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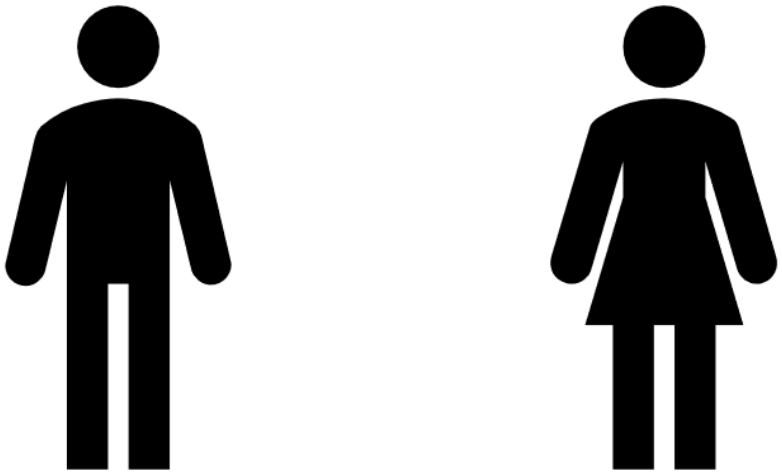

Gender Issues

ESRA2 Thematic report Nr. 13

Publications Date of this report: 16/12/2020
Main responsible organization for this report: Université Gustave Eiffel (Univ. Gustave Eiffel, IFSTTAR)
D/2020/0779/35 - Report number: 2020-T-09-EN

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Please refer to this document as follows: Granié, M.-A., Thévenet, C., Evennou, M., Lyon, C. & Vanlaar, W. (2020) Gender Issues. ESRA2 Thematic report Nr. 13. ESRA project (E-Survey of Road users' Attitudes). Lyon, France: Université Gustave Eiffel.

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Acknowledgement

The authors of this report would like to thank the following persons and organizations for their much-appreciated contribution to this report:

- PRP (Carlos Pires) and CTL (Davide Shingo Usami, Isabella Corazziari) for providing the de-scriptive figures;
- NTUA (Alexandra Laiou) and bfu (Yvonne Achermann) for providing contextual information on the topic;
- IATSS (Kazuko Okamura) for reviewing this report and SWOV (Charles Goldenbeld) for coordinating the review procedure;
- Vias institute (Uta Meesmann, Katrien Torfs, Huong Nguyen, Wouter Van den Berghe) for coordinating ESRA, conducting the fieldwork and developing the ESRA2 survey and data-base;
- PRP (Carlos Pires) for supervising the quality of the ESRA2 database;
- all ESRA2 core group organizations for helping to develop the ESRA2 survey and the com-mon ESRA2 output;
- all ESRA2 partners for supporting and financing the national ESRA2 surveys in 32 countries.

ESRA is funded through the contributions of the partner organisations, either from their own re-sources or from sponsoring. Part of the funding for Vias institute is provided by the Belgian Federal Public Service Mobility & Transport.

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List of Abbreviations

Country codes

AT Austria
BE Belgium
CA Canada
CH Switzerland
DE Germany
EL Greece
FR France
IT Italy
JP Japan
NL Netherlands
PL Poland
PT Portugal

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

ESRA	E-Survey of Road Users' Attitudes
EU	European Union
GGEI	Global Gender Equality Index
RSO	Road Safety Observatory
SEM	Structural Equation Model

1. Summary

Objective and methodology

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

The basis 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 different types of road users.

The first edition of the ESRA survey (ESRA1) was carried out in three waves between 2015-2017. Data was gathered from almost 40,000 road users in 38 countries across 5 regions. The present report is based on the second edition of this global survey, which was conducted in 2018 (ESRA2_2018). In this first wave, data from more than 35,000 road users were collected across 32 countries and the sample was expanded in a second wave in 2019.

Hence, the ESRA database is a comprehensive dataset, which enables a wide range of analyses which are useful for understanding road safety risks and the effectiveness of measures. An overview of the project and the results are available on: www.esranet.eu.

The purpose of this thematic report on gender issues is to explore the cultural effect on gender differences in reported risky behaviours while driving. This ESRA thematic report analyses gender differences in self-reported data on driving behaviour, attitudes and beliefs, comparing countries and regions. The four regions based on a geographical criterion, were used to distinguish potential cultural differences on a meso-level, while gender differences were also investigated on a microlevel, by analysing the differences by country. For the sake of brevity and clarity, data from the same hypothetical psychological construct available in the ESRA questionnaire were grouped together into aggregate scores. The scores of men and women were compared at the level of each country and region. The focus was on the items concerning psychological constructs on which we can expect gender differences, according to literature: self-declared and acceptability of unsafe behaviours, self-efficacy, perceived safety, road safety policy support, risk perception, number of crashes, social desirability and compliance intention, law perception, descriptive norms, enforcement, and perception of automated vehicles.

Key results

Acceptability of risky driving behaviours

For perceived social acceptability, gender differences were seen for 18 out of the 32 countries although all the effect sizes were small. For all the countries where gender difference was significant, males perceived higher social acceptability of risky behaviours than females. Perceived social acceptability was highest for both genders in Africa.

For personal acceptability, gender differences were seen for 27 out of the 32 countries. Again, all the effect sizes were small. For all the countries where gender difference was significant, males perceived higher personal acceptability of risky behaviours than females. The gap between males and females was lowest in Africa.

Linear regression models also confirmed that scores of perceived social acceptability and personal acceptability were higher among males and younger drivers. The level of income seems to have a positive effect on road safety, by decreasing the level of social acceptability of risky behaviours, but it also had negative effect by increasing the personal acceptability of violations. Gender equality seems to have positive effects, by lowering social and personal acceptability of violating behaviours.

Declared risky driving behaviours

Significant gender differences were seen for 30 out of the 32 countries. All the effect sizes were small, except for Greece, Italy and Portugal where the effect sizes were medium. For all the countries where gender difference was significant, males declared higher frequency of risky driving behaviours than females, except in India where females declared riskier behaviours than males.

The number of transgressions reported by males was higher in all regions, compared to females. The gender gap was largest in Europe, while Africa and North America showed the highest score for male transgressions.

Linear regression models also confirmed risky declared behaviours were higher among males and younger drivers. The level of income seems to have positive effect on road safety, by decreasing the level of risky driving behaviours. Gender equality has negative effects, by increasing risky behaviours declared. In contrast to the whole sample, for the Europe region, the country level of income seems to have a negative effect on road safety, with higher incomes increasing the risky behaviours declared.

Among the gender equality indices, national levels of education and economic participation of females are related to higher levels of reported risk behaviours. At the European country level, the national level of female economic participation reinforces the risk behaviours reported by participants. It is also observed that, while the behaviours reported by the male group are only affected by female economic participation (the more females have economic participation, the higher the level of risk behaviours reported by males), the behaviours reported by females are related to all indices of gender equality: female level of education and economic participation at the national level reinforces the risk behaviours reported by females, while national levels of female health and political involvement are related to lower levels of self-reported risk behaviours among females.

It was also found that for countries with higher gender equality in terms of educational attainment, the increase in risky driving behaviours are higher for females than for males indicating that their reported risky driving behaviours are increasing to be more similar to males in countries with high gender equality for educational attainment.

Self-efficacy in risky driving behaviours

Gender differences were seen for 29 out of the 32 countries. All the effect sizes were small, except for Czech Republic, Denmark, Finland, Italy, The Netherlands, and Portugal where the effect sizes were medium. For all the countries where gender difference was significant, males declared higher level of self-efficacy than females. This effect was significant in all regions, but the effect size was larger in Europe and in North America.

Linear regression models confirmed that scores of self-efficacy were higher among males and younger drivers. The level of income seems to have positive effect on road safety, by decreasing the feeling of self-efficacy in risky situations. Gender equality seems to have negative effects, by increasing self-efficacy feeling in risky situations.

In contrast to the whole sample, for the Europe region, the country level of income seems to have a negative effect on road safety, with higher incomes increasing the feeling of self-efficacy in risky situations.

Perceived safety in driving

Gender differences were seen for 21 out of the 32 countries. All the effect sizes were small. For all the countries where gender difference was significant, males declared higher perceived safety in driving than females. This was especially true in Europe, where the effect size was the largest.

Linear regression models confirmed that scores of perceived safety were higher among males and younger drivers. The level of income seems to have positive effect on road safety, by decreasing the perceived safety of driving. Gender equality seems to have negative effects by increasing perceived safety of driving.

In contrast to the whole sample, for the Europe region, the country level of income seems to have a negative effect on road safety, with higher incomes increasing the perceived safety of driving.

Road safety policy support

Gender differences were seen for 30 out of the 32 countries. All the effect sizes were small, except for Finland, Greece and Sweden were the effect sizes were medium. For 29 out of 30 countries where gender difference was significant, females declared higher road safety policy support than males, except in Morocco, where males declared higher road safety support. Females were more likely to support road safety policies than males were, in all regions, except in Africa, where the support was similar for both genders. However, in Europe and North America, the gender gap was bigger, with a lower general support, especially in North America.

Linear regression models confirmed that scores of road safety policy support were higher among females and older drivers. The level of income seems to have a negative effect by weakening the support for road safety policies. Gender equality seems to have positive effects by increasing support for road safety policies.

Perception of risky behaviours

Gender differences were seen for 24 out of the 32 countries. All the effect sizes were small. For 23 out of 24 countries where gender difference was significant, females declared higher risk perception than males. The opposite was true in Morocco, where males had a higher risk perception. In each region, except in Africa, females perceived a higher risk of driving in a risky manner compared to males. Regional differences are also evident, as Asia-Oceania perceived lower risk compared to the three other regions.

Linear regression models confirmed that scores of risk perception were higher among females and older drivers. The level of income seems to have a negative effect by lowering the perception of risk. Gender equality seems to have positive effects by increasing risk perception.

Number of crashes

Significant gender differences were seen for 9 out of the 32 countries. Gender differences were significant for Belgium, Canada, Egypt, France, Germany, Greece, Morocco, the Netherlands, and Slovenia. All the effect sizes were small. For 8 countries out of the 9 countries where gender difference was significant, males declared higher number of crashes than females, except for Morocco where females declared higher number of crashes than males. The number of crashes was particularly high in Africa and Asia-Oceania, where no gender differences were found. However, a significant gender gap was observed in Europe and North America.

Linear regression models confirmed that the number of crashes were higher among males and younger drivers. The level of income seems to have positive effect on road safety, by decreasing the number of crashes. Gender equality seems to have positive effects, by lowering the number of crashes. In contrast to the whole sample, for the Europe region, the country level of income seems to have a negative effect on road safety, with higher incomes increasing the number of crashes.

Social desirability and compliance intention

Significant gender differences were seen for 12 out of the 32 countries. All the effect sizes were small. For 11 countries out of the 12 countries where gender difference was significant, females declared higher compliance intention than males, whereas for Kenya males declared higher compliance intention than females. Females had a higher social desirability score than males in Asia-Oceania and in Europe. Although not statistically significant, the results were reversed in Africa, with a higher social desirability for male.

Linear regression models confirmed that scores of social desirability were higher among females and older drivers.

Compliant law perception

Significant gender differences were seen for 6 out of the 11 countries who used this bonus question. Gender differences were significant for Canada, Egypt, Japan, Slovenia, South Africa and United Kingdom. All the effect sizes were small. For 5 countries out of the 6 countries where gender difference was significant, females declared a higher importance for respecting the law than males, whereas for Egypt males declared a higher importance than females. The effect size of the gender gap in Asia-Oceania was particularly important.

Risky social norms

Significant gender differences were seen for 9 out of the 32 countries. All the effect sizes were small. For all the countries where gender difference was significant, males declared risker descriptive norms than females. In all regions, with the exception of Africa, males perceived their friends to act more in a risky manner than females perceived, except in Africa where the gender gap wasn't significant. The maximum gender gap appeared in North America.

Linear regression models confirmed that scores of descriptive norms were higher among males and younger drivers. Scores of social desirability, road safety policy support and risk perception were higher among females and older drivers. The level of income seems to have positive effect on road safety, by decreasing the level of descriptive norms.

Perceived probability of enforcement

Gender differences were seen for 21 out of the 32 countries. All the effect sizes were small. For all the countries where gender difference was significant, males perceived higher probability of enforcement than females. In all regions, males perceived their likelihood to encounter enforcement related to different transgressions more likely than females did. The perceived likelihood was lower in North America.

