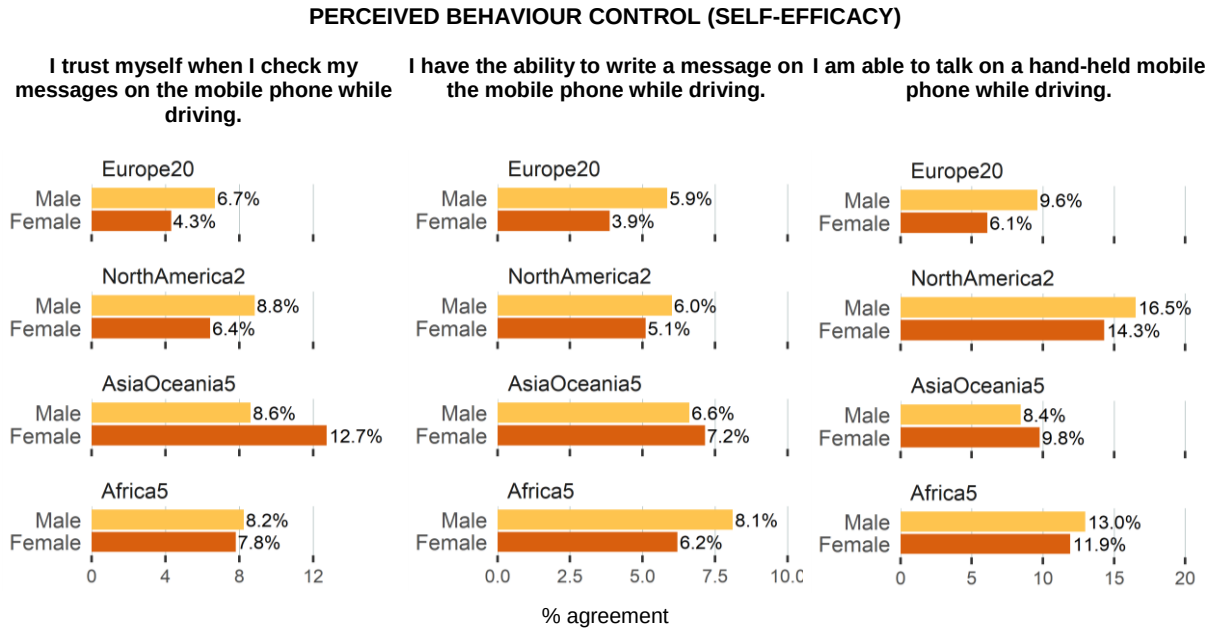
The analysis of the association with age shows that the perceived behaviour control depend significantly on the age for all regions ($p < 0.01$), except for the item 'I trust myself when I check my messages on the mobile phone while driving' in Africa5 ($p = 0.547$). However, while in Europe20 and in NorthAmerica2 the perceived behaviour control is higher in younger drivers and decreases with the increase of age, in AsiaOceania5 and Africa5 this pattern does not exist (Figure 13).



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

Figure 13: Perceived behaviour control (self-eficacy) concernig the use of mobile of mobile phone while driving, by region and age group.

Overall, perceived behaviour control was higher among men than women in Europe20, NorthAmerica2 and Africa5. On the contrary, in AsiaOceania5, it was higher among women than men. However, differences were only significantly different for the statements 'I trust myself when I check my messages on the mobile phone while driving' in Europe20 and AsiaOceania5, and 'I have the ability to write a message on the mobile phone while driving' in Europe20, and the strength of the associations was small for all regions (Cramer's $V < 0.07$) (Figure 14).



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

Figure 14: Perceived behaviour control (self-eficacy) concernig the use of mobile of mobile phone while driving, by region and gender.

3.1.4 Risk perception

To assess the risk perception of using the mobile phone while driving, 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. Two of them concerning to the use of mobile phone: 'using a hand-held mobile phone while driving' and '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.

The analysis by region (Figure 15) shows that road users consider riskier talking on a hand-held mobile phone while driving than using a hands-free mobile phone in all the four regions. Differences are smaller in AsiaOceania5 than in other regions – in Republic of Korea, the risk perception of using hands-free devices is lower than of talking on a hand-held phone.

The percentages of respondents who consider that talking on a hand-held while driving is often/frequently the cause of a road crash involving a car were significantly different between all pairs or regions (p-value < 0.01): Europe20 (75.8%), NorthAmerica2 (70.8%), Africa5 (61.9%), and AsiaOceania5 (53.6%). In the case of talking on a hands-free phone, the proportion was significantly higher in Europe20 (50.9%) than in the other regions (p-value < 0.01): NorthAmerica2 (45.6%), AsiaOceania5 (48.1%), and Africa5 (47.5%) – there were no significant differences among the three regions (p-value > 0.01). The association with the regions was stronger for talking on a hand-held mobile phone (Cramer's V = 0.193) than for using hands-free devices (Cramer's V = 0.037).

Using a hands-free mobile phone while driving was the behaviour considered less risky among all the eight risky behaviours presented (driving after drinking alcohol, driving faster than the speed limit, driving after taking drugs (other than medication), driving while tired, and inattentiveness or day-dreaming while driving) in all the four regions (results not shown). Talking on a hand-held mobile phone was the second in Europe20 (after DUI), the third in NorthAmerica2 (after DUI and speeding), the fifth in AsiaOceania5 and the seventh in Africa5.

Results on risk perception, together with results on acceptability and self-declared behaviours, show that many drivers use the mobile phone while driving even being aware of the risks. The social expectation to return calls or answer text messages immediately; professional reasons; or perceived practical, social, and psychological benefits could outweigh the risk of using the mobile phone while

driving (Nurullah, 2013). Personality traits that lead drivers to take risks while driving could also be an explanation, as suggested by Zhao et al. (2013).

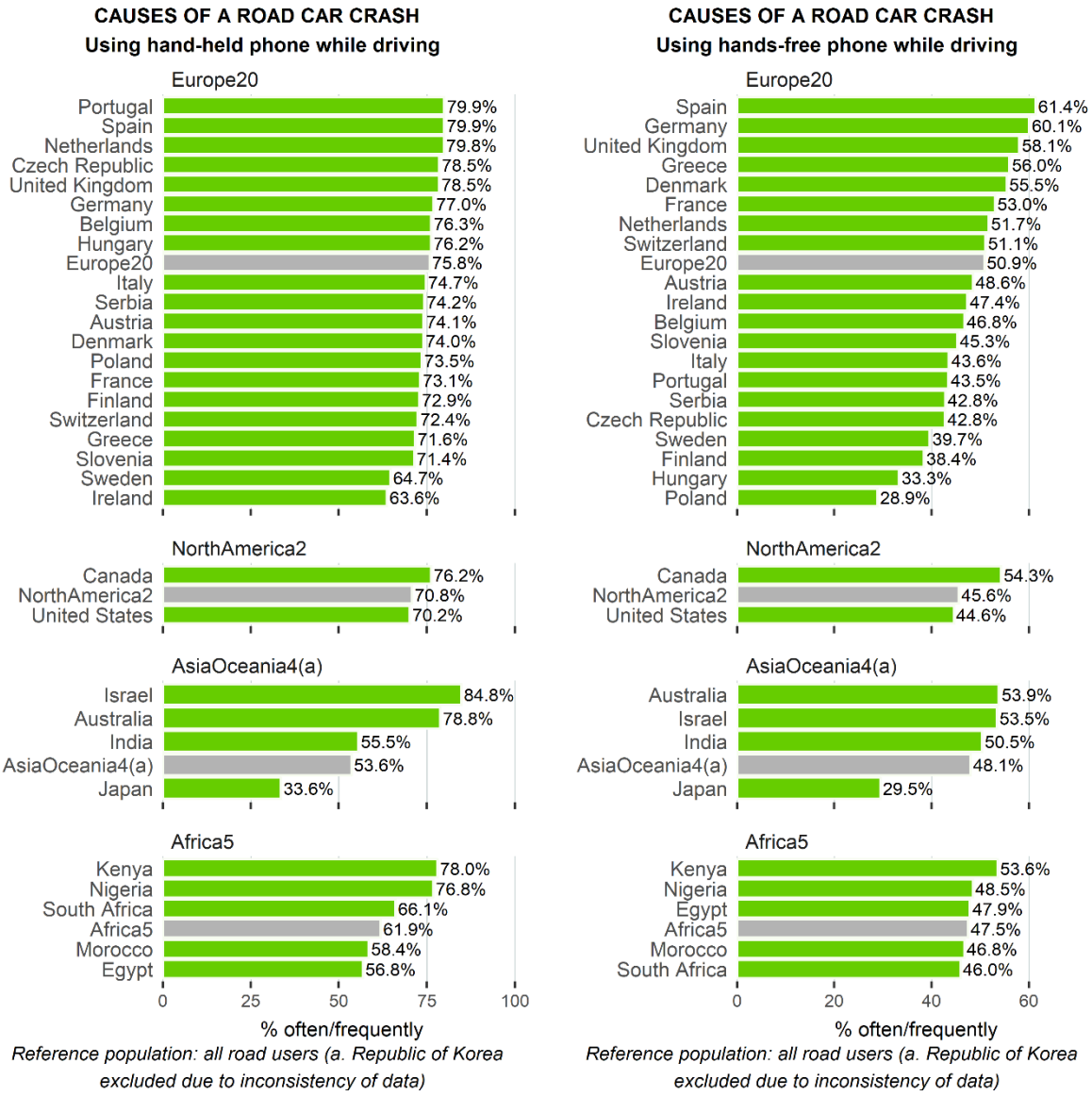


Figure 15: Risk perception of talking on a mobile phone while driving, by region and country.

The association of risk perception and gender was small in all regions (Cramer's V < 0.09). Comparing to men, women consider the use of a hand-held mobile phone while driving riskier – percentages significantly higher for all regions (p-value < 0.01). For talking on a hands-free mobile phone, the percentages were significantly higher among females in Europe20 and in AsiaOceania5 (p-value < 0.01), but there were no statistically significant differences neither in NorthAmerica2 nor in Africa5 (p-value > 0.01) (Figure 16).

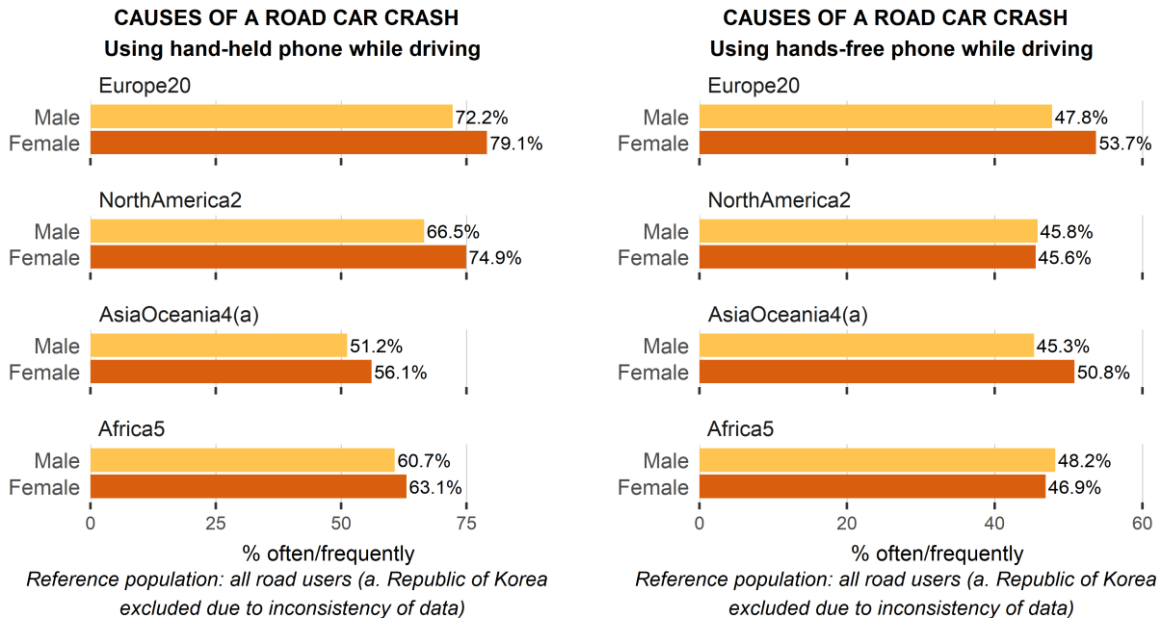


Figure 16: Risk perception of talking on a mobile phone while driving, by region and gender.