Linear regression models confirmed that scores of perceived enforcement were higher among males and younger drivers. The level of income seems to have a negative effect by lowering the perceived enforcement likelihood. Gender equality seems to have negative effects by weakening perceived enforcement likelihood.

Positive perception of automated vehicles

Gender differences were seen for 22 out of the 32 countries. All the effect sizes were small. For all the countries where gender difference was significant, males declared higher positive perception of automated and semi-automated vehicles than females. Globally, males judged the likelihood of benefits of fully and semi-automated cars more likely than females did. The gender gap was higher in Europe and North America, where benefits were seen as more unlikely in these regions.

Linear regression models confirmed that scores of positive perception of automated vehicles were higher among males and younger drivers.

Advanced analysis

Linear regression models suggested that all attitudinal variables have a significant effect on reported risky driving behaviours, with the exception of the social acceptability of risk behaviours. The significant effects of gender and age on declared risky driving behaviours were likely to be mediated by the attitudinal variables. Furthermore, reported risky driving behaviours were higher in countries with a high level of Gender Equality, while all things being equal, these behaviours decreased as income level increased. More precisely, the more females have economic participation in the country, the higher the level of risk behaviours reported by males. However, the reported risk behaviours of females were higher when the female level of education and economic participation was high but also when the female health and political involvement was low. Structural Equation Model further indicated that

females' risky behaviours increased to be more similar to males in countries with high gender equality for educational attainment.

Conclusion

Globally, an effect of gender on psychological constructs was found, and a significant effect of region. More occasionally, an interaction between gender and region was revealed, leading us to conclude that gender differences are also culturally constructed. This was the case for personal acceptability, declared behaviours, self-efficacy, perceived safety, road safety policy support, social desirability, law perception and perception of automated vehicle. However, the fact that some constructs are only explained by gender without interaction with cultural context can be interpreted in two manners. Firstly, we can understand that the biologic aspect of gender cannot be denied when trying to explain gender differences in attitudes and other related constructs in road safety. However, we can also argue the fact that maybe the way people are socialized as men and women all around the world is not different enough to find cultural differences on gender's effect on some constructs.

Key recommendations

Policy recommendations at national and regional level

- Continue to study the impact of gender on crash risk and aim programs at those most at risk. In this study males were found to be more at risk than females. Even in Europe and North America, whereas crashes are less common, men are still more at risk than women.
- A reduction in the gap of equality measures between men and women is associated with a reduction of the gender differences in risky road behaviours, with women becoming more prevalent in typical riskier "masculine" behaviours. Explanations for this behavioural adaptation should be identified and strategies for mitigating this outcome implemented.
- To reduce risky driving behaviours in risk prone subsets of the population (especially men but also young drivers), target psychological constructs that have the greatest impact on risky driving, such as personal acceptability and self-efficacy.

Specific recommendations to particular stakeholders

- *[To Non-Governmental Organizations (NGOs)]* Contribute to education and awareness campaigns and events aimed at reducing risky behaviours, especially among males. The strong influence of personal acceptability on risky behaviours calls for action on the perception of risks and rules. In particular, "male" values that influence individual behaviour should be targeted, including among women in countries where gender equality is high.
- *[To vehicle manufacturers, other companies and research organisations]* Develop research aimed at understanding the psychological mechanisms by which gender influences risky behaviours and those aimed at influencing this relationship.

The ESRA project has 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 across the world. 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. This will become a solid foundation for a joint international monitoring system on road safety attitudes and behaviour.

2. Introduction

In 8th place among the causes of death in the world (WHO, 2009), road crashes remain a significant public health issue, where the role of gender is undeniable. Even when exposure is controlled for, males are more often involved in road crashes than females (GHE, 2016), including those involving a car, motorcycle, bicycle or on foot (Prati, Fraboni, De Angelis & Pietrantoni, 2019; Pulido et al., 2016; Stimpson, Wilson & Muelleman, 2013; Zhu, Zhao, Coben & Smith, 2013), especially when they are young (Twisk, Bos, Shope, & Kok, 2013). For example, although females represent 51% of the world's population, their share of road deaths is only 24% (Rodrigues, Fonseca & Cardoso, 2015; Traffic Safety Basic Facts, 2016). Among those killed, females are also less often the drivers (31% compared to 70% of males) (Traffic Safety Basic Facts, 2016) and less often judged to be responsible for the crash (ONISR, 2018). On the contrary, the mere presence of a male in the passenger compartment is sufficient to increase young driver fatality rates (Williams, Ferguson & McCartt, 2007).

Although males exhibit higher risk factors, such as driving on less dense networks than females (motorways, rural areas), slightly more kilometres travelled and more use of two-wheelers, this does not seem to be sufficient to explain such a gender differential in road crashes and injuries (Waylen & McKenna, 2002). Ninety per cent of road crashes involve human factors as a cause (Alonso et al. 2002, cited in Gonzalez-Iglesias, Gomez-Fraguela, Luengo-Martin, 2012). Therefore, to further understand the impacts of gender on road crash risk, the relationship of gender to attitudes towards driving skills and road safety measures have been the subject of much analysis.

The observed gender differences in road crashes may be partly explained by males' greater involvement in risky and illegal behaviour (Barr et al, 2015; Butters, Mann, Wickens & Boase, 2012; Scott-Parker, Watson, King & Hyde, 2014), their greater sensation-seeking (Cestac, Paran & Delhomme, 2011) and the lower use of safety measures that could protect them (e.g. seat belts, helmets) (Fernandes, Hatfield & Job, 2010; Jiménez-Mejías et al., 2014). Males represent 75% of the young risk-taking driver population, who consider crashes to be related to external causes and therefore difficult to control (Lucidi et al., 2010). They tend to perceive themselves as immune to risks that threaten others, and overestimate their driving skills (Glendon, Dorn, Davies, Matthews & Taylor, 1996), particularly in risky situations (Farrow & Brissing, 1990). Conversely, some studies propose that females perceive a greater overall risk on the road and feel less able to cope with the difficulties they might encounter, compared to males (Farrand & McKenna, 2001; Glendon et al., 2014). For example, they perceive greater risks in speeding (Obst, Armstrong, Smith & Banks, 2011; Holocher & Holte, 2019) and in using their phone while driving (Struckman-Johnson, Gaster, Struckman-Johnson, Johnson & May-Shinagle, 2015).

However, these observed gender differences may not be universal. According to Lund and Rundmo (2009), the fact that females are more risk-sensitive and perceive a higher risk on the road than males is only valid in high-income countries. Indeed, in Ghana, the perception of risk is similar between males and females, because as inhabitants of developing countries, they are more accustomed to risk, which could affect their perception (Flynn, Slovic & Mertz, 1994). Other researchers found no difference between genders in the perception of the frequency and probability of a crash (Cordellieri et al., 2016). Nevertheless, males consider risky behaviour as less serious (DeJoy, 1992; Gonzalez-Iglesias et al., 2012), feel less concerned about the risk of it happening to them (Cordellieri et al., 2016; Gonzalez-Iglesias et al., 2012) or of injuring someone (Glendon et al., 2014). They may consider driving to be dangerous, but not for them (DeJoy, 1992). Thus, risk-taking among males is not explained by a lower perception of risk but by a more detached attitude towards it, since risk-taking can be rewarding for this population (Guého, 2015). Conversely, females feel concerned by all road safety problems (Butters et al., 2012).

The way in which males and females assess their skills also varies. With respect to driving, two forms of competence can be distinguished: competence in terms of driving skills and competence in terms of safety (Sibley & Harré, 2009). Most individuals express a bias regarding their skills, perceiving them as superior to those of the average driver (Sibley & Harré, 2009). However, males value their skills more in terms of ability, while females value their caution, both overtly and implicitly, automatically (Sibley & Harré, 2009). However, it is interesting to note that males still perceive themselves as safe drivers - even more so than females - even though they report more risky behaviour (Barr et al., 2015; Rodrigues

et al., 2015). As a result, they express more negative attitudes towards road enforcement actions (e.g., Akaateba & Amoh-Gyimah, 2013; Bener et al., 2013; Butters et al., 2012; Corbett & Caramlau, 2006) as well as traffic law (Møller & Haustein, 2014) and report more intentions to break traffic rules in the future (Scott-Parker et al., 2014). These attitudes may be partly explained by the fact that males typically feel excitement in traffic situations and vehicles that they find difficult to control (Redshaw, 2006). In general, males experience more positive emotions and interest in driving, which predicts risky driving (Harré, Field & Kirkwood, 1996; Rhodes & Pivik, 2010). Conversely, females have more positive attitudes to driving safely and more satisfaction in complying with traffic regulations than males (Rodrigues et al., 2015).

Many traffic offences increase the risk of road crashes, sometimes occurring simultaneously, and males tend to commit more traffic offences than females (Barr et al., 2015; Butters et al., 2012; Scott-Parker et al., 2014). Even with regard to driving while fatigued, males represent a population at greater risk (Gonçalves et al., 2015; Obst et al., 2011). They more frequently report driving while fatigued and do not perceive this to be as risky as females do (Obst et al., 2011). As a result, they are more likely to have narrowly escaped a collision when fatigue is a factor (Obst et al., 2011). Furthermore, males use seat belts to a lesser extent and also require their passengers to use them less (Barr et al., 2015), as shown in the study by Granié et al. (2019), in North America, Europe and Africa, but not in Asia-Oceania, where the proportion is the same. However, Obeng (2011) found that among those who had been in a car crash, females were less likely to wear seatbelts than males.

Gender differences are even greater in crashes involving substances use (alcohol, illegal drugs or medication), where males are over-represented in general (Amarasingha & Dissanayake, 2014; Romano, Peck & Voas, 2012). They are at greater risk of driving while drunk (Mouloua, Brill & Shirkey, 2007) and of being arrested because they have used a substance (Vaca, Romano & Fell, 2014). Thus, some authors have come to consider that gender differences in road crashes may be explained by differences in alcohol consumption (Kelley-Baker & Romano, 2010). However, it would appear that this gender gap has narrowed in recent decades, with a much larger increase in the rate of females arrested for driving under the influence compared to males (Vaca et al., 2014). This is partly explained by a change in the behaviour of females (Vaca et al., 2014).

Distracted driving, another risky behaviour, has increased in recent decades with the widespread use of mobile phones. Among young adults, the frequency of sending messages or making calls with a mobile phone while driving is 94% (Nemme & White, 2010). However, this frequency is higher among males in studies conducted in the United States (Barr et al., 2015) and Qatar (Bener et al., 2013) but not in those conducted in Australia (Nemme & White, 2010; Struckman-Johnson et al., 2015), demonstrating a cultural effect in this gender difference. Similarly, in the study by Pires, Areal and Trigoso (2019), mobile phone use is higher among males than females in Europe and Africa but not in Asia-Oceania and the South and North America. However, in Australian studies, more females consider the behaviour to be dangerous and that it should be prohibited (Struckman-Johnson et al., 2015).

Finally, speed is considered a major cause of road crashes: for example, it is the leading cause of fatal collisions in France, responsible for 18% of deaths (OMS, 2018). Males and females behave differently towards speed control radars. For example, females are more compliant with speed regulations, whereas males show manipulative behaviour, avoiding speed cameras or slowing down just as they pass (Corbett & Caramlau, 2006). As a result, the rate of males getting caught twice or more by a speed camera is double than that of females (Corbett & Caramlau, 2006). This male tendency to drive fast is observed in many countries around the world, such as in Qatar (Bener et al., 2013), England (Corbett & Caramlau, 2006), Australia (Horvath, Lewis & Watson, 2012) and Ukraine (Sullman, Stephens & Hill, 2017), which was confirmed in a first analysis of ESRA2 data. Across all regions, males consistently report more speeding than females, with varying regional differences (Granié et al., 2019). This is also reflected in their intentions to drive excessively fast. Among individuals intending to exceed the speed limit in a specific situation, males are more willing to do so than females (Horvath et al., 2012).

Classically, the tendency for males to take risks has been explained by a combination of biological and evolutionary theories (Granié & Papafava, 2011). Males are thought to have a higher rate of sensation seeking and take more risks than females because they produce more androgens (Zuckerman, 1991). According to evolutionary theory, this tendency would be the natural consequence of the function of

males to protect the community and reproduce their genetic heritage by competing to attract females (Daly & Wilson, 1987). Social relations between males would therefore be more competitive (Yagil, 1998), leading them to perceive social pressure to drive fast, which is less the case for females (Cestac et al., 2011). However, these hypotheses do not seem to be sufficient to explain such differences and the results, sometimes contradictory, discussed above. Some studies highlight the fact that gender differences on the road could be explained, not in terms of gender differences, but in terms of gender roles and would result from socialisation (Granié, Degraeve & Varet, 2019; Oppenheim, Oron-Gilad, Parmet & Shinar, 2016; Sibley & Harré, 2009). Gender roles and gender stereotypes refer to a set of social beliefs about what a male and a female should be in a given society (Ashmore, Del Boca & Wohlers, 1986). As these stereotypes vary across cultures, the behaviours expected of males and females may also vary. For Simon and Corbett (1996), gender differences are simply a reflection of gender role differences, presenting the female role as passive, non-competitive and cautious while the male role is risk-taking, competitive and non-compliant. Norms of masculinity even prescribe a minimization of danger, coupled with reckless behaviour (Struckman-Johnson et al., 2015). Males then engage in risky behaviours in order to demonstrate their masculinity, adopting typical behaviours and thus departing from feminine behaviours (Courtenay, 2000).

At the crossroads of biological and social explanations, some authors suggest that an individual's level of risk taking depends on two factors: on the one hand, endogenous trends and, on the other, constraints and restrictions on risk-taking in the individual's culture (laws, norms, educational practices, etc.) (Arnett, 1992). The most recent research thus attempts to show both the biological and social origins - innate and acquired - of gender differences in risk-taking. Brown (2013) thus identifies a double risk factor for the male population. The male gender leads to a high level of androgens, a lower effect of alcohol on psychomotor performance and slower neurocognitive development, which reduces risk perception and increases impulsivity and sensation seeking in adolescence. The masculine psychosocial gender role brings a cultural, social and individual value to risk-taking, aggressiveness, competition and alcohol consumption, and greater exposure in terms of driving frequency. On the contrary, females have a double protective factor against the risk of crashes: the female gender but also the feminine gender role constitute obstacles to the biological and social factors that explain risk-taking.

This last explanation suggests that gender differences could vary across cultures and gender roles socially expected for females and males. Although some studies have explored cultural differences between road users from both developed and developing countries (Üzümcüoğlu et al., 2018), and some others have looked at gender differences across cultures (Schmitt et al., 2008), most of the research on gender differences has so far been based on developed countries. To our knowledge, no study has yet attempted to compare gender differences in driver behaviours according to the geographical and cultural context. Such an approach might show that gender differences in car driving behaviours vary across countries and geographical and cultural contexts and thus support psychosocial explanations of gender differences in driving behaviour. Some studies have shown, for example, that there are already variations in gender differences within countries between high- and low-income regions. For example, in low-income regions, gender differences are more pronounced, with females having even fewer car crashes than in wealthier regions (Al-Balbissi, 2003).

The first analysis of gender differences in the ESRA2 data by Granié et al. (2019) revealed cultural variations for four transgressions: drunk driving, driving while using a telephone, speeding, and seat belt use. However, regions were constructed on the basis of geographical proximity of countries and could therefore include culturally different countries. The aim of this study is to build on the results previously found by analysing gender differences across the entire sample, by region, but also by comparing countries among themselves. In particular, we will investigate the cultural differences between these countries, based on their gender equality indices and income levels. This thematic ESRA report aims at describing the differences between males and females in the self-declared behaviours and attitudes related to driving in a sample from 32 countries worldwide. Factors that influence these self-declared behaviours are examined within each of the four regions: Europe20, NorthAmerica2, AsiaOceania5 and Africa5.

3. Methodology

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

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

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

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

The project has been initiated and is coordinated by the Vias institute (BE). Twelve institutes: BASt (DE), bfu (CH), CTL (IT), IATSS (JP), IFSTTAR (FR), ITS (PL), KFV (AT), NTUA (EL), PRP (PT), SWOV (NL), TIRF (CA) and Vias institute (BE) – combined their expertise and resources to analyse the common data and to disseminate the results. The results of the ESRA2_2018 survey will be published in a Main Report and fifteen thematic reports (Table 1:).

Table 1: ESRA2 thematic reports

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

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

An overview of the data collection method and the sample per country can be found in (LINK Methodological report). A weighting of the data was applied to the descriptive analyses. This weighting considered 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). 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.

The present report summarizes the ESRA2_2018 results with respect to gender issues on psychological variables that may affect the declared behaviours. In investigating the gender differences across regions and countries, the focus is only on participants who reported driving, at least a few days a month during the past 12 months. The resulting sample consists of 25,459 individuals: 13,540 males (53.18% of the sample) and 11.919 females (46.82% of the sample) equally distributed in the four regions studied (Table 2). The analyses are focused on this population, as the sample of each gender is not equally distributed or not large enough on the other transport modes and/or the number of survey items devoted to these modes were not sufficient to the analyses.

Table 2: Distribution of the sample over the four regions studied according to gender

	Continent								Total	
	Africa5		AsiaOceania5		Europe20		NorthAmerica2			
Sample	N	%	N	%	N	%	N	%	N	%
Gender										
Male	1925	56.44	1986	53.94	8869	52.78	760	48.69	13540	53.18
Female	1486	43.56	1696	46.06	7936	47.22	801	51.31	11919	46.82
Age										
18-24	687	20.14	409	11.11	1544	9.19	173	11.08	2813	11.05
25-34	1142	33.48	720	19.55	2814	16.75	270	17.30	4946	19.43
35-44	878	25.74	767	20.83	3184	18.95	259	16.59	5088	19.99
45-54	450	13.19	663	18.01	3167	18.85	277	17.75	4557	17.90
55-64	164	4.81	542	14.72	2735	16.27	266	17.04	3707	14.56
65+	90	2.64	581	15.78	3361	20.00	316	20.24	4348	17.08

The purpose of this thematic report is to explore the cultural effect on gender differences in reported risk behaviours while driving. The four regions differentiated above, based on a geographical criterion, will be used to distinguish potential cultural differences on a meso-level, while gender differences will be also on a microlevel, by analysing the differences in aggregated scores by country.

For the purposes of analysis and for the sake of clarity and conciseness, we have chosen to focus on the variables taken as a whole rather than going into detail about each of the behaviours included in the ESRA questionnaire. For details by behaviour, the reader is invited to consult the other thematic reports, in which gender differences are analysed for each item.

We focus on the items concerning psychological constructs on which we can expect gender differences, according to literature. To consider the general psychological constructs, we performed a Principal Component Analysis on each psychological construct studied, in order to verify that all the items were of the same dimension (saturation >.40 on the 1st axis), then we calculated aggregate scores on each construct. These 13 factors are hypothetical and have not, however, been validated upstream by an exploratory factor analysis. The variables considered and the corresponding question number from the survey found in Appendix 1 are:

- Social acceptability of risky behaviours (Q13.1)
- Personal acceptability of risky behaviours (Q14.1)
- Declared risky behaviours (Q12.1b and Q12.1a). Note that behaviours concerning children's use of seat-belt were excluded
- Self-efficacy in risky behaviours (Q15.i.j.k.l.m.n.o.p)

- Perceived safety in driving (Q16). Only items concerning feelings of safety in cars were considered
- Road safety policy support (Q18)
- Perception of risky driving behaviours (factors causing a crash) (Q17)
- Number of crashes (Q23.1a.2a.3a)
- Social desirability and intention to comply (Q28)
- Compliant law perception (bonus question used by 20 countries in the ESRA2019
- Risky social norms (15.a.b)
- Perceived probability of enforcement (enforcement perception) (Q20)
- Positive perception of automated vehicles (Q24, Q25.1, Q25.2).

As the effect of age on driver perceptions, attitudes and behaviour is already well demonstrated in the literature (Borowsky et al., 2010), age was also included in the analysis, in addition to gender and regional effects, to control for its effect.

First, two-way analysis of variance was carried out on each variable to assess the effect of gender and age on the whole sample. Three-way analysis of variance (ANOVA) was carried out to assess the effect of gender, region and age on each aggregated score explained above. The between subject factors comprised two gender groups (males and females), four regional groups (Europe20, North America2, Asia-Oceania5 and Africa5) and six age groups (18-24, 25-34, 35-44, 45-54, 55-64, 65+).

Two-way analyses (ANOVA) were carried out to assess the effect of gender and age by country. The between subject factors comprised two gender groups (males and females), and six age groups (18-24, 25-34, 35-44, 45-54, 55-64, 65+).

Given the focus of this paper on the effect of gender and region/country and their interactions, we report the main effect of age but not the interaction between age and the two other factors. For each significant *F* test, we give eta squared (η^2) value as a measure of effect size. The scale of magnitude given by Cohen (1988) is as follows: small when η^2=.01, medium when η^2=.06, large when η^2=.14.

For the ANOVAs, the mean and standard deviation are presented in a table for each variable for each country and region. Correlations between the 13 psychological constructs are presented in Appendix 3. Stars identify and differentiate levels of statistically significant differences that are synthetized in the result section.

Linear regression analyses were also carried out to analyse first the effect of gender and countries on each variable, and second the effect of gender, country and attitudinal variables measured on the declared behaviours. To further explain the differences by country, we use the gender equality indices and income level of each country as explanatory variables of the effect of country on the analysis of gender differences in the whole sample. For controlling the effect of the income level, we use the income categories proposed by the World Bank, dividing word's economies in four groups: high, upper-middle, lower-middle, and low.

Gender equality indices used here are those indicated by the World Economic Forum (WEF, 2018). They benchmark progress toward parity in four dimensions: Health and Survival (gender ratio at birth and gender gap in healthy life expectancy); Political Empowerment (gender ratio in ministerial and parliamentary positions and in years in national executive office) and Educational Attainment (gender ratio in primary, secondary and tertiary level of education); and Economic Participation and Opportunity (employment remuneration and advancement gaps between males and females).

4. Results & discussion

4.1 General results

Descriptive results by gender per item are presented in the various thematic reports. In this report on gender aspects, we present the means and tests of the significance of the difference between the two gender groups in each country for each aggregate variable we have constructed.

4.1.1. Social acceptability of risky driving behaviours

The aggregated score of social acceptability of risky driving behaviours has been calculated after verifying by PCA that all the items correctly loaded on the first factor. The calculated score included the following items:

Where you live, how acceptable would most other people say it is for a CAR DRIVER to….?

- 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
- 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

As shown in Table 3, the tests of analysis of variance showed significant gender differences for 18 out of the 32 countries and all the regions of the ESRA sample. Gender differences are not significant for Austria, Egypt, Finland, Greece, India, Ireland, Kenya, Morocco, Poland, Portugal, Serbia, South Africa, Sweden and the United States. All the effect sizes were small. For all the countries and regions where gender difference was significant, males perceived higher social acceptability of risky driving behaviours than females.

Table 3: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for the score of social acceptability of risky driving behaviours by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	9.98***	4.76	8.89	3.26	.02
Austria	13.45	5.27	12.97	5.72	<.01
Belgium	11.65***	4.78	10.85	4.18	.01
Canada	11.35***	5.58	10.11	4.04	.02
Czech Republic	11.31***	4.10	9.86	3.19	.04
Denmark	10.41**	3.84	9.49	2.87	.01
Egypt	14.74	5.95	14.35	6.86	<.01
Finland	12.68	3.74	12.20	3.96	<.01
France	11.60*	4.48	10.86	4.31	.01
Germany	12.49***	5.32	11.41	4.80	.01
Greece	14.05	6.90	13.43	6.30	<.01
Hungary	9.95**	3.63	9.09	2.95	.01
India	12.48	5.80	12.84	7.11	<.01
Ireland	9.86	4.24	9.31	3.73	<.01
Israel	12.32**	5.25	11.20	5.00	.01
Italy	11.04*	4.69	10.43	4.48	.01
Japan	11.57***	4.58	10.31	3.93	.02
Kenya	13.40	6.23	13.80	6.52	<.01
Morocco	13.13	5.92	13.02	6.69	<.01
The Netherlands	10.21**	3.69	9.41	3.28	.01

Nigeria	13.01*	5.57	12.16	6.19	.01
Poland	14.30	5.65	13.67	5.90	<.01
Portugal	10.81	4.18	10.74	4.88	<.01
Republic of Korea	11.64**	3.71	10.66	3.48	.01
Serbia	12.35	6.05	12.27	6.09	<.01
Slovenia	10.48*	4.02	9.80	4.07	.01
South Africa	11.32	5.40	10.78	4.89	<.01
Spain	11.26*	4.24	10.47	5.47	.01
Sweden	11.53	4.21	10.90	4.06	<.01
Switzerland	11.48**	4.44	10.47	3.85	.01
United Kingdom	10.29*	5.18	9.35	4.29	.01
USA	11.31	4.85	10.73	4.28	<.01
Africa	13.03*	5.89	12.61	6.25	<.01
AsiaOceania	11.61**	4.94	10.74	4.89	<.01
Europa	11.64**	4.92	10.90	4.74	<.01
NorthAmerica	11.33***	5.23	10.44	4.18	<.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.2. Personal Acceptability of risky driving behaviours

The aggregated score of personal acceptability of risky driving behaviours has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

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

- 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

As shown in Table 4, the tests of analysis of variance showed significant gender differences for 27 out of the 32 countries and all the regions of the ESRA sample. Gender differences are not significant for Egypt, India, Kenya, Morocco and Nigeria. All the effect sizes were small. For all the countries and all the regions where gender difference was significant, males perceived higher personal acceptability of risky driving behaviours than females.