Regarding the association of risk perception with age (Figure 17), in regions Europe20 and NorthAmerica2 the risk perception increases with the increase of the age – associations of medium to high strength (Cramer's V ranging from 0.12 to 0.20) and statistically significant (p-value < 0.01). This trend is not present neither in AsiaOceania5 nor in Africa5.

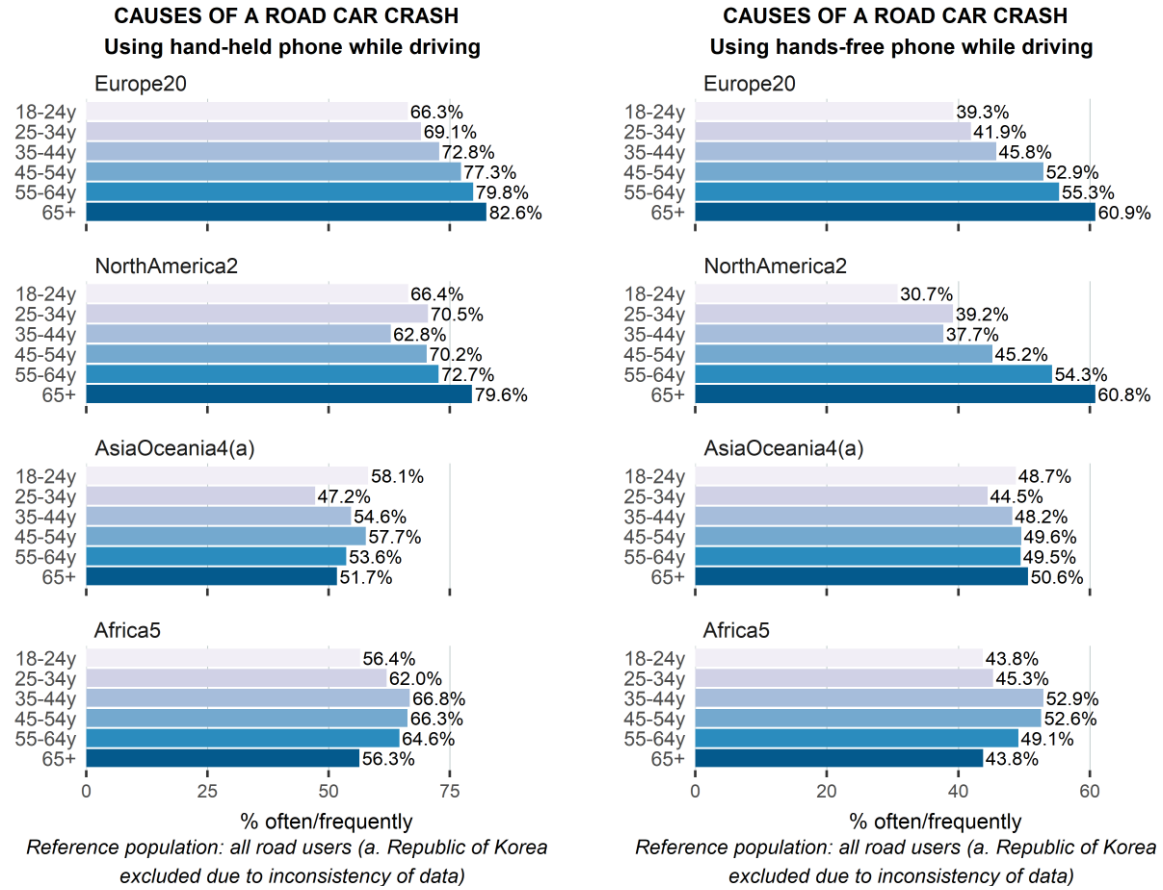


Figure 17: Risk perception of talking on a mobile phone while driving, by region and age group.

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 have zero tolerance for using any type of mobile phone while driving (hand-held or hands-free) for all drivers?*' (answer on a Likert scale from 1 (oppose) to 5 (support)).

More than half of the respondents support zero tolerance for using any type of mobile phone while driving for all drivers (answers from 4 or 5). Results show that the rate of support depends significantly on the region ($p < 0.01$): AsiaOceania5 (67.1%) was the region with the highest rate of support, followed by Africa5 (56.2%) and by Europe20 (54.0%) and NorthAmerica2 (51.8%) (differences between Europe20 and NorthAmerica2 were not statistically significant).

3.1.6 Traffic rules and penalties

Opinions on rules and penalties concerning the use of a mobile phone while driving or riding were assessed by asking if they agree/disagree with three statements: '*traffic rule/penalties should be stricter*', '*traffic rules/penalties are too severe*', and '*traffic rules are not being checked sufficiently*'.

Results from Figure 18 show that the majority of respondents from Europe20, NorthAmerica2 and AsiaOceania5 agree that traffic rules/penalties should be stricter and are not being checked sufficiently: 73.1% and 79.5%, respectively, in Europe20; 67.0% and 75.9% in NorthAmerica2; 92.0% and 79.7% in AsiaOceania5. On the other hand, a minority agree that traffic rules/penalties are too severe: 22.6% in Europe20; 20.1% in NorthAmerica2; 34.2% in AsiaOceania5.

In Africa5, the percentage of respondents who agree that traffic rule/penalties should be stricter (50.3%) and are not being checked sufficiently (54.6%) is significantly lower than in other regions, and the percentage of those who agree that traffic rules/penalties are too severe (46.0%) is significantly higher than in other regions.

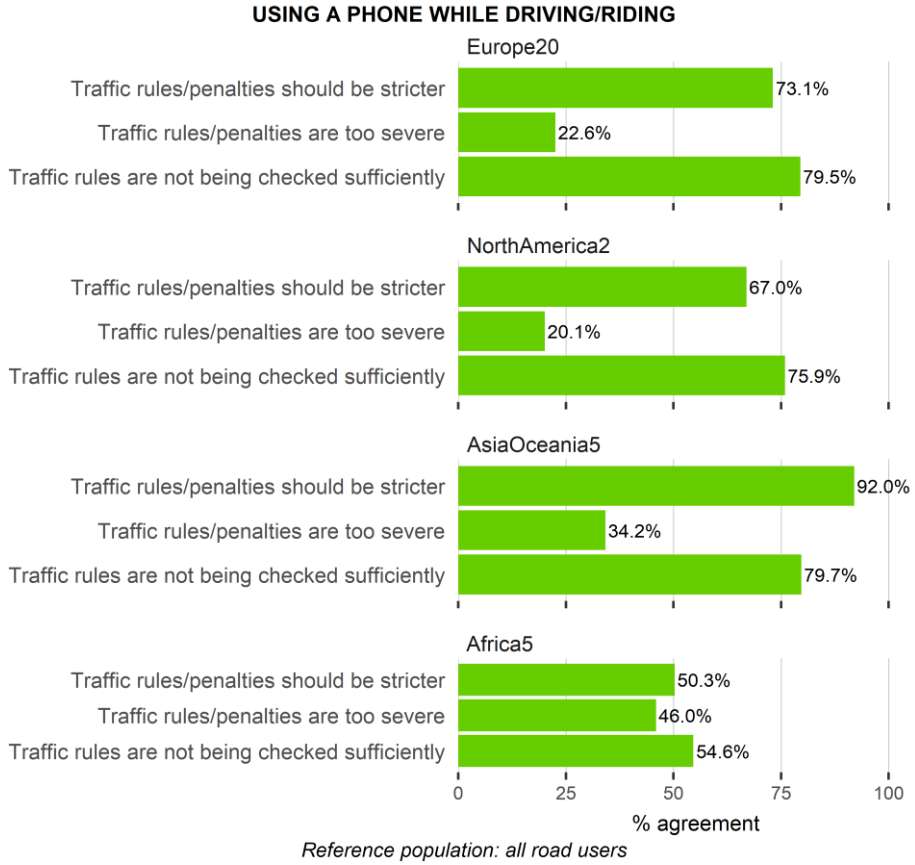


Figure 18: Opinons on traffic rules and penalties, by region.

3.1.7 Enforcement perception

Enforcement perception was assessed by asking '*On a typical journey, how likely is it that you (as a car driver) will be checked by the police for the use of hand-held mobile phone to talk or text while driving?* The scale of answer ranged from 1 (very unlikely) to 7 (very likely).

Results show that the percentage of car drivers that found it likely (answers from 5 to 7) to be checked by the police for using a hand-held mobile phone while driving depend significantly on the region (p-value < 0.001). Proportions were significantly different between all pairs or regions: it was higher in Africa5 (31.7%), followed by AsiaOceania5 (25.2%), Europe20 (18.9%) and NorthAmerica2 (12.7%).

3.2 Further analyses

3.2.1 Factors that influence the use of mobile phone while driving a car

In this section, binary logistic regression models are used to study the factors that influence self-declared behaviours of using a mobile phone while driving a car: talking on a hand-held mobile phone and texting. Models were carried out separately for each of the four regions: Europe20, NorthAmerica2, AsiaOceania5, and Africa5.

In each model, the outcome is a binary variable indicating the absence (0=never) or presence (1=at least once) of self-declared behaviours in the past 30 days concerning the use of the mobile phone while driving a car (talk on a hand-held mobile phone and read a text message/email or check social media). Models include car drivers who have driven a car at least a few days a month in the past 12 months.

Independent variables entered in the model in two blocks: the first block included sociodemographic characteristics (gender, age, educational level and professional occupation); the second block included the acceptability of unsafe traffic behaviours, attitudes, risk perception, enforcement perception, and support for policy measures. Models were adjusted for the Socially Desirable Scale and for frequency of driving a car.

Odds ratios (and the respective 99% Confidence Intervals) are used to measure the strength of association between the variables.

Talking on a hand-held mobile phone while driving (car drivers)

Table 2 shows the results of the four logistic regression models for talking on a hand-held mobile phone while driving a car – one model for each region.

The odds of talking on a hand-held mobile phone while driving a car for men, in comparison with women, increase by 26% (OR = 1.26, p-value < 0.01) in Europe20, by 21% (OR = 1.21, p-value < 0.01) in AsiaOceania5, and by 57% (OR = 1.57, p-value < 0.01) in Africa5. In NorthAmerica2, men are less likely to talk on a hand-held mobile phone while driving, but the effect is not statistically significant (OR = 0.82, p-value > 0.01).

Overall, the odds of talking on a hand-held mobile phone decrease with the increase of the age group, when comparing with younger drivers (aged 18 to 24 – reference group), in Europe20, NorthAmerica2, and AsiaOceania5. In other words, in these regions, the older the driver, the lower the probability of talking on a hand-held mobile phone while driving. This trend is not observed in Africa5.

Educational level does not have a significant effect on the self-declared behaviour of talking on hand-held mobile phone, considering a significant level of 1%. Despite not being statistically significant, in AsiaOceania5 and in Africa5, drivers with higher educational levels (Bachelor's degree or higher) are more likely to talk on the mobile phone than those with lower level of education (no education or primary education): OR > 1.90, but p-value > 0.01).

Overall, drivers who have a professional occupation are more likely to talk on a hand-held mobile phone while driving than drivers who have no professional occupation (reference group).

Table 2: Factors that influence the self-declared behaviour of talking on a hand-held mobile phone while driving a car.

Independent variables (reference categories)	Dependent variable: self-declared behaviour (past 30 days) - **talk on a hand-held mobile phone while driving a car** (0=never; 1=at least once)			
	Europe20	**NorthAmerica2**	**AsiaOceania5**	**Africa5**
	Odds Ratio (CI99%)	Odds Ratio (CI99%)	Odds Ratio (CI99%)	Odds Ratio (CI99%)
BLOCK 1 – Sociodemographic				
Gender (Ref. female)				
Male	**1.26**** (1.15-1.38)	**0.82** (0.61-1.11)	**1.21**** (0.99-1.48)	**1.57**** (1.30-1.89)
Age group (Ref. 18-24y)				
25-34y	**0.90** (0.75-1.07)	**0.79** (0.46-1.35)	**0.74*** (0.51-1.06)	**1.32**** (1.01-1.73)
35-44y	**0.81**** (0.68-0.96)	**0.58*** (0.34-1.01)	**0.68**** (0.47-0.97)	**1.05** (0.79-1.40)
45-54y	**0.61**** (0.52-0.73)	**0.44**** (0.25-0.75)	**0.67**** (0.47-0.98)	**1.08** (0.77-1.52)
55-64y	**0.48**** (0.40-0.58)	**0.44**** (0.25-0.76)	**0.55**** (0.38-0.82)	**0.40**** (0.25-0.66)
65+y	**0.32**** (0.26-0.39)	**0.22**** (0.12-0.40)	**0.33**** (0.22-0.52)	**0.70** (0.38-1.29)
Educational level (Ref. none/ primary education)				
Secondary education	**0.92** (0.75-1.14)	**0.66** (0.36-1.20)	**1.12** (0.32-3.90)	**1.43** (0.57-3.61)
Bachelor's degree or similar	**0.97** (0.78-1.21)	**0.58*** (0.32-1.08)	**1.92** (0.55-6.63)	**1.96** (0.79-4.88)
Master's degree or higher	**1.03** (0.81-1.30)	**1.00** (0.48-2.07)	**1.93** (0.55-6.81)	**1.93** (0.76-4.94)
Professional occupation (Ref. no professional occupation)				
White collar/office worker (excluding executive)/ employee	**1.23**** (1.08-1.41)	**1.30** (0.86-1.97)	**1.52**** (1.13-2.05)	**1.27*** (0.94-1.72)
Blue collar or manual worker/worker	**1.30**** (1.10-1.52)	**1.30** (0.81-2.10)	**1.07** (0.68-1.68)	**1.16** (0.69-1.92)
Executive	**1.67**** (1.38-2.02)	**1.27** (0.58-2.79)	**2.00**** (1.32-3.04)	**1.51**** (1.04-2.21)
Self-employed/independent professional	**1.66**** (1.40-1.97)	**1.90**** (1.10-3.29)	**1.88**** (1.33-2.66)	**1.24** (0.91-1.67)
BLOCK 2				
Acceptability (Ref. unacceptable/neutral)				
Others' acceptability (acceptable)	**1.64**** (1.38-1.95)	**1.33** (0.71-2.50)	**1.40*** (0.94-2.08)	**1.37*** (1.00-1.88)
Personal acceptability (acceptable)	**2.58**** (1.92-3.46)	**3.41**** (1.50-7.76)	**1.85**** (1.06-3.20)	**1.45** (0.88-2.39)
Attitudes (Ref. disagree/neutral)				
I use a mobile phone while driving, because I always want to be available (agree)	**1.67**** (1.34-2.08)	**1.68** (0.72-3.89)	**2.20**** (1.42-3.42)	**2.11**** (1.40-3.19)
To save time, I often use a mobile phone while driving (agree)	**1.77**** (1.39-2.26)	**2.51**** (1.03-6.07)	**2.40**** (1.58-3.64)	**3.15**** (1.91-5.18)
I am able to talk on a hand-held mobile phone while driving (agree)	**2.69**** (2.28-3.18)	**3.04**** (1.84-5.04)	**3.10**** (2.13-4.53)	**3.13**** (2.19-4.49)
Risk perception (Ref. not that often/not frequently)				
How often do you think using a hand-held mobile phone while driving is the cause of a road crash involving a car (often/frequently)	**0.76**** (0.69-0.85)	**0.72*** (0.50-1.04)	**0.66**** (0.53-0.81)	**0.96** (0.78-1.19)
Enforcement perception (Ref. unlikely/neutral)				
Being checked by the police for the use of hand-held mobile phone to talk or text while driving (likely)	**1.41**** (1.26-1.58)	**1.56*** (0.97-2.52)	**1.14** (0.88-1.48)	**1.26**** (1.02-1.56)
Support for policy measures (Ref. oppose/neutral)				
Support legal obligation to have zero tolerance for using any type of mobile phone while driving (hand-held or hands-free) for all drivers (support)	**0.60**** (0.55-0.66)	**0.42**** (0.30-0.58)	**0.80**** (0.65-0.99)	**0.65**** (0.53-0.80)

*Notes: (1) reference population – car drivers at least a few days a month; (2) models adjusted for Socially Desirable Scale and for frequency of driving a car; (3) * p-value<0.05, **p-value<0.01.*

Concerning the other factors, results show that the higher the acceptability (personal and others' acceptability) and the higher the attitudes towards talking on a hand-held mobile phone while driving a car (using a mobile phone while driving because always want to be available, use a mobile phone while driving to save time, and the belief of being able to talk on a hand-held mobile phone while driving), the higher the odds of doing it. On the other hand, drivers with higher risk perception and the ones who support zero tolerance for using any type of mobile phone while driving, are less likely to talk on a hand-held mobile phone while driving a car. These results were observed in all regions, except for the effect of the risk perception in Africa5. In this region, the perception of risk doesn't influence the self-declared behaviours of using a mobile phone while driving a car (OR = 0.96, p-value > 0.01).

In Europe20 and in NorthAmerica2, personal acceptability and perceived behaviour control were the ones with the strongest effect on the self-declared behaviour of talking on a hand-held mobile while driving a car. In fact, car drivers who find that talking on a hand-held mobile phone while driving is acceptable are 2.58 times more likely to do it in Europe20 and 3.41 times more likely to do it in NorthAmerica2, when comparing with the drivers that don´t accept it or have a neutral opinion. Car drivers who declared being able to talk on a hand-held mobile phone while driving are 2.69 times more likely to do it in Europe20 and 3.04 times more likely to do it in NorthAmerica2.

In AsiaOceania5 and in Africa5, attitudes towards talking on a hand-held mobile phone while driving were the factors with the strongest influence on the self-declared behaviour: car drivers who declared using a mobile phone while driving, because they always want to be available are 2.20 times more likely to do it in AsiaOceania5 and 2.11 times more likely to do it in Africa5; car drivers who often use a mobile phone while driving to save time are 2.40 times more likely to do it in AsiaOceania5 and 3.15 times more likely to do it in Africa5; car drivers who belief that are able to talk on a hand-held mobile phone while driving are 3.10 times more likely to do it in AsiaOceania5 and 3.13 times more likely to do it in Africa5.

Results also show a significant association between the enforcement perception and the self-declared behaviour: drivers who believe it to be likely to be checked by the police for the use of hand-held mobile phone while driving are more likely to report the behaviour. This result is consistent with other findings based on self-reported data (Meesmann et al., 2015). This result must not lead to the conclusion that the enforcement leads to increase of the behaviour. Although the logistic regression analysis identifies several explanatory variables that predict the self-declared behaviour, the associations between independent and dependent variables are correlational and the causal direction of influence between variables is not indicated by the analysis. In this case, results may suggest that, compared to drivers that never use the mobile phone, drivers who do it have a higher perception of enforcement.

Reading a text message/email or check social media while driving (car drivers)

Table 3 shows the results of the four logistic regression models for reading a text message/email or check social media while driving a car – one model for each region.

The effects of the gender, the educational level, and the professional occupation on texting while driving a car are similar to the ones observed for talking on a hand-held mobile phone: higher odds for men and for drivers who have a professional occupation, and no significant effect of educational level. The effect of age is also similar, however it's stronger: the odds decrease more with the increase of the age than the observed for talking on a hand-held mobile phone.

Overall, the perceived behavioural control is the factor that influences the most the self-declared behaviour of texting while driving a car. In fact, car drivers who declared trusting themselves when they are checking messages on the mobile phone while driving are much more likely to text than the others ($p < 0.01$): OR = 4.16 in Europe20, OR = 4.38 in NorthAmerica2, OR = 4.44 in AsiaOceania5, and OR =2.50 in Africa5. The belief that they are able to write a message on the mobile phone while driving also strongly increases the odds of texting: OR = 3.22 in Europe20, OR = 3.09 in NorthAmerica2, OR = 2.04 in AsiaOceania5, and OR =3.25 in Africa5.

The personal acceptability of texting while driving, the use of a mobile phone while driving for always being available and to save time also increase the odds of texting while driving in all regions.

Drivers who support zero tolerance for using any type of mobile phone (hand-held or hands-free) while driving are less likely to talk on a hand-held mobile phone ($p < 0.01$): OR = 0.65 in Europe20, OR = 0.53 in NorthAmerica2, OR = 0.67 in AsiaOceania5, and OR =0.77 in Africa5.

Results also show that the perception of enforcement increases the odds of texting while driving in drivers from Europe20 region (OR = 1.34, $p < 0.01$). In the other regions, the effect is not statistically significant ($p > 0.05$).

Table 3: Factors that influence the self-declared behaviour of reading a text message/email or check social media (e.g. Facebook, twitter, etc.) while driving a car.