Table 4: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for the score of personal acceptability of risky driving behaviours by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	17.61***	7.70	15.40	4.74	.03
Austria	22.42***	7.88	20.41	7.54	.01
Belgium	21.03***	7.29	19.12	6.16	.02

Canada	20.89***	9.33	18.19	6.67	.03
Czech Republic	21.23***	7.28	18.52	5.78	.04
Denmark	18.88***	6.59	16.78	4.58	.02
Egypt	22.61	8.48	21.12	9.07	<.01
Finland	23.85***	6.75	20.98	6.06	.03
France	21.27***	7.48	19.06	6.20	.02
Germany	20.50***	7.42	19.10	6.63	.01
Greece	19.14***	7.37	16.90	4.79	.03
Hungary	18.52***	5.59	16.53	4.79	.03
India	19.12	8.40	19.67	10.98	<.01
Ireland	17.77***	6.75	15.55	4.72	.03
Israel	19.88***	6.50	18.21	6.38	.01
Italy	19.37***	6.18	17.40	5.38	.03
Japan	20.75***	6.85	18.87	7.17	.02
Kenya	17.35	6.25	16.52	5.52	<.01
Morocco	20.39	8.23	20.29	8.69	<.01
The Netherlands	19.61***	6.63	17.70	5.51	.02
Nigeria	17.42	5.98	17.03	5.99	<.01
Poland	23.76***	7.90	20.54	6.68	.04
Portugal	19.92***	6.10	18.25	5.46	.01
Republic of Korea	21.66***	6.49	19.29	5.91	.02
Serbia	17.60***	5.74	16.08	4.26	.02
Slovenia	19.16***	5.65	17.28	4.80	.03
South Africa	18.90**	7.19	17.29	5.68	.01
Spain	19.45***	6.69	17.08	6.42	.03
Sweden	21.37***	6.96	19.17	5.99	.03
Switzerland	21.29***	7.03	18.99	5.51	.03
United Kingdom	18.80***	8.23	16.49	6.59	.02
USA	19.70**	7.32	18.33	6.31	.01
Africa	19.26***	7.50	18.33	7.18	<.01
AsiaOceania	19.81***	7.34	18.16	7.85	.01
Europa	20.29***	7.12	18.22	6.01	.02
NorthAmerica	20.30***	8.42	18.26	6.47	.02

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.3. Declared risky driving behaviour

The aggregated score of declared risky driving behaviours has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The items related to the transport of children have been excluded due to the high number of missing values. The calculated score included the following items:

Over the last 12 months, how often did you as a car driver …?

- 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

Over the last 30 days, how often did you as a car driver …?

- 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
- 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.

As shown in Table 5, the tests of analysis of variance showed significant gender differences for 30 out of the 32 countries and all regions of the ESRA sample. Gender differences are not significant for Kenya and Morocco. All the effect sizes were small, except for Greece, Italy and Portugal where the effect sizes are medium. For all the countries and all the regions where gender difference was significant, males declared higher frequency of declared risky driving behaviours than females, except in India where females declared riskier behaviours than males.

Table 5: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for declared risky driving behaviour score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	22.39 **	8.59	20.84	5.97	.01
Austria	28.20***	8.65	25.04	7.40	.03
Belgium	26.14***	8.47	23.34	7.22	.03
Canada	26.78***	10.38	23.91	8.20	.03
Czech Republic	24.85***	7.34	22.21	6.37	.04
Denmark	26.19***	8.15	23.09	5.77	.04
Egypt	26.72*	8.65	25.30	9.16	.01
Finland	26.22***	7.28	24.02	6.50	.02
France	25.65***	8.95	23.46	7.64	.01
Germany	25.53***	8.04	23.15	7.48	.02
Greece	25.85***	7.14	21.98	6.40	.06
Hungary	22.87***	6.25	20.27	5.30	.03
India	23.63	8.57	24.91**	12.51	.01
Ireland	23.91***	8.06	21.24	6.36	.02
Israel	25.47***	6.72	23.51	6.35	.02
Italy	24.66***	8.07	21.08	6.07	.05
Japan	23.64***	6.81	21.18	7.24	.02
Kenya	26.75	8.98	24.48	9.82	.01
Morocco	24.17	7.94	23.18	8.08	<.01
The Netherlands	24.63***	7.76	21.87	6.43	.03
Nigeria	25.16***	7.81	22.43	7.11	.03
Poland	25.65***	7.89	22.59	6.44	.04
Portugal	27.64***	7.77	23.49	7.11	.06
Republic of Korea	24.98***	7.52	21.95	6.35	.03
Serbia	24.48***	7.34	21.58	5.72	.04
Slovenia	25.88***	6.94	22.83	5.78	.05
South Africa	27.34***	9.49	23.83	7.33	.02
Spain	24.79***	7.75	21.17	6.94	.04
Sweden	26.19***	7.78	23.57	6.71	.02
Switzerland	25.59***	7.84	22.77	5.82	.04
United Kingdom	23.60**	8.99	21.21	7.64	.01
USA	26.38*	9.28	24.72	8.57	.01
Africa	26.06***	8.65	23.79	8.28	.02
AsiaOceania	24.08***	7.76	22.49	8.02	.01
Europa	25.51***	7.96	22.62	6.78	.04
NorthAmerica	26.59***	9.85	24.32	8.41	.02

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.4. Self-efficacy in risky behaviours

The aggregated score of self-efficacy in risky behaviours has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

To what extent do you agree with each of the following statements?

- 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

As shown in Table 6, the tests of analysis of variance showed significant gender differences for 29 out of the 32 countries and all the regions of the ESRA sample. Gender differences are not significant for India, Morocco and Nigeria. All the effect sizes were small, except for Czech Republic, Denmark, Finland, Italy, The Netherlands, and Portugal where the effect sizes are medium. For all the countries and regions where gender difference was significant, males declared a higher level of self-efficacy in risky behaviours than females.

Table 6: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for the score of self-efficacy in risky behaviours by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	12.95***	6.03	10.89	3.57	.04
Austria	16.72***	5.90	14.07	5.49	.05
Belgium	15.20***	6.12	12.67	5.27	.04
Canada	14.39***	6.49	12.08	5.01	.04
Czech Republic	13.68***	5.91	11.05	4.58	.06
Denmark	14.62***	5.56	11.74	4.06	.06
Egypt	13.28*	5.08	12.60	4.65	.01
Finland	15.10***	5.89	11.90	4.40	.08
France	14.05***	5.52	11.73	4.88	.04
Germany	15.13***	5.75	12.97	4.83	.04
Greece	13.91***	5.87	12.02	4.24	.03
Hungary	13.24***	5.79	10.73	3.81	.04
India	14.26	5.74	14.56	6.97	<.01
Ireland	13.52***	5.98	11.40	4.27	.03
Israel	13.48***	5.46	11.17	4.20	.04
Italy	14.44***	5.86	11.72	4.51	.05
Japan	11.49**	4.01	10.45	4.41	.01
Kenya	14.75**	6.14	12.91	5.43	.01
Morocco	12.34	4.96	11.90	5.08	<.01
The Netherlands	14.89***	5.44	12.13	4.33	.07
Nigeria	14.29	5.79	13.21	6.44	<.01
Poland	13.50***	5.19	11.76	4.52	.03
Portugal	14.88***	5.96	12.04	4.48	.05
Republic of Korea	12.44***	4.84	10.60	3.78	.03
Serbia	13.22***	5.82	11.10	3.75	.04
Slovenia	14.84***	6.36	12.32	4.88	.04
South Africa	16.95***	7.12	13.84	5.64	.03
Spain	13.23***	5.37	10.81	4.35	.05

Sweden	13.92***	5.67	11.61	4.32	.04
Switzerland	14.90***	5.88	11.89	4.24	.07
United Kingdom	13.09***	5.52	11.25	4.77	.02
USA	14.30***	6.04	12.63	4.85	.02
Africa	14.43***	6.09	12.98	5.57	.02
AsiaOceania	12.96***	5.36	11.52	4.89	.02
Europa	14.42***	5.86	12.00	4.66	.05
NorthAmerica	14.35***	6.27	12.37	4.93	.03

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.5. Perceived safety in driving

The score of perceived safety is based on the score on the item "How safe or unsafe do you feel when using the following transport modes in [country]?" for the following transport modes:

- drive a car (non-electric or non-hybrid)
- drive a hybrid or electric car

As shown in Table 7, the tests of analysis of variance showed significant gender differences for 21 out of the 32 countries and all the regions of the ESRA sample. Gender differences are not significant for Austria, Czech Republic, Egypt, India, Italy, Japan, Kenya, Morocco, Nigeria, Republic of Korea and Spain. All the effect sizes were small. For all the countries and regions where gender difference was significant, males declared higher perceived safety in driving than females.

Table 7: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for perceived safety in driving score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	8.25**	2.88	7.62	2.54	.01
Austria	9.12	3.81	8.79	3.10	<.01
Belgium	8.20***	3.36	7.69	3.00	.01
Canada	8.94**	3.36	8.42	3.05	.01
Czech Republic	7.77	3.31	7.19	3.27	.01
Denmark	9.71*	3.68	9.00	3.26	.01
Egypt	8.99	4.62	9.01	4.90	<.01
Finland	9.50***	3.60	8.49	3.23	.02
France	8.42**	3.59	7.58	2.87	.01
Germany	8.85**	3.15	8.43	2.64	<.01
Greece	8.12**	4.22	6.90	3.22	.01
Hungary	8.42**	3.95	7.60	3.40	.01
India	9.26	4.43	9.59	4.83	<.01
Ireland	8.51**	3.62	7.86	3.06	.01
Israel	8.81*	4.51	8.02	3.71	.01
Italy	8.13	3.61	7.71	3.20	<.01
Japan	7.95	3.54	7.30	3.25	<.01
Kenya	9.43	4.85	8.37	4.15	<.01
Morocco	8.62	3.97	8.53	5.14	<.01
The Netherlands	9.02***	3.51	8.15	3.33	.02
Nigeria	8.80	4.36	8.24	4.54	<.01
Poland	8.27*	4.15	7.62	3.96	.01
Portugal	9.16**	3.53	8.15	3.58	.01
Republic of Korea	7.20	3.30	6.92	3.54	<.01
Serbia	8.10***	3.41	7.22	3.22	.02
Slovenia	9.12***	3.86	7.64	3.26	.04
South Africa	7.73*	3.82	7.10	3.38	.01
Spain	8.55	3.26	8.26	3.72	<.01
Sweden	10.10***	4.57	8.87	4.00	.02
Switzerland	9.99***	3.88	8.74	3.20	.03

United Kingdom	8.52***	3.06	7.81	2.66	.02
USA	8.48*	3.45	7.97	3.27	.01
Africa	8.68***	4.35	8.14	4.39	<.01
AsiaOceania	8.29**	3.87	7.90	3.71	<.01
Europa	8.76***	3.69	8.01	3.28	.01
NorthAmerica	8.71**	3.41	8.18	3.18	<.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.6. Road safety policy support

The aggregated score of road safety policy support has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

Do you oppose or support a legal obligation to …?

- 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

As shown in Table 8, the tests of analysis of variance showed significant gender differences for 30 out of the 32 countries and all regions of the ESRA sample. Gender differences are not significant for India and the Republic of Korea. All the effect sizes were small, except for Finland, Greece and Sweden were the effect sizes are medium. For 29 out of 30 countries and all the regions where gender difference was significant, females declared higher road safety policy support than males, except in Morocco, where males declared higher road safety support.