Independent variables (reference categories)	Dependent variable: self-declared behaviour (past 30 days) - **read a text message/email or check social media while driving a car** (0=never; 1=at least once)			
	Europe20	**NorthAmerica2**	**AsiaOceania5**	**Africa5**
	Odds Ratio (CI99%)	Odds Ratio (CI99%)	Odds Ratio (CI99%)	Odds Ratio (CI99%)
BLOCK 1 - Sociodemographic				
Gender (Ref. female)				
Male	**1.14**** (1.03-1.26)	**0.92** (0.67-1.26)	**1.12** (0.92-1.36)	**1.51**** (1.25-1.82)
Age group (Ref. 18-24y)				
25-34y	**0.79**** (0.66-0.94)	**0.96** (0.56-1.66)	**0.95** (0.66-1.35)	**1.03** (0.79-1.34)
35-44y	**0.59**** (0.50-0.71)	**0.65*** (0.37-1.12)	**0.83** (0.58-1.18)	**0.80*** (0.60-1.07)
45-54y	**0.38**** (0.31-0.45)	**0.36**** (0.21-0.63)	**0.58**** (0.40-0.84)	**0.65**** (0.46-0.91)
55-64y	**0.21**** (0.17-0.25)	**0.29**** (0.16-0.52)	**0.50**** (0.34-0.73)	**0.26**** (0.15-0.45)
65+y	**0.14**** (0.11-0.17)	**0.13**** (0.06-0.25)	**0.28**** (0.18-0.44)	**0.42**** (0.22-0.79)
Educational level (Ref. none/ primary education)				
Secondary education	**0.86** (0.68-1.09)	**0.79** (0.41-1.51)	**0.86** (0.28-2.71)	**1.14** (0.45-2.88)
Bachelor's degree or similar	**0.98** (0.77-1.25)	**0.82** (0.42-1.59)	**1.**20 (0.38-3.73)	**1.59** (0.64-3.97)
Master's degree or higher	**1.01** (0.78-1.30)	**1.41** (0.64-3.09)	**1.16** (0.36-3.69)	**1.69** (0.66-4.29)
Professional occupation (Ref. no professional occupation)				
White collar/office worker (excluding executive)/ employee	**1.37**** (1.19-1.58)	**1.62**** (1.04-2.51)	**1.65**** (1.23-2.22)	**1.11** (0.82-1.50)
Blue collar or manual worker/worker	**1.35**** (1.14-1.60)	**1.56*** (0.94-2.59)	**1.15** (0.75-1.77)	**1.09** (0.65-1.82)
Executive	**1.85**** (1.51-2.27)	**1.36** (0.60-3.11)	**2.56**** (1.69-3.88)	**1.31** (0.90-1.91)
Self-employed/independent professional	**1.74**** (1.44-2.10)	**2.02**** (1.12-3.62)	**1.95**** (1.38-2.76)	**0.95** (0.70-1.29)
BLOCK 2				
Acceptability (Ref. unacceptable/neutral)				
Others' acceptability (acceptable)	**1.44**** (1.15-1.80)	**1.66** (0.68-4.05)	**1.34** (0.87-2.05)	**0.92** (0.65-1.31)
Personal acceptability (acceptable)	**2.21**** (1.41-3.44)	**2.27** (0.39-13.06)	**2.58**** (1.34-4.97)	**1.93**** (1.12-3.32)
Attitudes (Ref. disagree/neutral)				
I use a mobile phone while driving, because I always want to be available (agree)	**1.92**** (1.52-2.44)	**1.59** (0.63-4.04)	**2.11**** (1.32-3.36)	**2.06**** (1.43-2.98)
To save time, I often use a mobile phone while driving (agree)	**2.44**** (1.87-3.19)	**2.93**** (1.12-7.64)	**2.40**** (1.54-3.74)	**2.02**** (1.33-3.07)
I trust myself when I check my messages on the mobile phone while driving (agree)	**4.16**** (3.28-5.29)	**4.38**** (1.91-10.08)	**4.44**** (2.80-7.05)	**2.50**** (1.65-3.77)
I have the ability to write a message on the mobile phone while driving (agree)	**3.22**** (2.47-4.18)	**3.09**** (1.18-8.08)	**2.04**** (1.13-3.69)	**3.25**** (2.01-5.26)
Enforcement perception (Ref. unlikely/neutral)				
Being checked by the police for the use of hand-held mobile phone to talk or text while driving (likely)	**1.34**** (1.18-1.52)	**1.35** (0.82-2.22)	**1.13** (0.87-1.46)	**1.02** (0.82-1.26)
Support for policy measures (Ref. oppose/neutral)				
Support legal obligation to have zero tolerance for using any type of mobile phone while driving (hand-held or hands-free) for all drivers (support)	**0.65**** (0.59-0.73)	**0.53**** (0.38-0.75)	**0.67**** (0.54-0.83)	**0.77**** (0.63-0.94)

*Notes: (1) reference population – car drivers at least a few days a month; (2) models adjusted for Socially Desirable Scale and for frequency of driving a car; (3) * p-value<0.05, **p-value<0.01.*

3.2.2 Bivariate associations, by country

Acceptability vs. self-declared behaviours

Figure 19 and Figure 20 show the association between personal acceptability and the self-declared behaviours of using a mobile phone while driving at a country level. Results show a positive correlation, indicating that the higher the personal acceptability in a country, the higher the rate of the self-declared behaviour, both for talking on a hand-held mobile phone (R = 0.498, p-value = 0.004) and for texting (R = 0.574, p-value = 0.001). Similar analysis for talking on a hands-free mobile phone revealed a weak and non-statistically significant association between self-declared behaviour and the personal acceptability (R = 0.192, p-value = 0.202). Figures Figure 19 and Figure 20 also allow to observe that the rates of the self-declared behaviour are much higher than the rates of acceptability in all countries and regions.

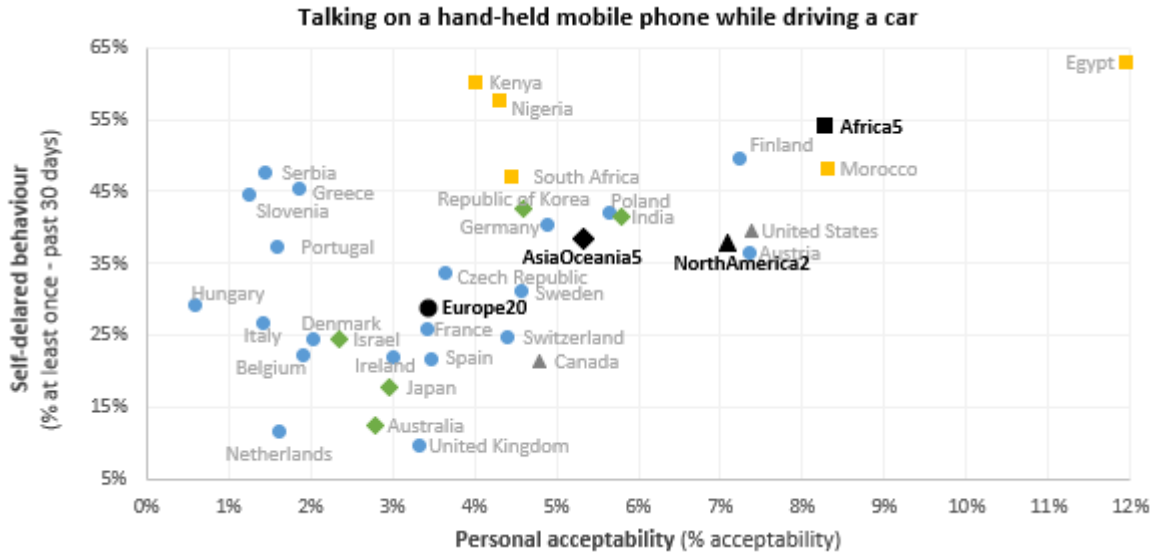


Figure 19: Association between self-declared behaviour and personal acceptability of talking on a hand-held mobile phone while driving a car, by country.

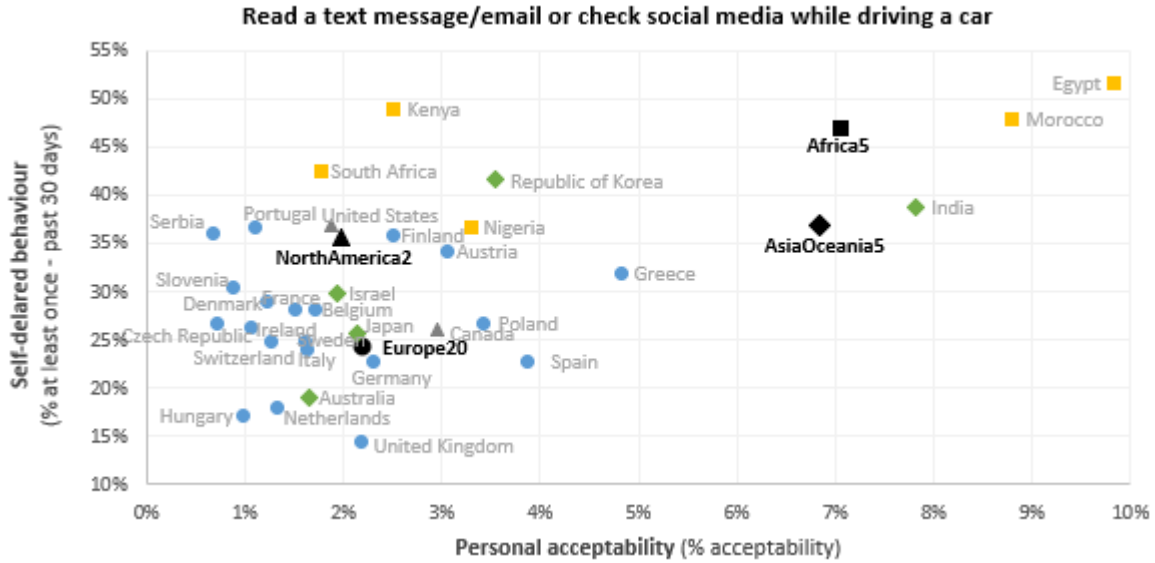


Figure 20: Association between self-declared behaviour and personal acceptability of reading a text message/email or check social media while driving a car, by country.

Enforcement perception vs. self-declared behaviour

The analysis of the association between self-declared behaviour and enforcement perception (Figure 21 and Figure 22) at a country level, shows that the higher the enforcement perception, the higher the self-declared behaviour, both for talking on a hand-held mobile phone (R = 0.475, p-value = 0.006) and for texting (R = 0.427, p-value = 0.015). However, these associations are strongly influenced by the 5 countries with higher enforcement perception (Egypt, Kenya, Nigeria, Serbia, and Morocco). Without these countries, the correlation coefficients are not significantly different from zero, both for talking on a hand-held mobile phone (R = 0.002, p-value = 0.991) and for texting (R = -0.083, p-value = 0.681).

These results suggest that the current enforcement on the mobile phone use is not effective.

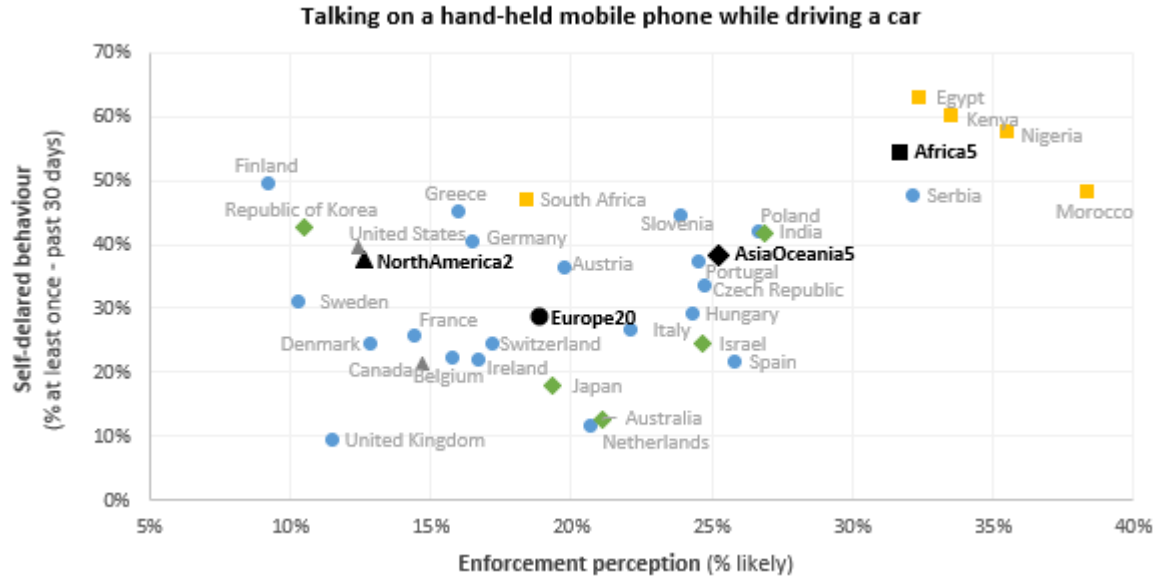


Figure 21: Association between enforcement perception and self-declared behaviour of talking on a hand-held mobile phone while driving a car, by country.