Table 8: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for road safety policy support score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	58.66	10.26	62.06***	8.59	.03
Austria	54.54	11.81	59.20***	10.72	.03
Belgium	57.41	10.57	61.11***	9.08	.03
Canada	59.43	10.28	62.24***	9.84	.02

Czech Republic	58.45	10.61	62.85***	8.32	.05
Denmark	57.65	11.31	61.16***	9.60	.02
Egypt	59.71	12.18	61.52**	12.39	.01
Finland	55.20	10.40	61.74***	8.73	.08
France	57.60	9.67	60.47***	10.13	.02
Germany	57.37	10.88	60.91***	9.67	.03
Greece	62.63	8.55	66.50***	6.31	.06
Hungary	61.36	9.38	65.00***	8.55	.03
India	62.68	10.68	64.61	10.30	<.01
Ireland	63.52	9.28	66.72***	7.94	.02
Israel	59.28	10.58	63.90***	8.19	.04
Italy	60.72	9.86	62.63***	8.40	.01
Japan	57.83	9.70	60.63*	9.28	.01
Kenya	67.72	7.78	69.00*	6.88	.01
Morocco	61.21*	12.68	59.25	16.65	.01
The Netherlands	53.09	12.10	55.55***	10.43	.01
Nigeria	66.73	7.69	67.99*	7.61	.01
Poland	58.69	11.60	63.66***	9.04	.05
Portugal	62.19	9.22	65.56***	7.88	.03
Republic of Korea	60.52	9.49	62.26	9.96	<.01
Serbia	62.16	9.64	65.36***	8.32	.03
Slovenia	63.60	9.10	66.97***	7.71	.03
South Africa	64.08	9.71	66.33*	8.08	.01
Spain	62.71	8.56	66.53***	8.07	.05
Sweden	57.74	10.49	62.43***	8.07	.06
Switzerland	56.28	10.72	60.19***	9.28	.03
United Kingdom	60.31	9.58	63.92***	8.87	.03
USA	55.88	12.59	61.19***	10.26	.05
Africa	63.99	10.59	64.96**	11.10	<.01
AsiaOceania	59.83	10.28	62.76***	9.30	.02
Europa	59.06	10.66	62.74***	9.34	.03
NorthAmerica	57.68	11.60	61.68***	10.07	.03

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.7. Perception of risky behaviours

The aggregated score of risk perception of risky behaviours has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

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

- 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

As shown in Table 9, the tests of analysis of variance showed significant gender differences for 24 out of the 32 countries and all regions of the ESRA sample. Gender differences are not significant for Czech Republic, Egypt, Germany, Greece, Italy, Japan, Kenya and Republic of Korea. All the effect sizes were small. For 23 out of 24 countries and all the regions where gender difference was significant, females declared higher risk perception of risky behaviours than males, except in Morocco, where males had a higher risk perception.

Table 9: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for risk perception of risky behaviour score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	28.94	7.99	31.35***	7.53	.02
Austria	27.98	8.02	29.72**	8.44	.01
Belgium	27.86	7.06	29.55***	7.40	.01
Canada	27.94	8.97	30.13**	7.91	.01
Czech Republic	30.32	6.59	31.51	7.69	.01
Denmark	27.87	7.45	30.10***	6.45	.02
Egypt	26.44	11.44	26.66	12.88	<.01
Finland	28.69	5.87	31.37***	5.91	.04
France	28.00	8.94	30.21***	8.36	.01
Germany	29.21	7.69	30.00	7.79	<.01
Greece	28.67	9.71	29.43	11.15	<.01
Hungary	29.43	7.92	31.17**	8.85	.01
India	23.86	12.26	26.37**	12.47	.01
Ireland	25.55	10.08	28.32**	9.55	.01
Israel	29.76	7.53	32.55***	7.66	.03
Italy	28.33	9.75	29.72	10.29	<.01
Japan	20.55	10.18	19.26	10.95	<.01
Kenya	32.39	8.88	33.81	7.77	<.01
Morocco	27.54*	10.97	26.03	13.67	.01
The Netherlands	27.25	7.32	29.56***	6.73	.03
Nigeria	31.03	9.13	32.63*	9.82	.01
Poland	28.60	7.80	30.90***	8.48	.02
Portugal	29.92	7.89	32.18***	8.61	.02
Republic of Korea	18.30	10.00	19.29	11.95	<.01
Serbia	30.29	8.18	32.25***	8.39	.02
Slovenia	28.03	7.60	30.87***	7.30	.03
South Africa	26.54	10.09	30.05*	9.27	.02
Spain	30.01	7.80	32.79***	9.31	.02
Sweden	28.14	7.71	29.54*	7.08	.01
Switzerland	27.64	7.66	29.56**	7.89	.01
United Kingdom	28.89	7.76	30.52*	7.85	.01
USA	26.54	9.95	29.28***	9.39	.02
Africa	28.76	10.39	29.86**	11.05	<.01
AsiaOceania	24.41	10.72	26.45***	11.56	<.01
Europa	28.52	8.04	30.67***	8.31	.01
NorthAmerica	27.24	9.48	29.68***	8.74	.02

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.8. Number of crashes

The aggregated score of the number of crashes has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

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?
- with only minor injuries (no need for hospitalisation) for you or other people?
- with only material damage?

As shown in Table 10, the tests of analysis of variance showed significant gender differences for 9 out of the 32 countries and 3 of the 4 regions of the ESRA sample. Gender differences are significant for Belgium, Canada, Egypt, France, Germany, Greece, Morocco, the Netherlands, and Slovenia and for the regions North America, Asia Oceania and Europa. All the effect sizes were small. For 8 countries out of the 9 countries and the 3 regions where gender difference was significant, males declared higher

number of crashes than females, except for Morocco where females declared higher number of crashes than males.

Table 10: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for number of crashes by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	0.27	1.38	0.13	0.96	<.01
Austria	0.50	1.95	0.46	1.78	<.01
Belgium	0.35**	1.18	0.22	0.77	<.01
Canada	0.75***	3.61	0.29	1.39	.02
Czech Republic	0.38	1.07	0.30	0.68	<.01
Denmark	0.31	1.24	0.20	0.79	<.01
Egypt	2.37***	3.91	1.84	3.86	.02
Finland	0.18	0.96	0.12	0.39	<.01
France	0.20*	0.82	0.15	0.67	<.01
Germany	0.29*	1.11	0.21	0.71	<.01
Greece	0.42**	1.08	0.21	0.71	.01
Hungary	0.28	0.93	0.37	1.06	<.01
India	2.20	3.32	2.14	3.35	<.01
Ireland	0.27	0.86	0.23	1.18	<.01
Israel	0.43	1.09	0.42	0.98	<.01
Italy	0.32	1.36	0.26	0.84	<.01
Japan	0.27	0.97	0.18	0.51	.01
Kenya	1.57	2.51	1.21	1.90	<.01
Morocco	1.51	2.94	2.46***	4.81	.04
The Netherlands	0.48***	1.91	0.15	0.61	.02
Nigeria	1.62	2.67	1.59	2.97	<.01
Poland	0.40	1.19	0.42	0.94	<.01
Portugal	0.32	1.07	0.27	0.82	<.01
Republic of Korea	1.53	2.28	1.35	2.15	<.01
Serbia	0.21	0.62	0.23	0.60	<.01
Slovenia	0.21*	0.54	0.14	0.46	.01
South Africa	0.53	1.43	0.49	1.48	<.01
Spain	0.33	1.18	0.38	1.70	<.01
Sweden	0.29	1.14	0.22	0.74	<.01
Switzerland	0.22	0.92	0.16	0.51	<.01
United Kingdom	0.43	2.10	0.20	1.06	<.01
USA	0.23	0.84	0.19	0.80	<.01
Africa	1.47	2.83	1.44	3.12	<.01
AsiaOceania	0.95*	2.18	0.81	1.99	<.01
Europa	0.32***	1.22	0.24	0.92	<.01
NorthAmerica	0.50*	2.66	0.24	1.11	<.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.9. Social desirability and compliance intention

The aggregated score of social desirability and compliance intention has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

To what extent are the following statements true?

- 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
- I am always confident of how to react in traffic situations

As shown in Table 11, the tests of analysis of variance showed significant gender differences for 12 out of the 32 countries and 2 of the 4 regions of the ESRA sample. Gender differences are significant for Austria, Belgium, Czech Republic, Greece, Hungary, Italy, Kenya, Nigeria, Poland, Spain, Sweden and Switzerland, and for the regions Asia Oceania and Europa. All the effect sizes were small. For 11 countries out of the 12 countries and the 2 regions where gender difference was significant, females declared higher social desirability and compliance intention than males, whereas for Kenya males declared higher compliance intention than females.

Table 11: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for social desirability and compliance intention score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	22.94	4.35	23.13	4.11	<.01
Austria	20.30	4.54	21.08*	4.44	.01
Belgium	21.51	4.27	22.09*	4.38	<.01
Canada	22.18	4.37	22.32	4.27	<.01
Czech Republic	22.37	4.13	23.16*	4.21	.01
Denmark	21.56	4.44	21.57	4.13	<.01
Egypt	23.13	5.69	22.81	6.10	<.01
Finland	21.03	4.35	21.52	4.47	<.01
France	21.60	4.26	22.30	4.18	<.01
Germany	20.73	4.36	20.88	4.72	<.01
Greece	21.89	4.60	23.56***	4.13	.02
Hungary	20.97	4.62	22.22**	4.88	.01
India	24.79	4.66	24.95	4.27	<.01
Ireland	22.26	4.34	23.09	4.36	<.01
Israel	22.74	4.37	22.92	4.60	<.01
Italy	22.55	4.43	23.33*	4.25	.01
Japan	20.24	4.21	20.78	4.23	<.01
Kenya	23.67**	4.13	22.98	4.97	.01
Morocco	23.55	5.18	23.06	6.26	<.01
The Netherlands	21.19	4.24	21.72	4.19	<.01
Nigeria	23.51	4.28	23.85*	5.20	.01
Poland	22.51	4.31	23.17*	4.23	.01
Portugal	21.21	4.31	21.97	4.91	<.01
Republic of Korea	21.25	4.44	21.67	4.12	<.01
Serbia	23.44	4.41	24.12	4.13	<.01
Slovenia	22.88	4.26	23.27	4.51	<.01
South Africa	22.38	4.42	22.38	4.24	<.01
Spain	22.12	4.12	22.95*	4.55	.01
Sweden	20.47	4.53	21.69**	4.30	.01
Switzerland	21.75	4.15	22.66*	4.36	.01
United Kingdom	22.19	3.92	21.79	4.00	<.01
USA	22.07	4.59	22.06	4.76	<.01
Africa	23.22	4.78	22.98	5.28	<.01
AsiaOceania	22.43	4.66	22.76*	4.49	<.01
Europa	21.67	4.41	22.31***	4.48	<.01
NorthAmerica	22.12	4.48	22.18	4.54	<.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.10. Compliant law perception

The aggregated score of compliant law perception has been calculated for the 11 countries that used this bonus question without modification and after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

To what extent do you agree with each of the following statements?

- people should do what the law says
- all laws should be strictly obeyed
- obeying the law ultimately benefits everyone in the community
- there are times when it is ok to ignore the law (reversed score)

As shown in Table 12, the tests of analysis of variance showed significant gender differences for 6 out of the 11 countries of the ESRA sample who use this bonus question and 3 of the 4 regions. Gender differences are significant for Canada, Egypt, Japan, Slovenia, South Africa and United Kingdom and for the regions North America, Asia Oceania and Europa. All the effect sizes were small. For 5 countries out of the 6 countries and all the regions where gender difference was significant, females declared a higher compliant law perception than males, whereas for Egypt males declared a higher compliant law perception than females.

Table 12: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for compliant law perception score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Canada	15.47	3.31	16.16**	3.27	.01
Egypt	16.85*	3.44	16.83	3.85	.01
France	14.21	3.65	14.71	3.52	.01
Japan	14.30	3.21	15.30***	3.26	.02
Kenya	17.81	2.87	17.49	3.04	.01
Morocco	16.68	3.49	16.63	4.31	<.01
Nigeria	17.86	2.88	17.85	3.04	<.01
Serbia	16.74	3.29	17.08	2.86	<.01
Slovenia	14.91	3.59	15.87***	3.53	.02
South Africa	16.78	3.29	17.37*	3.15	.01
United Kingdom	15.23	3.27	16.03**	3.23	.01
Africa	17.19	3.24	17.25	3.47	<.01
AsiaOceania	12.56	3.16	13.17***	3.06	.01
Europa	14.14	3.66	14.74***	3.45	<.01
NorthAmerica	15.46	3.31	16.16**	3.27	.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean. The regions only included the countries where these items where asked*

4.1.11. Risky social norms

The score of risky social norms is based on the score on the 2 items of perceived descriptive norm:

To what extent do you agree with each of the following statements?

- 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

As shown in Table 13, the tests of analysis of variance showed significant gender differences for 9 out of the 32 countries and 3 of the 4 regions of the ESRA sample. Gender differences are significant for Belgium, Canada, Denmark, Israel, Italy, the Netherlands, Poland, Republic of Korea and the United States, in North America, Asia Oceania and Europa. All the effect sizes were small. For all the countries and regions where gender difference was significant, males declared riskier social norms than females.

Table 13: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for the risky social norms score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	2.98	1.51	2.87	1.26	<.01
Austria	4.04	1.71	4.01	1.77	<.01
Belgium	4.37*	1.82	4.17	1.85	<.01
Canada	3.77***	1.86	3.41	1.57	.01
Czech Republic	3.87	1.72	3.75	1.74	<.01
Denmark	3.26***	1.57	2.88	1.24	.02
Egypt	3.60	1.59	3.54	1.67	<.01
Finland	3.17	1.40	3.02	1.35	<.01
France	3.77	1.77	3.61	1.69	<.01
Germany	3.90	1.72	3.77	1.69	<.01
Greece	5.23	2.17	4.75	2.24	<.01
Hungary	3.80	1.61	3.61	1.65	<.01
India	4.57	1.80	4.49	2.15	<.01
Ireland	3.69	1.96	3.42	1.67	<.01
Israel	3.83**	1.80	3.39	1.61	.01
Italy	4.62***	1.90	3.90	1.89	.03
Japan	3.51	1.44	3.69	1.63	<.01
Kenya	5.15	2.37	4.99	2.37	<.01
Morocco	3.73	1.72	3.40	1.70	<.01
The Netherlands	3.71**	1.82	3.41	1.53	.01
Nigeria	4.25	2.05	4.25	2.05	<.01
Poland	4.42**	1.92	3.98	1.78	.01
Portugal	4.99	1.89	4.69	2.00	<.01
Republic of Korea	3.51**	1.54	3.11	1.34	.01
Serbia	4.71	2.13	4.92	2.20	<.01
Slovenia	4.20	1.83	4.08	1.84	<.01
South Africa	5.16	2.23	4.98	2.27	<.01
Spain	4.15	1.70	4.26	2.06	<.01
Sweden	3.02	1.29	2.79	1.26	<.01
Switzerland	3.60	1.62	3.64	1.71	<.01
United Kingdom	3.86	1.87	3.65	1.70	<.01
USA	4.37*	2.01	4.06	1.91	<.01
Africa	4.41	2.12	4.28	2.25	<.01
AsiaOceania	3.68***	1.71	3.48	1.70	<.01
Europa	4.05***	1.87	3.85	1.85	<.01
NorthAmerica	4.07**	1.96	3.76	1.79	<.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.12. Perceived probability of enforcement

The aggregated score of perceived probability of enforcement has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

On a typical journey, how likely is it that you (as a car driver) will be checked by the police for…

- … 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

As shown in Table 14, the tests of analysis of variance showed significant gender differences for 21 out of the 32 countries and all regions of the ESRA sample. Gender differences are not significant for Czech Republic, Finland, Greece, India, Japan, Morocco, the Netherlands, Nigeria, Poland, Republic of Korea and Sweden. All the effect sizes were small. For all the countries where gender difference was significant, males perceived higher probability of enforcement than females.

Table 14: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for perceived probability of enforcement score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	16.60*	7.73	15.22	7.72	<.01
Austria	15.62***	7.59	13.72	7.72	.02
Belgium	15.66*	6.77	14.89	7.03	<.01
Canada	13.00**	7.50	11.47	7.22	.01
Czech Republic	17.91	8.02	16.89	8.11	<.01
Denmark	13.90***	7.56	11.03	5.68	.05
Egypt	18.88***	8.23	16.35	8.15	.02
Finland	14.28	5.61	14.22	5.98	<.01
France	13.81***	7.68	11.37	6.78	.02
Germany	14.28***	7.23	12.73	6.95	.01
Greece	15.03	7.55	14.97	7.56	<.01
Hungary	16.92*	8.12	15.18	8.87	.01
India	16.19	9.76	14.79	9.73	<.01
Ireland	15.13**	8.28	13.18	7.36	.01
Israel	14.19***	7.17	11.61	7.42	.03
Italy	16.02***	7.83	13.82	7.99	.02
Japan	14.35	8.17	13.08	8.47	<.01
Kenya	19.43***	7.76	18.55	8.73	.02
Morocco	17.57	8.69	15.54	9.72	<.01
The Netherlands	16.20	6.37	15.69	6.83	<.01
Nigeria	16.81	8.03	15.66	9.14	<.01
Poland	19.36	7.46	20.38	7.68	.01
Portugal	16.34***	8.50	13.68	8.92	.02
Republic of Korea	11.93	7.27	11.33	7.84	.02
Serbia	20.34***	8.06	17.14	8.65	.03
Slovenia	17.62***	7.96	15.00	8.55	.02
South Africa	16.35***	7.67	13.62	7.47	.02
Spain	17.85**	7.66	15.54	8.83	.01
Sweden	13.32	6.94	12.70	6.77	<.01
Switzerland	15.58***	7.14	12.54	6.68	.04
United Kingdom	12.37**	7.60	10.54	6.49	.01
USA	12.54**	7.67	10.94	7.13	.01
Africa	17.73***	8.15	15.69	8.68	.01
AsiaOceania	14.60***	8.21	13.21	8.35	<.01
Europa	15.84***	7.72	14.15	7.77	.01
NorthAmerica	12.77***	7.58	11.19	7.17	.01

*Note: ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.1.13. Positive perception of automated vehicles

The aggregated score for the positive perception of automated vehicle has been calculated after verifying by PCA that all the items correctly loaded of the first factor. The calculated score included the following items:

How interested would you be in using the following types of automated passenger car?

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

How likely do you think it is that the following benefits will occur if everyone would use a semi-automated / automated passenger car?

- 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)

As shown in Table 15, the tests of analysis of variance showed significant gender differences for 22 out of the 32 countries and all regions of the ESRA sample. Gender differences are not significant for Australia, Czech Republic, Egypt, Greece, Hungary, India, Japan, Kenya, Morocco and Poland. All the effect sizes were small. For all the countries and all regions where gender difference was significant, males declared higher positive perception of automated and semi-automated vehicles than females.

Table 15: Mean, standard deviation and partial eta square for the analysis of variance of gender difference for the positive perception of automated vehicle score by country and region

Country	Gender				η^2
	Males		Females		
	Mean	SD	Mean	SD	
Australia	71.88	25.78	70.17	25.47	<.01
Austria	75.30***	27.25	63.80	24.98	.04
Belgium	73.37***	25.34	65.52	24.45	.02
Canada	77.17**	25.52	71.11	27.34	.01
Czech Republic	73.07	24.59	73.02	21.61	<.01
Denmark	78.17**	26.19	71.44	24.82	.01
Egypt	87.42	23.19	86.38	26.40	<.01
Finland	66.52**	27.24	61.97	24.44	.01
France	74.56***	24.14	68.90	24.70	.02
Germany	79.00***	25.59	69.62	25.02	.03
Greece	78.21	24.63	78.28	22.04	<.01
Hungary	80.30	24.87	79.04	25.85	<.01
India	94.32	20.46	93.11	21.22	<.01
Ireland	76.04***	28.32	65.09	24.56	.03
Israel	85.08***	24.28	76.66	23.45	.03
Italy	79.16*	23.34	73.64	25.29	.01
Japan	82.96	21.59	78.64	20.64	<.01
Kenya	89.76	19.87	88.85	23.74	<.01
Morocco	83.20	23.54	83.06	28.11	<.01
The Netherlands	75.09**	24.46	68.82	23.67	.01
Nigeria	90.40**	18.55	86.60	22.36	.01
Poland	74.45	23.01	73.12	22.71	<.01
Portugal	85.63**	22.39	79.41	26.89	.01
Republic of Korea	83.51*	18.41	79.41	17.87	.01
Serbia	82.83*	25.84	78.25	25.24	.01
Slovenia	83.01***	24.79	75.53	25.06	.02
South Africa	85.73**	23.87	80.32	24.44	.01
Spain	82.26*	22.30	76.91	25.54	.01
Sweden	74.90***	25.75	65.91	21.57	.03
Switzerland	75.38***	24.79	65.72	23.93	.03
United Kingdom	72.40*	25.81	67.69	22.72	.01
USA	74.38**	27.78	67.14	29.13	.01
Africa	87.29**	22.02	84.59	25.07	<.01

AsiaOceania	83.54***	23.28	79.11	23.40	<.01
Europa	77.71***	25.40	70.71	24.97	.02
NorthAmerica	75.79***	26.68	68.98	28.37	.02

*Note : ***p<.001, **p<.01, *p<.05. The symbol of significance is presented next to the significantly highest mean*

4.2. Advanced analyses: gender differences by regions

Section 4.1 explores gender differences across variables and countries. In this section, we analyse the interaction between gender and region for each variable constructed. Three-way analysis of variance (ANOVA) was carried out to assess the effect of gender, region and age on each aggregated score. The between subject factors comprised two gender groups (males and females), four regional groups (Europe20, North America2, Asia-Oceania5 and Africa5) and six age groups (18-24, 25-34, 35-44, 45-54, 55-64, 65+). Age was added to the models to control its effect but will not be discussed in detail here.

4.2.1. Social acceptability of risky driving behaviours

Participants were asked how acceptable most other people would perceive some risky behaviours (e.g., using a hand-held mobile phone while driving, driving after drinking alcohol), on a Likert scale from 1 (unacceptable) to 5 (acceptable). As Table 16 shows, ANOVA revealed a significant main effect of gender, $F(1, 25426) = 67.69$, $p < .001$, $\eta^2 < .01$, age, $F(5, 25426) = 85.48$, $p < .001$, $\eta^2 = .02$ and region, $F(3, 25426) = 74.43$, $p < .001$, $\eta^2 = .01$. The analysis also pointed out a significant interaction between age and region, $F(15, 25426) = 7.07$, $p < .001$, $\eta^2 < .01$, but no interaction between gender and region (see figure 1) and age and gender, $p > .05$.

Table 16: Means and standard deviation of the social acceptability of risky driving behaviour according to region and gender

Region	Gender	Social Acceptability		
		Mean	SD	η²
Africa5	Male	13.04	5.86	<.01
	Female	12.61	6.22	
	Total	12.84	6.03	
AsiaOceania5	Male	11.59	4.94	.01
	Female	10.71	4.88	
	Total	11.18	4.93	
Europe20	Male	11.53	4.58	<.01
	Female	10.81	4.41	
	Total	11.19	4.51	
NorthAmerica2	Male	11.33	5.24	.01
	Female	10.44	4.18	
	Total	10.88	4.75	
TOTAL	Male	11.75	4.90	<.01
	Female	11.02	4.76	
	Total	11.40	4.85	

As Figure 1 shows, social acceptability of risky driving behaviour is higher in the Africa region. Regardless of the region, males always considered that most other people perceived a higher acceptability of transgressions compared to females.