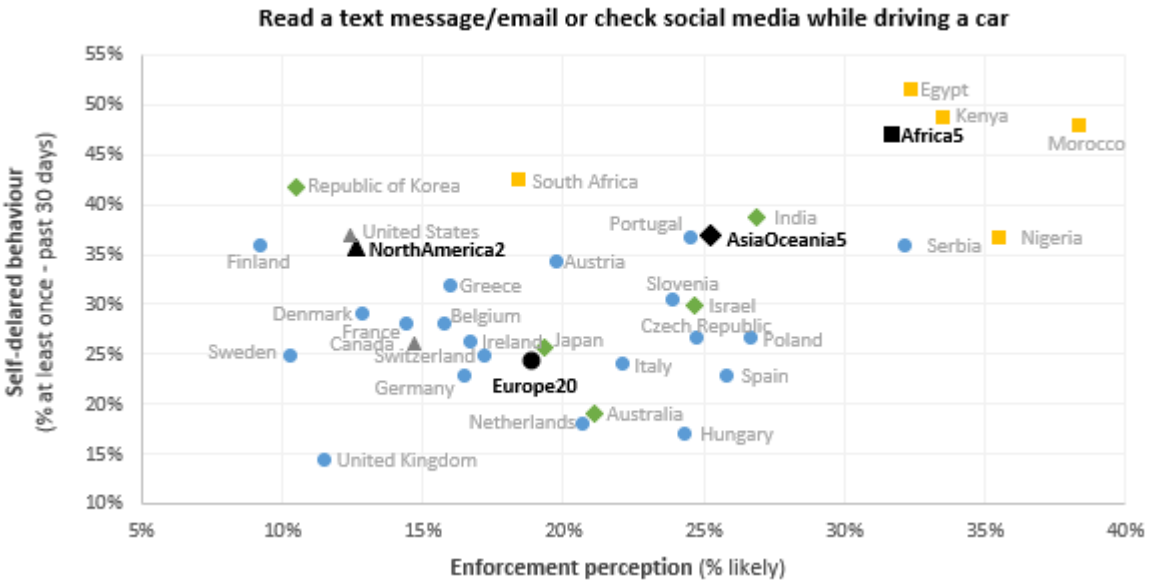


Figure 22: Association between enforcement perception and self-declared behaviour of reading a text message/email or check social media while driving a car, by country.

3.2.3 Contextual data

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

Traffic rules

Talking on a hand-held mobile phone while driving is prohibited in all countries that participated in ESRA2_2018 survey, except for the United States, where the law varies by state – there are states with no restrictions on mobile phone use while driving, states where it is prohibited for all drivers and states where it is prohibited only for novice drivers or professional drivers.

On the other hand, the use of hands-free devices while driving is allowed for all drivers in most of the countries (no data was available for Africa5 countries). The exceptions are Australia (it's prohibited for novice drivers), France (the hands-free kit with earphones are prohibited since 2015), India, and Serbia (it's prohibited for drivers with beginner driving license). In the United States there is no law specifically targeted at hands-free mobile only, but 38 states and D.C. ban all cell phone use by novice or teen drivers, and 21 states and D.C. prohibit any cell phone use for school bus drivers. The analysis of self-declared behaviours shows that the prevalence of using hands-free mobile phones is lower in some of these countries, when comparing with reginal means and with other behaviours (talking on a hand-held phone and texting). France has the second lowest rate of talking on a hands-free phone in Europe20, while the rates of handling the phone (to talk or text) are closer to the Europe20 mean. Serbia has the second highest rate on talking on a hand-held mobile phone and on texting while driving, while the rate of talking on a hands-free phone is closer to the Europe20 mean. In the United States, in comparison with Canada, the differences in the percentages of car drivers who declared handling a mobile phone to talk (39.6% in the United States vs. 21.3% in Canada) or to text (36.8% in the United States vs. 26.0% in Canada) are higher than the differences of the rates of using hands-free devices (51.2% in the United States vs. 43.6% in Canada).

Number of tickets for illegal use of mobile phone (2015)

Data of the number of tickets for illegal use of mobile phones was retrieved from 'PIN Flash Report 31 – How Traffic Law Enforcement can Contribute to Safer Roads' (Adminaite et al., 2016). Data was available for 15 out of the 32 countries participating in ESRA2_2018 survey.

Figure 23 shows that there is no significant association between the number of tickets by country (per 1,000 population) and the percentage of car drivers who reported taking on a hand-held mobile phone ($R = 0.076$, p-value = 0.781).

The analysis of the association between the number of tickets and the prevalence of texting by country, shows that the percentage of car drivers who declared texting while driving a car increases with the increase of the number of tickets for illegal use of mobile phones ($R = 0.438$, p-value = 0.089). Finland and Greece are exception on this trend – both have high rate of self-declared behaviour and low number of tickets per 1,000 population (Figure 24).

Data from Figure 25 shows that there is no correlation number of tickets for illegal use of mobile phones while driving and the enforcement perception ($R = 0.103$, p-value = 0.704).

These results, together with the association between self-declared behaviour and enforcement perception (Figure 21 and Figure 22) shows that, overall, the enforcement and the current traffic penalties concerning the use of the mobile phone while driving do not influence the self-declared behaviours.

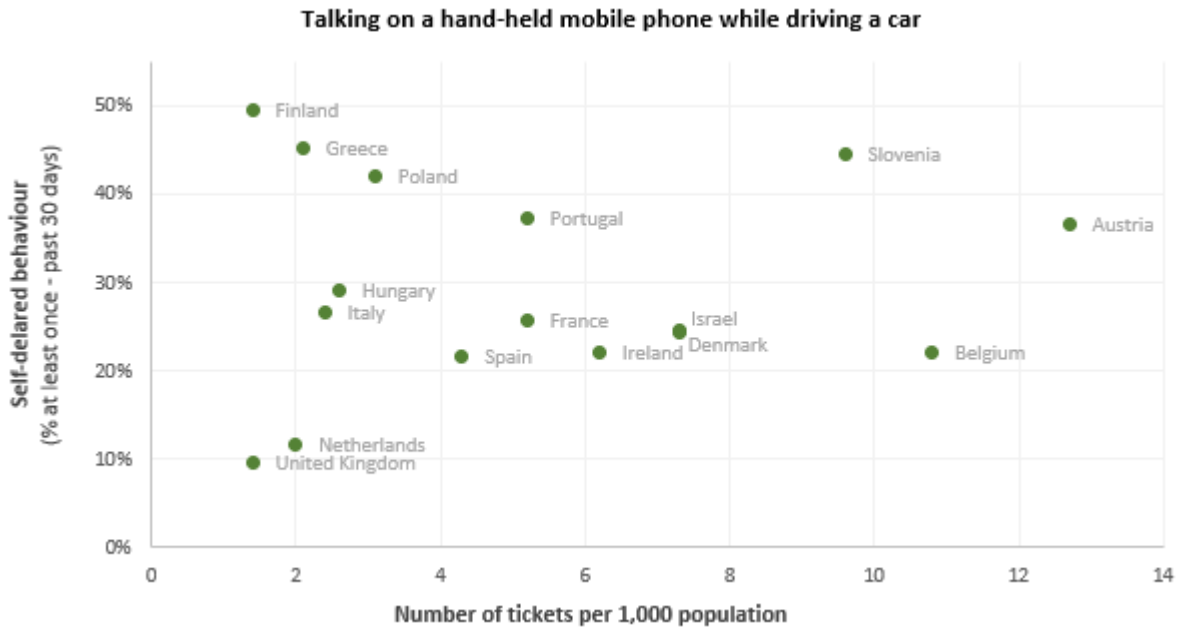


Figure 23: Association between the number of tickets for illegal use of mobile phones and self-declared behaviour of talking on a hand-held while driving a car, by country.

NOTES (1) Italy: number of tickets for illegal use of mobile phone following checks by the National police and Carabinieri only. Data on tickets following checks by local police operating in cities is not available. (2) United Kingdom: number of tickets for illegal use of mobile phone following checks in England and Wales only.

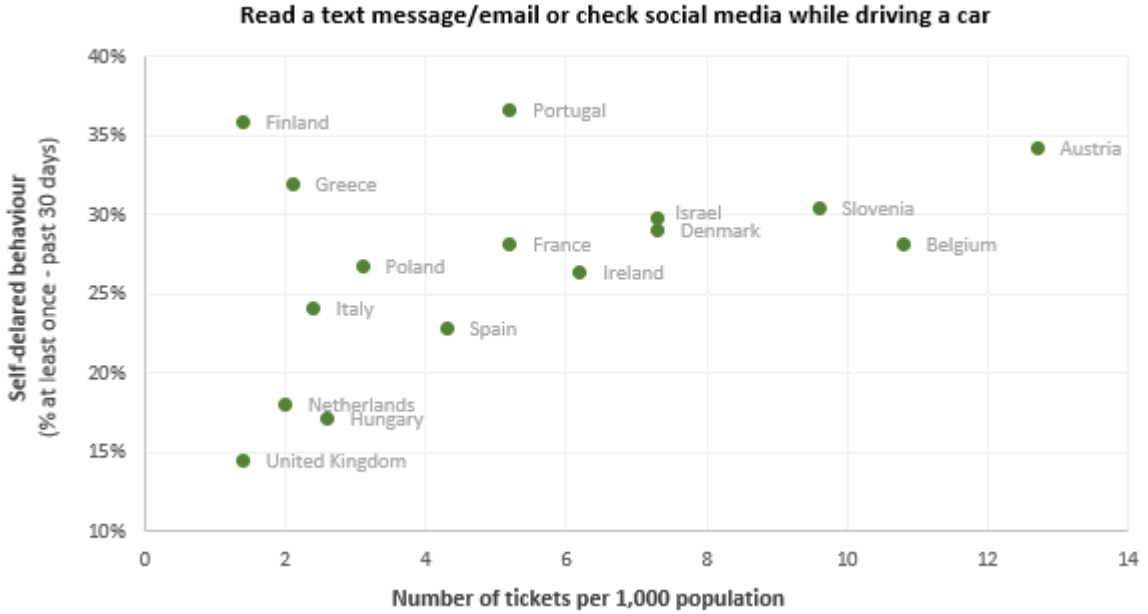


Figure 24: Association between number of tickets for illegal use of mobile phones and self-declared behaviour of reading a text message/email or check social media while driving a car, by country.