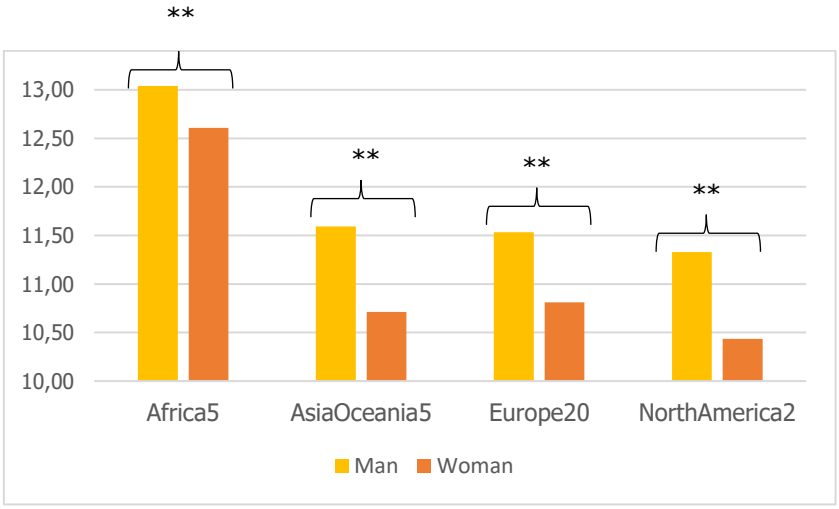

Figure 1: Mean values for 'social acceptability of risky driving behaviours' by gender and region

4.2.2. Personal acceptability of risky driving behaviour

Another factor grouped all the personal acceptability score of risky driving behaviours for the same risky behaviours. Participants had to answer how they personally found certain behaviours as acceptable on a Likert scale from 1 (unacceptable) to 5 (acceptable). As Table 17 shows, ANOVA revealed a significant main effect of gender, $F(1,25426) = 204.96$, $p < .001$, $\eta^2 = .01$, age, $F(5,25426) = 107.79$, $p < .001$, $\eta^2 = .02$, and region, $F(3, 25426) = 12.06$, $p < .001$, $\eta^2 < .01$. A significant interaction between gender and region was found, $F(3, 25426) = 7.91$, $p < .001$, $\eta^2 < .01$ (see Figure 2), as an interaction between gender and age, $F(5,25426) = 3.35$, $p = .005$, $\eta^2 < .01$, and between age and region, $F(15, 25426) = 14.91$, $p < .001$, $\eta^2 = .01$.

Table 17: Means and standard deviation of the personal acceptability of risky driving behaviours according to gender and region

Region	Gender	Personal Acceptability		
		Mean	SD	η²
Africa5	Male	19.25	7.45	<.01
	Female	18.32	7.13	
	Total	18.82	7.33	
AsiaOceania5	Male	19.79	7.32	.01
	Female	18.12	7.32	
	Total	19.01	7.37	
Europe20	Male	20.18	6.65	.02
	Female	18.06	5.52	
	Total	19.17	6.22	
NorthAmerica2	Male	20.31	8.45	.02
	Female	18.26	6.48	
	Total	19.28	7.57	
TOTAL	Male	19.99	6.99	.01
	Female	18.12	6.09	
	Total	19.10	6.64	

As Figure 2 shows, personal acceptability of risky driving behaviours is higher in Europe and North America and, in all regions, males accepted significantly more risky behaviours at a personal level, than females did, especially in Europe and North America. The gap between males and females was lowest in Africa.

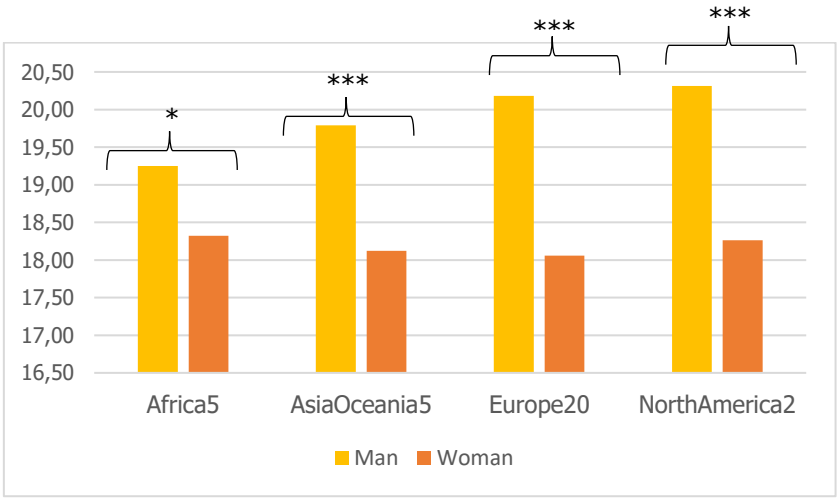

Figure 2: Mean values for 'personal acceptability of risky driving behaviours' by gender and region

4.2.3. Declared risky driving behaviour

Participants were asked how often, during the past 30 days, they behaved in a risky manner. As Table 18 shows, significant main effects of gender, $F(1, 25426) = 292.21$, $p < .001$, $\eta^2 = .01$, age, $F(5, 25426) = 90.70$, $p < .001$, $\eta^2 = .02$ and region, $F(3, 25426) = 43.17$, $p < .001$, $\eta^2 < .01$, were found. The analysis also revealed significant interactions between gender and region, $F(3, 25426) = 8.36$, $p < .001$, $\eta^2 < .01$ (see Figure 3) and between age and region, $F(15, 25426) = 8.681$, $p < .001$, $\eta^2 < .01$.

Table 18: Means and standard deviation of declared risky driving behaviour according to gender and region

Region	Gender	Declared Behaviour		
		Mean	SD	η²
Africa5	Male	26.07	8.61	.01
	Female	23.79	8.25	
	Total	25.02	8.52	
AsiaOceania5	Male	24.06	7.74	.01
	Female	22.47	7.98	
	Total	23.32	7.90	
Europe20	Male	25.40	7.43	.03
	Female	22.48	6.26	
	Total	24.00	7.03	
NorthAmerica2	Male	26.59	9.88	.01
	Female	24.34	8.41	
	Total	25.45	9.22	
TOTAL	Male	25.36	7.83	.01
	Female	22.79	6.98	

	Total	24.14	7.54

The declared driving behaviour is safer in Asia-Oceania. The number of transgressions reported by males was higher in all regions, compared to females. The gender gap was largest in Europe, while Africa and North America showed the highest score for male transgressions.

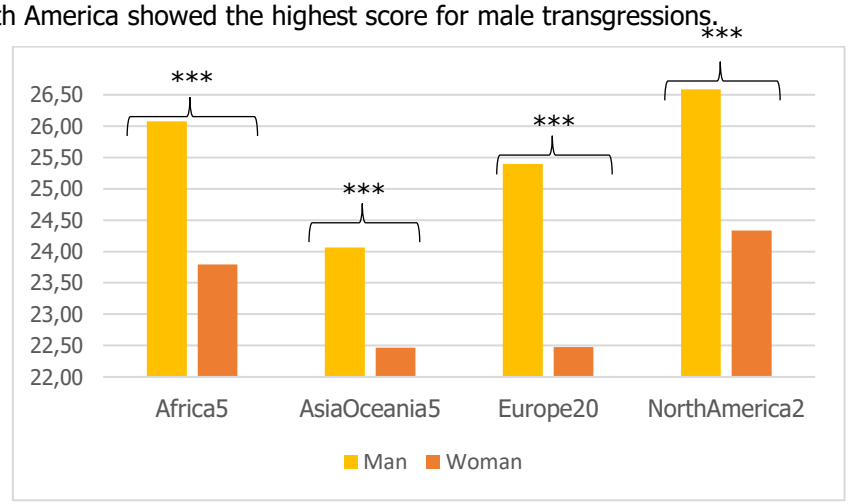

Figure 3: Mean values for 'declared risky driving behaviours' by gender and region

4.2.4. Self-efficacy in risky driving behaviours

Participants rated to what extent they felt capable of engaging in some risky behaviours, on a Likert scale from 1 (disagree) to 5 (agree). As Table 19 shows, the analysis detected a significant main effect of gender, $F(1, 25426) = 388.27$, $p < .001$, $\eta^2 = .01$, age, $F(5, 25426) = 102.59$, $p < .001$, $\eta^2 = .02$ and region, $F(3, 25426) = 49.87$, $p < .001$, $\eta^2 = .01$. Likewise, significant interactions for gender and region, $F(3, 25426) = 14.62$, $p < .001$, $\eta^2 < .01$, age and gender, $F(5, 25426) = 4.47$, $p < .001$, $\eta^2 < .01$ and age and region, $F(15, 25426) = 8.44$, $p < .001$, $\eta^2 < .01$, were found.

Table 19: Means and standard deviation of self-efficacy in risky driving behaviours according to gender and region

Region	Gender	Self-Efficacy		
		Mean	SD	η²
Africa5	Male	14.44	6.05	.01
	Female	12.98	5.54	
	Total	13.77	5.88	
AsiaOceania5	Male	12.95	5.36	.02
	Female	11.49	4.87	
	Total	12.27	5.19	
Europe20	Male	14.27	5.48	.04
	Female	11.84	4.28	
	Total	13.11	5.08	
NorthAmerica2	Male	14.35	6.28	.03
	Female	12.37	4.93	
	Total	13.35	5.71	
TOTAL	Male	14.09	5.62	.01
	Female	11.98	4.60	

Total	13.09	5.26

As Figure 4 shows, self-efficacy in risky driving behaviours is lower in Asia-Oceania and males perceived themselves as more capable of engaging in risky behaviours compared to what females perceived. This effect for gender was significant in all regions, but the effect size was larger in Europe and in North America.

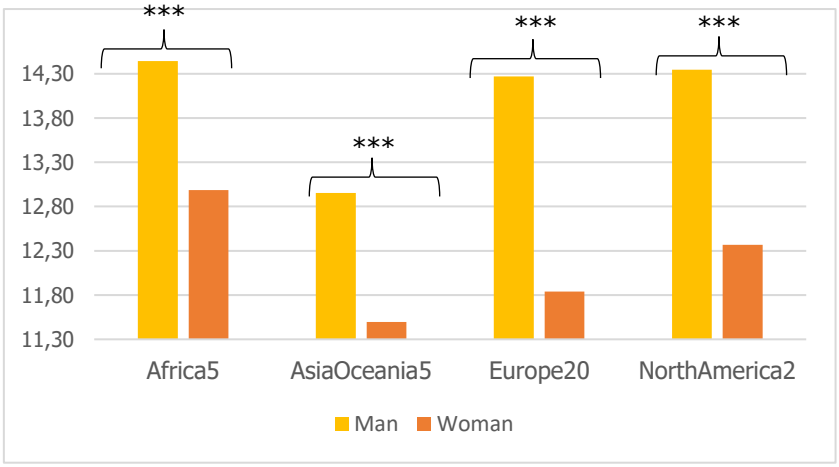

Figure 4: Mean values for 'self-efficacy in risky driving behaviours' by gender and region

4.2.5. Perceived safety in driving

Participants were asked how safe, they felt when they drove a car, on a Likert scale from 0 (very unsafe) to 10 (very safe). Results showed a significant main effect of gender, $F(1,25426) = 77.96$, $p < .001$, $\eta^2 < .01$, age, $F(5, 25426) = 17.49$, $p < .001$, $\eta^2 < .01$ and region, $F(3, 25426) = 8.70$, $p < .001$, $\eta^2 < .01$. ANOVA also revealed significant interactions between gender and region, $F(3, 25426) = 4.52$, $p = .004$, $\eta^2 < .01$, age and gender $F(5, 25426) = 3.77$, $p = .002$, $\eta^2 < .01$ and between age and region, $F(15, 25426) = 2.70$, $p < .001$, $\eta^2 < .01$ (see Table 20).

Table 20: Means and standard deviation of perceived safety in driving according to gender and region

Region	Gender	Perceived Safety		
		Mean	SD	η²
Africa5	Male	8.68	4.33	<.01
	Female	8.14	4.37	
	Total	8.43	4.35	
AsiaOceania5	Male	8.29	3.86	<.01
	Female	7.90	3.70	
	Total	8.11	3.79	
Europe20	Male	8.77	3.50	.01
	Female	7.98	3.11	
	Total	8.39	3.34	
NorthAmerica2	Male	8.72	3.41	.01
	Female	8.19	3.18	

	Total	8.45	3.30	
TOTAL	Male	8.68	3.68	<.01
	Female	8.01	3.38	
	Total	8.36	3.56	

As shown in Figure 5, perceived safety in driving is lower in Asia-Oceania and males always felt more secure than females, especially in Europe, where the effect size was the largest.