NOTES (1) Italy: number of tickets for illegal use of mobile phone following checks by the National police and Carabinieri only. Data on tickets following checks by local police operating in cities is not available. (2) United Kingdom: number of tickets for illegal use of mobile phone following checks in England and Wales only.

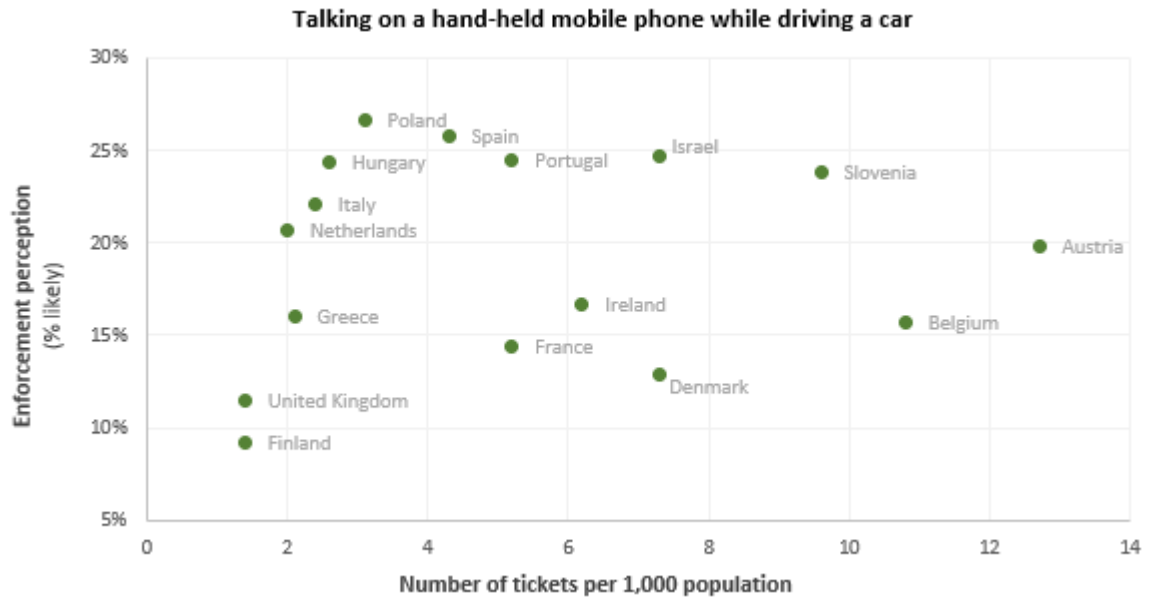


Figure 25: Association between number of tickets for illegal use of mobile phones and enforcement perception (likelihood of being checked by the police for the use of a mobile phone while driving), by country.

NOTES (1) Italy: number of tickets for illegal use of mobile phone following checks by the National police and Carabinieri only. Data on tickets following checks by local police operating in cities is not available. (2) United Kingdom: number of tickets for illegal use of mobile phone following checks in England and Wales only.

Time spent on Internet and on Social Media

Data concerning time per day using mobile internet and the time spent on social media were retrieved from The Digital Report 2018 (We Are Social, 2018). Both times were estimated based on a survey of internet users aged 16-64. Data was available for 22 out of the 32 countries of ESRA2_2018 survey.

Results from Figure 26 and Figure 27 show that the higher the time using mobile internet ($R = 0.743$, p-value < 0.001) and the higher the time spent on social media ($R = 0.699$, p-value < 0.001), the higher the percentage of car drivers who declared texting while driving a car.

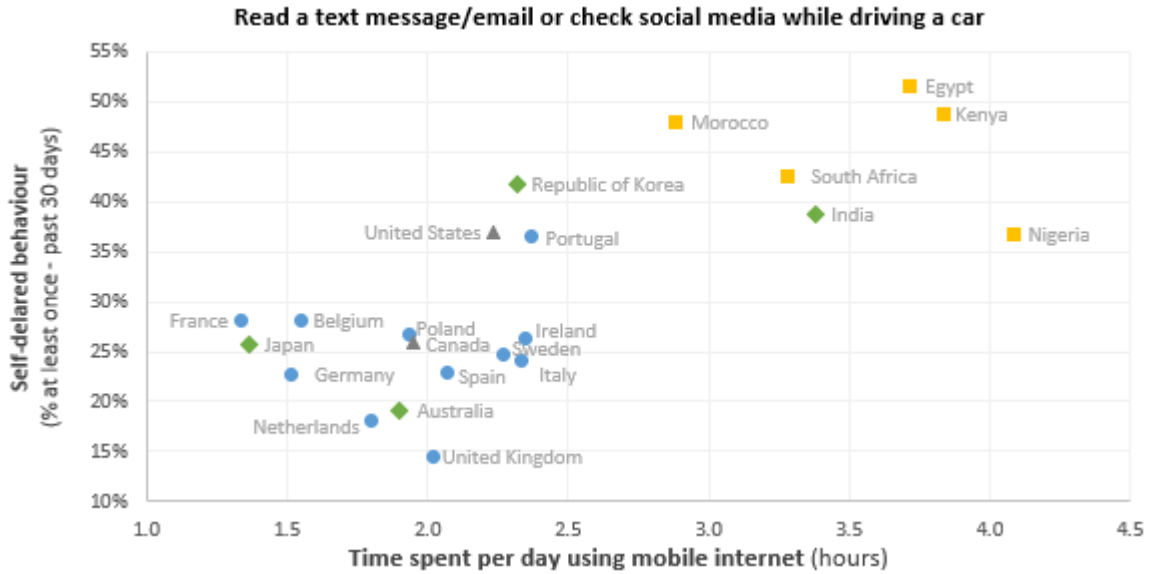


Figure 26: Association between the spend per day using mobile internet and self-declared behaviour of talking on a hand-held while driving a car, by country.

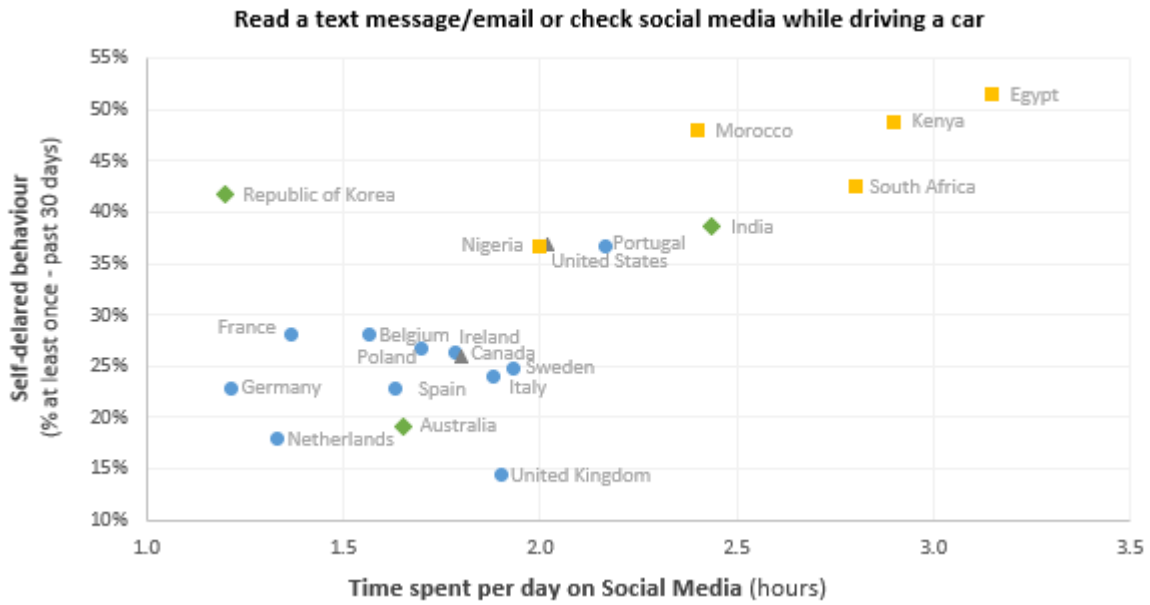


Figure 27: Association between the spend per day using mobile internet and self-declared behaviour of reading a text message/email or check social media while driving a car, by country.

3.3 Comparison with other findings

In previous ESRA1 survey in 17 European countries (Trigoso et al., 2016), 38% of car drivers declared having talked on a hand-held mobile phone while driving at least once in the 12 months previous to the survey, 51% talked on a hands-free mobile phone, 36% read text messages or emails, and 27% sent text messages or emails. Present ESRA2 survey focused on the self-declared behaviours in a shorter period of time (30 days), and the questions concerning texting are different. However, one question was repeated with the aim to analyse the evolution of self-declared behaviours: 'Over the last 12 months, how often did you as a car driver read a text message or email while driving' – 32% of car drivers from Europe20 region declared the behaviour at least once in past 12 months. This percentage is slightly lower than the percentage observed in ESRA1 (36%), but the number the countries surveyed is different, which make it difficult to have accurate conclusions on the evolution of this behaviour.

A common question in both surveys was the one concerning the support for zero tolerance for using any type of mobile phone while driving. The percentage of respondents supporting this measure in European countries increased from 47% in ESRA1 survey to 54% in current ESRA2 survey.

Despite some differences in the period of self-declared behaviours and in some questions, several results from European20 region confirm to results of previous version in 17 European countries:

- higher percentages of using hands-free devices than handling the phone while driving;
- lower risk perception and higher acceptability of talking on hands-free devices while driving, compared to handling the phone;
- low levels of acceptability and high risk perception of using the mobile phone on traffic;
- compared to men, women consider using the phone while driving riskier, less acceptable and use it less in traffic;
- risk perception increases with the increase of the age;
- acceptability and self-declared behaviours decrease with the increase of the age;
- the acceptability of unsafe traffic behaviours concerning the use of the mobile increases the likelihood of its use while driving;
- the likelihood of using a mobile phone while driving decreases with the increase of the risk perception.

A deeper analysis of the evolution of several aspects included in both surveys will be presented in another ESRA2 report.

Results allowed to identify several factors that influences the decision of using the mobile phone while driving. Positive attitudes towards using the mobile phone while driving were the most important factors influencing the behaviour, mainly personal acceptability and perceived behaviour control. The trust and the belief of being able to use the phone when driving to talk or to text was the attitude that most affect the use of the phone while driving. These results are in line with findings from (Sullman et al., 2018) and (Ajzen, 1991), the last based on the Theory of Planned Behaviour.

Using the phone while driving to save time and to always be available are other reasons influencing the use of the mobile phone while driving. These results suggest that the social expectation to return calls or answer text messages immediately, professional reasons, or perceived practical, and social benefits are associated with a higher risk of using the mobile phone while driving, as found by (Nurullah, 2013). The fact that drivers who have a professional occupation being more likely to use the phone in traffic than drivers who have no professional occupation, reinforces the influence of professional reasons to use the mobile phone in traffic.

Results also confirm other findings that show that men and younger people as more likely to engage in several risky driving behaviours, including using mobile phone while driving (Ivers et al., 2009; Nurullah, 2013; CDC, 2013). Besides being more prone to take risks, younger drivers may also be more influenced by a social expectation among their peer group to communicate at all times, including while driving (Walsh et al., 2011).

Another finding was the fact that the increase of risk perception decreases the likelihood of using the phone while driving. Similar results had been found in ESRA1 survey (Trigoso et al., 2016) and in several other studies (Becker, 1974, Shi et al., 2016; Oviedo-Trespalacios et al, 2017). However, despite this effect, many drivers use the mobile phone while driving even being aware of the risks. For these drivers, the perceived benefits seem to outweigh the risk of using the mobile phone while driving.

3.4 Limitations of the data

In general, self-report data are vulnerable to a number of biases, like (Choi & Pak, 2005; Krosnick and 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.

Results of logistic regression were adjusted for the Social Desirability Scale (SDS), but descriptive results were not. The effect of the SDS on the self-declared behaviours was negative (OR about 0.90 for all models) showing that the higher the score of the SDS, the lower the likelihood to declare the behaviour. These results indicate that the real percentages of unsafe behaviours may be higher than the percentages of the self-declared behaviours.

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

The number of African respondents aged 65 or older was quite low, so that the answers of this particular age group in African countries cannot be considered to be representative.

Although the logistic regression analysis identifies several explanatory variables that predict the self-declared behaviour, the associations between explanatory and dependent variables are correlational and the causal direction of influence between variables is not indicated by the analysis.

4 Conclusions

The use of the mobile phone while driving a car (self-declared) is more frequent in Africa5 region: 66.8% of car drivers declared have talked on a hands-free mobile phone while driving a car, 54.1% talked on a hand-held mobile phone, and 46.9% read a text message/email or check social media. Europe20 is the region where the use of the mobile phone while driving a car is less prevalent: 47.7% used hands-free devices, 28.6% talked on a hand-held mobile phone, and 24.2% read a text message/email or checked social media. NorthAmerica2 and AsiaOceania5 have similar percentages of car drivers declaring the use of the mobile phone while driving: 50.5% of NorthAmerica2 drivers and 54.5%% of AsiaOceania5 drivers used hands-free devices, 37.7% of NorthAmerica2 drivers and 38.2% of AsiaOceania5 drivers talked on hand-held phone, and texting was declared by 35.7% of NorthAmerica2 drivers and by 36.9% of AsiaOceania5 drivers.

A high percentage of respondents consider it risky talking on a hand-held mobile phone while driving: 75.8% of Europe20 drivers, 70.8% NorthAmerica2 drivers, 61.9% of Africa5, and 52.6% of AsiaOceania5 drivers considered talking on a hand-held phone the main cause of a road crash involving a car. Consistently with high risk perception, a low percentage consider it acceptable using the mobile phone while driving – talking on a hand-held phone was considered acceptable by 3.5% in Europe20, by 7.1% in NorthAmerica2, by 5.3% in AsiaOceania5, and by 8.3% in Africa5. However, the percentage of self-declared behaviours is higher than the percentage of acceptability and lower than the percentage of risk perception: 28.6% in Europe20, 37.7% in NorthAmerica2, 38.2% in AsiaOceania5, and 46.9% in Africa5. These results show that some drivers use the mobile phone while driving even being aware of the risks.

The use of the mobile phone while driving a car is more frequent among women in Europe20 and Africa5 regions, but no significant differences were found neither in America2 nor in AsiaOceania5. Age increase is generally associated with a decrease in the self-declared behaviours, except for Africa5 car drivers. The effect of the age is stronger for talking on a held mobile phone and for texting than for using hands-free devices.

A higher percentage of respondents accept talking on a hands-free mobile phone and consider that it has less risk, when compared with handling a mobile phone. The underestimation of the risk, together with being legal in almost all ESRA2 countries, makes the use of hands-free devices more acceptable and more prevalent in all regions.

Texting while driving is more frequent for car drivers than for moped drivers/motorcyclists and cyclists.

Several factors were found to be associated with the use of the mobile phone while driving: personal acceptability and perceived behaviour control are the factors that increases the most the likelihood of talking on a hand-held mobile phone and texting while driving. The likelihood of using a mobile phone while driving decreases with the increase of the risk perception. Drivers who have a professional occupation are more likely to use the phone while driving than drivers who have no occupation. Drivers who support legal obligation to have zero tolerance for using any type of mobile phone while driving are less likely to engage on the behaviour.

More than half of the respondents support zero tolerance for using any type of mobile phone while driving for all drivers in all regions: 67.1% in AsiaOceania5, 56.2% in Africa5, 54.0% in Europe20, and 51.8% in NorthAmerica2.

Most respondents (more than 2 out of 3) from Europe20, NorthAmerica2 and AsiaOceania5 agree that traffic rules/penalties should be stricter and are not being checked sufficiently. A minority agree that traffic rules/penalties are too severe: 22.6% in Europe20; 20.1% in NorthAmerica2; 34.2% in AsiaOceania5. In Africa5, the percentage of respondents who agree that traffic rule/penalties should be stricter (50.3%) and are not being checked sufficiently (54.6%) is significantly lower than in other regions, and the percentage of those who agree that traffic rules/penalties are too severe (46.0%) is significantly higher than in other regions.

Africa5 is the region with the highest level of enforcement perception: 31.7% of car drivers stated that is likely to be checked by the police for using a hand-held mobile phone while driving – 25.2% in AsiaOceania5, 18.9% in Europe20 and 12.7% in NorthAmerica2.

The enforcement and the current traffic penalties concerning the use of the mobile phone while driving do not influence the self-declared behaviours. More enforcement and/or new methods of enforcement of the mobile phone use while driving are needed.

Countries with restrictions concerning the use of hands-free devices to talk while driving have lower prevalence of this behaviour.

Countries whose population spend more time a day using mobile internet and on social media have higher percentages of drivers declaring texting while driving.

Recommendations

Policy recommendations at national and regional level

- Define distraction related indicators and set targets at regional level, such as the prevalence of distracted driving, the number of controls for mobile phone use, and the number of traffic casualties attributable to distraction.
- Facilitate and support the exchange of best practice in terms of countermeasures for the use of the mobile phone while driving.
- Support more research on effective countermeasures for distraction through developments in vehicle and Information Communication Technology (ICT).
- Conduct awareness-raising campaigns on the risks of distracted driving.
- Incorporate information on risks associated with distraction in educational programmes and in driver license training.
- Develop specific campaigns and awareness raising activities in relation to distraction of pedestrians, cyclists, motorcyclists, and other powered transport modes such as e-scooters, hoverboards, …
- Raise the awareness about the very high risks of texting while driving and increase penalties.
- Increase enforcement (and enforcement perception) and find new methods of enforcement in relation to the mobile phone use while driving. Ensure that penalties are applied to drivers who infringe the law.

Specific recommendations to particular stakeholders

- *[To Non-Governmental Organizations (NGOs)]* Contribute to education and awareness raising campaigns and events against distracted driving.
- *[To vehicle manufacturers, other companies and research organisations]* Develop low cost solutions to be incorporated in vehicles that can detect or prevent distracted driving.
- *[To private and public companies]* Develop road safety plans that include policies concerning the use of the mobile phone while driving.

Closing remarks

The initial aim of ESRA was to develop a system for gathering reliable and comparable information about people's attitudes towards road safety in a number of European countries. This objective has been achieved and the initial expectations have even been exceeded. ESRA has become a global initiative which already conducted surveys in 46 countries across six continents. The outputs of the ESRA project have become building blocks of national and international road safety monitoring systems.

The ESRA project has also demonstrated the feasibility and the added value of joint data collection on road safety attitudes and performance by partner organizations in a large number of countries. The intention is to repeat this initiative on a triennial basis, retaining a core set of questions in every wave allowing the development of time series of road safety performance indicators.

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References

Adminaite, D., Jost, J., Stipdonk, H., & Ward, H. (2016). PIN Flash Report 31 – How Traffic Law Enforcement can Contribute to Safer Roads. Brussels, Belgium: European Transport Safety Council.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

APR (2017). L'usage du téléphone au volant dans nos villes – Principaux résultats de l'enquête d'observation de l'association Prévention Routière janvier - mars 2017. Association Prévention Routière. Available at: https://www.preventionroutiere.asso.fr/wp-content/uploads/2017/05/R%C3%A9sultats-enqu%C3%AAte-observation_t%C3%A9l%C3%A9phone-en-conduisant_APR_2017.pdf [Accessed June 5, 2019].

Becker, M.H. (1974). The health belief model and personal health behavior. Health Education Monographs, 2, 324-473.

Briggs, G., Graham, H, Land, M. (2016). Imagery-inducing distraction leads to cognitive tunnelling and deteriorated driving performance. Transportation Research Part F: Traffic Psychology and Behaviour, Volume 38, April 2016, Pages 106-117. doi: 10.1016/j.trf.2016.01.007

CDC (2013). Mobile Device Use While Driving - United States and Seven European Countries, 2011. Center for Disease Control and Prevention - Morbidity and Mortality Weekly Report (MMWR), 62(10); 177-182.

Choi, B.C.K., Pak, A.W.P. (2005). A catalog of biases in questionnaires. Preventing Chronic Disease, 2 (1), A13.

Cohen, J. (1988), Statistical Power Analysis for the Behavioral Sciences, 2nd Edition. Lawrence Erlbaum Associates.

DfT (2015). Seat belt and mobile phone use surveys: England and Scotland, 2014. DfT Statistical Release, available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/406723/seatbelt-and-mobile-use-surveys-2014.pdf [Accessed June 5, 2019].

DG MOVE (2015). Study on good practices for reducing road safety risks caused by road user distractions - Final report. Retrieved May 13, 2019, from https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/behavior/distraction_study.pdf

Goodwin, A., Kirley, B., Sandt, L., Hall, W., Thomas, L., O'Brien, N., & Summerlin, D. (2013). Countermeasures that work: A highway safety countermeasures guide for State Highway Safety Offices. 7th edition. (Report No. DOT HS 811 727). Washington, DC: National Highway Traffic Safety Administration.

Ivers, R., Senserrick, T., Boufous, S., Stevenson, M., Chen, H., Woodward, M., & Norton R. (2009). Novice Drivers' Risky Driving Behavior, Risk Perception, and Crash Risk: Findings From the DRIVE Study. Am J Public Health, 99(9):1638–1644. doi:10.2105/AJPH.2008.150367

Krosnick, J. A., & Presser, S. (2010). Questionnaire design. In: J. D. Wright & P. V. Marsden (Eds.), Handbook of Survey Research (Second Edition). West Yorkshire, England: Emerald Group.

Lee, J.D., Young, K.L., & Regan, M.A. (2008). Defining driver distraction. In: Regan, M.A., Lee, J.D., & Young, K.L. (red.), *Driver distraction: theory, effects and mitigation*. CRC Press, Taylor & Francis Group, Boca Raton, Florida, p. 31-40.

Meesmann, U., Martensen, H., & Dupont, E. (2015) Impact of alcohol checks and social norm on driving under the influence of alcohol (DUI). Accident Analysis and Prevention 80 (2015) 251–261.

Meesmann, U., & Torfs, K. (2019) *ESRA2 survey methodology. ESRA2 report Nr. 1.* ESRA project (E-Survey of Road users' Attitudes). Brussels, Belgium: Vias institute.

Meesmann, U., Torfs, K., Nguyen, H., & Van den Berghe, W. (2017). *Do we care about road safety? Key findings from the ESRA1 project in 38 countries.* ESRA project (E-Survey of Road users' Attitudes). Brussels, Belgium: Vias institute.

NHTSA (2019a). Traffic Safety Facts – Research note: Driver Electronic Device Use in 2014. National Highway Traffic Safety Administration – US Department of Transportation. Retrieved June 5, 2019, from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812665.

NHTSA (2019b). Traffic Safety Facts – Research note: Distracted Driving in Fatal Crashes, 2017. National Highway Traffic Safety Administration – US Department of Transportation. Retrieved June 5, 2019, from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812700.

Nurullah, A. S., Thomas, J., & Vakilian, F. (2013). The Prevalence of Cell Phone Use while Driving in a Canadian Province. Transportation Research Part F: Traffic Psychology and Behaviour, 19, pp. 52–62. doi: 10.1016/j.trf.2013.03.006

NSC (2012). Understanding the distracted brain – why driving while using hands-free cell phones is risky behaviour (white paper). National Safety Council, US. Retrieved May 13, 2019, from https://www.nsc.org/Portals/0/Documents/DistractedDrivingDocuments/Cognitive-Distraction-White-Paper.pdf

Olson, R.L., Bocanegra, R.J., Hanowski, J., & Hickman J. S. (2009). Driver Distraction in Commercial Vehicle Operations. U.S. Department of Transportation. Retrieved May 21, 2019 from https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/DriverDistractionStudy.pdf

Oviedo-Trespalacios, O., King, M., Haque, M., & Washington, S. (2017). Risk factors of mobile phone use while driving in Queensland: Prevalence, attitudes, crash risk perception, and task-management strategies. PloS one, 12(9), e0183361. doi: 10.1371/journal.pone.0183361

Road Safety Observatory (2018). Driver distraction. Retrieved May 13, 2019, from http://www.roadsafetyobservatory.com/Review/10149

Shi, J., Xiao, Y., & Atchley, P. (2016) Analysis of factors affecting drivers choice to engage with a mobile phone while driving in Beijing. Transportation Research Part F: Traffic Psychology and Behaviour, Volume 37, February 2016, Pages 1-9. doi: 10.1016/j.trf.2015.12.003

Schroeder, P., Wilbur, M., & Peña, R. (2018, March). National survey on distracted driving attitudes and behaviors - 2015 (Report No. DOT HS 812 461). Washington, DC: National Highway Traffic Safety Administration.

Sullman, M., Hill, T., & Stephens, A. (2018). Predicting intentions to text and call while driving using the theory of planned behaviour. Transportation Research Part F: Traffic Psychology and Behaviour, Volume 58, October 2018, Pages 405-413. doi: 10.1016/j.trf.2018.05.002

SWOV (2018). Distraction in traffic. SWOV Fact sheet, July 2018. SWOV, The Hague.

Trigoso J., Areal A., & Pires C. (2016). Distraction (mobile phone use). ESRA2 Thematic report Nr. 3. ESRA project (European Survey of Road users' safety Attitudes). Lisbon, Portugal: Prevenção Rodoviária Portuguesa.

We Are Social (2018). Digital in 2018 - We Are Social. [online] Available at: https://wearesocial.com/blog/2018/01/global-digital-report-2018 [Accessed May 13 2019].

Walsh, S., White, K., Cox, S, & Young, R. (2011) Keeping in constant touch: The predictors of young Australians' mobile phone involvement. Computers in Human Behavior, 27(1), pp. 333-342.

WHO (2015). Global Status Report on Road Safety 2015. World Health Organization, Geneva, Switzerland.

Zhao, N., Reimer, B., Mehler, B., D'Ambrosio, L. A., & Coughlin, J. F. (2013). Self-reported and observed risky driving behaviors among frequent and infrequent cell phone users. Accident Analysis and Prevention, 61, p.71–77.

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 believes & 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 believe & 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.
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.

Appendix 3: Acceptability of unsafe traffic behaviours, by country

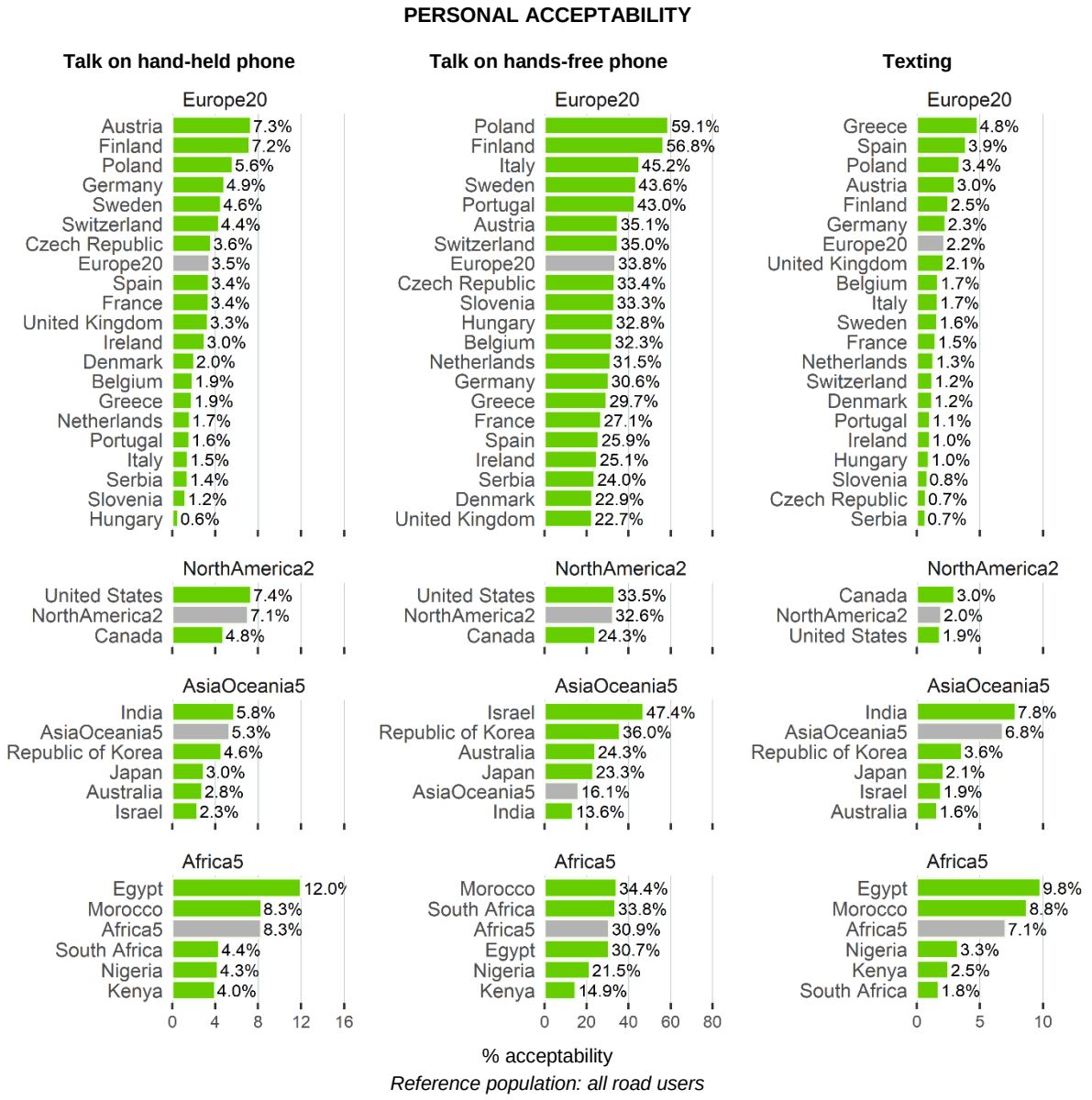
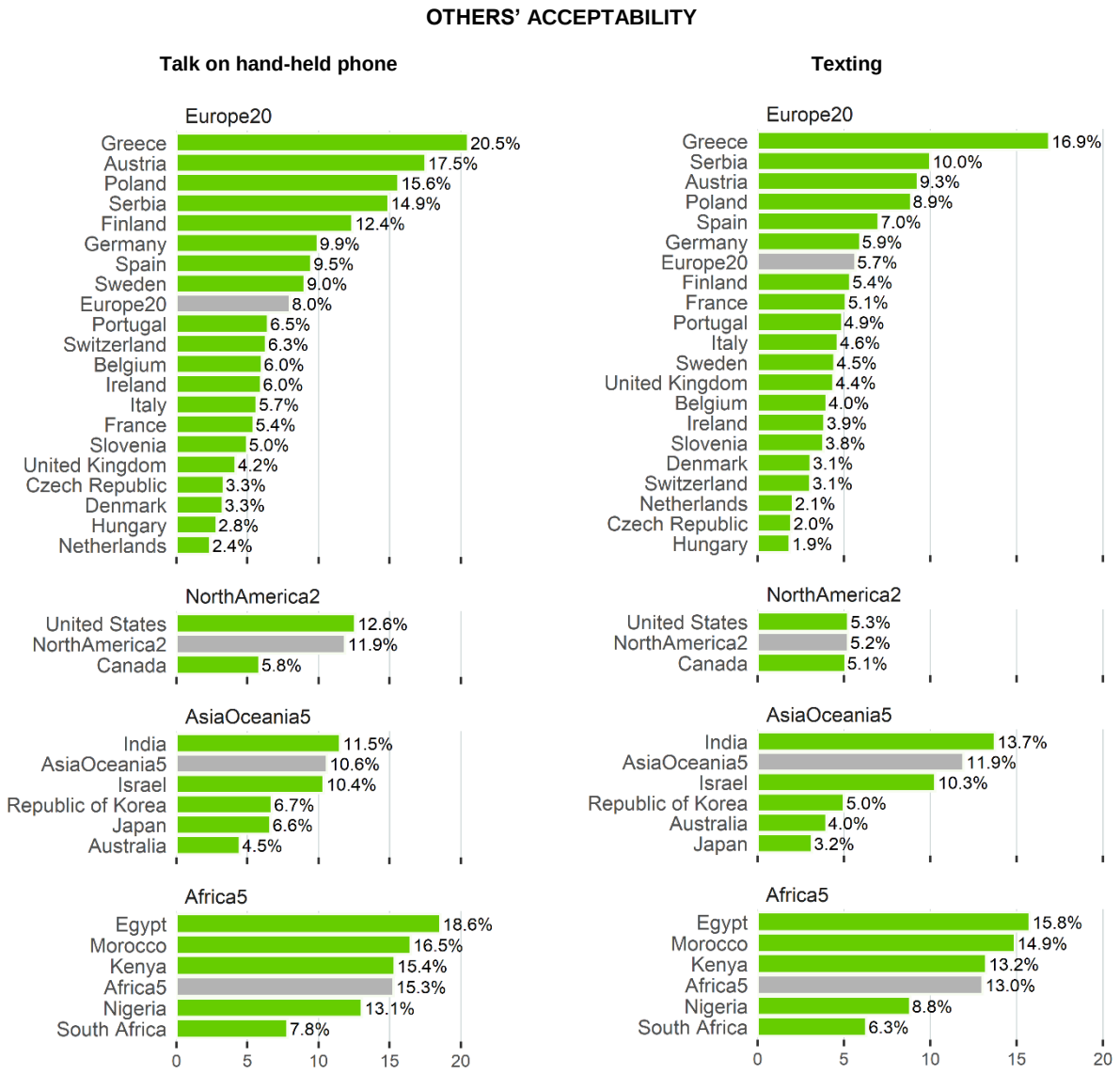


Figure A1: Personal acceptability of unsafe traffic behaviours related to the use of mobile phone while driving, by region and country.



Reference population: all road users

Figure A2: Others' acceptability of unsafe traffic behaviours related to the use of mobile phone while driving, by region and country.

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