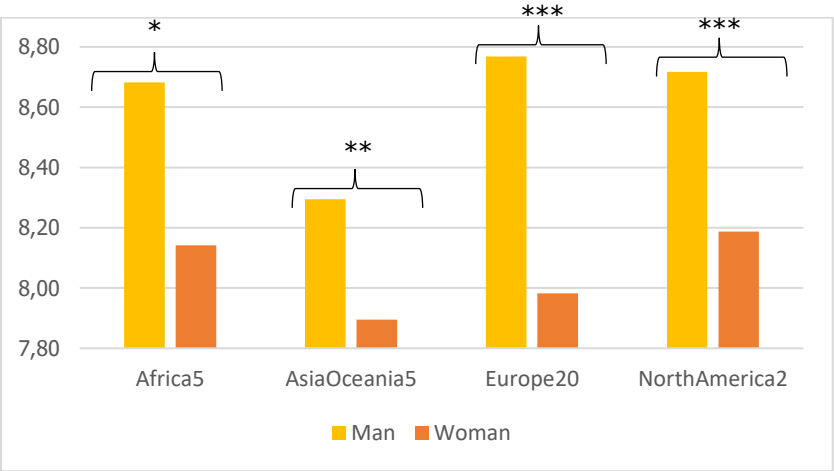

Figure 5: Mean values for 'perceived safety in driving' by gender and region

4.2.6. Road safety policy support

Support for road safety policies was also investigated by asking participants to what extent they would support policies aimed at reducing road crashes, on a Likert scale from 1 (oppose) to 5 (support). As shown in Table 21, ANOVA revealed a significant main effect of gender, $F(1, 25426) = 281.46$, $p < .001$, $\eta^2 = .01$, age, $F(5, 25426) = 82.38$, $p < .001$, $\eta^2 = .01$ and region, $F(3,25426) = 113.03$, $p < .001$, $\eta^2 = .01$. It also revealed a significant interaction between gender and region, $F(3, 25426) = 16.76$, $p < .001$, $\eta^2 < .01$ (see Figure 7), gender and age, $F(5, 25426) = 5.54$, $p < .001$, $\eta^2 < .01$ and between age and region, $F(15, 25426) = 32.70$, $p < .001$, $\eta^2 = .02$.

Table 21: Means and standard deviation of road safety policy support according to gender and region

Region	Gender	Road Safety Policy Support		
		Mean	SD	η²
Africa5	Male	64.01	10.51	<.01
	Female	65.00	10.99	
	Total	64.46	10.73	
AsiaOceania5	Male	59.79	10.27	.02
	Female	62.75	9.28	
	Total	61.18	9.94	
Europe20	Male	59.35	9.94	.03
	Female	63.01	8.66	
	Total	61.10	9.51	
NorthAmerica2	Male	57.71	11.60	.03
	Female	61.69	10.07	

	Total	59.72	11.02	
TOTAL	Male	60.00	10.30	.01
	Female	63.15	9.20	
	Total	61.50	9.92	

Road safety policy support is highest in Africa. Females were more likely to support road safety policies than males were, in all regions, except in Africa, where the support was similar for both genders. However, in Europe and North America, the gender gap was bigger, with a lower general support, especially in North America (Figure 6).

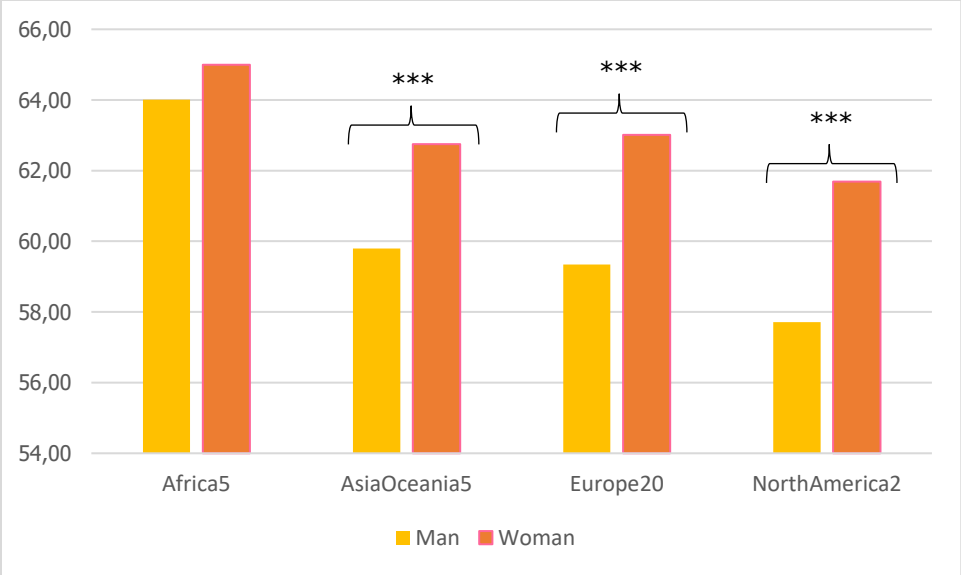

Figure 6: Mean values for 'road safety policy support' by gender and region

4.2.7. Perception of risky driving behaviours

To evaluate their perception of risky driving behaviours, participants had to answer how often they thought some factors were responsible for road crashes involving a car, on a Likert scale from 1 (never) to 6 (almost) always). As Table 22 shows, significant main effects of gender, $F(1, 25426) = 141.55$, $p < .001$, $\eta^2 = .01$, age, $F(5, 25426) = 6.64$, $p < .001$, $\eta^2 < .01$ and region, $F(3, 25426) = 165.67$, $p < .001$, $\eta^2 = .02$, were found. Likewise, the analysis revealed a significant interaction between age and region, $F(15, 25426) = 12.81$, $p < .001$, $\eta^2 = .01$, but no other interactions.

Table 22: Means and standard deviation of risk perception of risky driving behaviours according to gender and region

Region	Gender	Risk Perception		
		Mean	SD	η^2
Africa5	Male	28.78	10.33	<.01
	Female	29.89	10.98	
	Total	29.29	10.63	
AsiaOceania5	Male	24.50	10.67	.01
	Female	26.54	11.53	
	Total	25.46	11.12	

Europe20	Male	28.54	7.62	.01
	Female	30.45	7.84	
	Total	29.45	7.78	
NorthAmerica2	Male	27.26	9.49	.01
	Female	29.69	8.73	
	Total	28.48	9.18	
TOTAL	Male	27.85	8.77	.01
	Female	29.71	9.04	
	Total	28.74	8.94	

As Figure 7 shows, in each region, except in Africa, females perceived a higher risk of risky behaviours compared to males. Region differences are also blatant, as Asia-Oceanian perceived lower risk of risky behaviours compared to the three other regions. In accordance with Lund and Rundmo (2009), gender differences in risk perception in African countries were not statistically significant while they were significant in the three other regions.

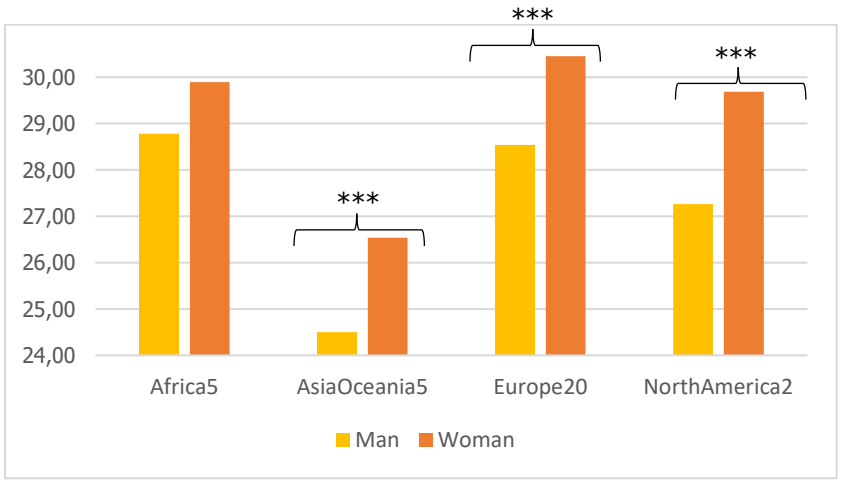

Figure 7: Mean values for 'perception of risky driving behaviours' by gender and region

4.2.8. Number of crashes

Participants were asked if and how many times they had been involved personally in a crash in the past 12 months. ANOVA revealed a significant main effect of gender, $F(1, 25426) = 23.29$, $p < .001$, $\eta^2 < .01$, age, $F(5, 25426) = 76.95$, $p < .001$, $\eta^2 = .01$ and region, $F(3, 25426) = 470.25$, $p < .001$, $\eta^2 = .05$. It also pointed out significant interactions between age and gender, $F(5, 25426) = 7.79$, $p < .001$, $\eta^2 < .01$ and between age and region, $F(15, 25426) = 31.69$, $p < .001$, $\eta^2 = .02$, but no interaction between gender and region, $p > .05$ (Table 23).

Table 23: Means and standard deviation of number of crashes according to gender and region

Region	Gender	Number of crashes		
		Mean	SD	η²
Africa5	Male	1.48	2.82	<.01
	Female	1.43	3.10	
	Total	1.46	2.94	
AsiaOceania5	Male	0.93	2.15	<.01

	Female	0.79	1.96	
	Total	0.86	2.07	
Europe20	Male	0.32	1.13	<.01
	Female	0.24	0.84	
	Total	0.28	1.00	
NorthAmerica2	Male	0.50	2.68	.01
	Female	0.24	1.12	
	Total	0.37	2.04	
TOTAL	Male	0.60	1.79	<.01
	Female	0.49	1.57	
	Total	0.55	1.69	

The number of crashes was particularly high in Africa and Asia-Oceania, where no gender differences were found. However, a significant gender gap was observed in Europe and North America, where males have more crashes than females (Figure 8).

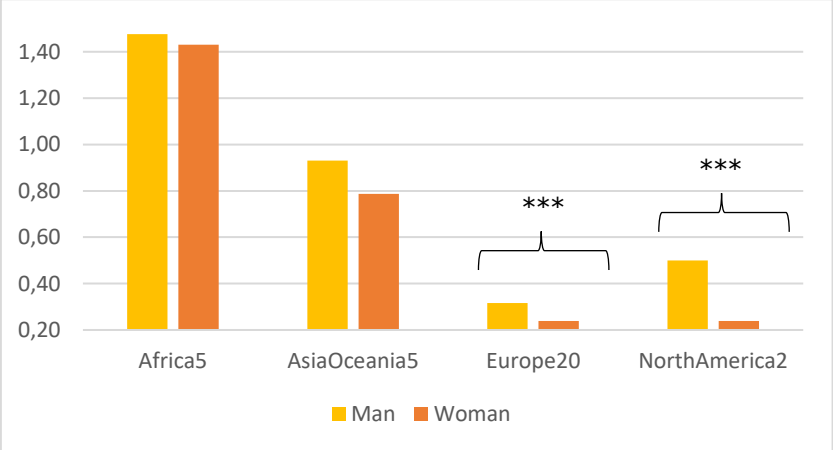

Figure 8: Mean values for 'number of crashes' by gender and region

4.2.9. Social Desirability and intention to comply

Participants were asked to indicate to what extent they agreed with some statements, which are considered socially desirable, on a Likert scale from 1 (very untrue) to 5 (very true). These statements could also be interpreted as rules internalisation. As shown in Table 24, ANOVA revealed a significant main effect of gender, $F(1, 25426) = 7.12$, $p = .008$, $\eta^2 < .01$, age, $F(5, 25426) = 14.36$, $p < .001$, $\eta^2 < .01$ and region, $F(3, 25426) = 57.70$, $p < .001$, $\eta^2 = .01$. We also found significant interactions between gender and region, $F(3, 25426) = 5.64$, $p = .001$, $\eta^2 < .01$ (see Figure 10), gender and age, $F(5, 25426) = 5.82$, $p < .001$, $\eta^2 < .01$, and between age and region, $F(15, 25426) = 12.94$, $p < .001$, $\eta^2 = .01$.

Table 24: Means and standard deviations of social desirability and intention to comply according to gender and region

Region	Gender	Social desirability		
		Mean	SD	η²
Africa5	Male	23.22	4.75	<.01
	Female	22.98	5.25	
	Total	23.11	4.97	

AsiaOceania5	Male	22.42	4.65	<.01
	Female	22.75	4.49	
	Total	22.57	4.58	
Europe20	Male	21.77	4.13	<.01
	Female	22.43	4.17	
	Total	22.08	4.16	
NorthAmerica2	Male	22.13	4.48	<.01
	Female	22.18	4.54	
	Total	22.16	4.51	
TOTAL	Male	22.11	4.35	<.01
	Female	22.54	4.40	
	Total	22.31	4.38	

Figure 9 shows social desirability and intention to comply is higher in Africa and females had a higher social desirability score than males in Asia-Oceania and in Europe. Although not statistically significant, the results were reversed in Africa, with a higher social desirability for males.

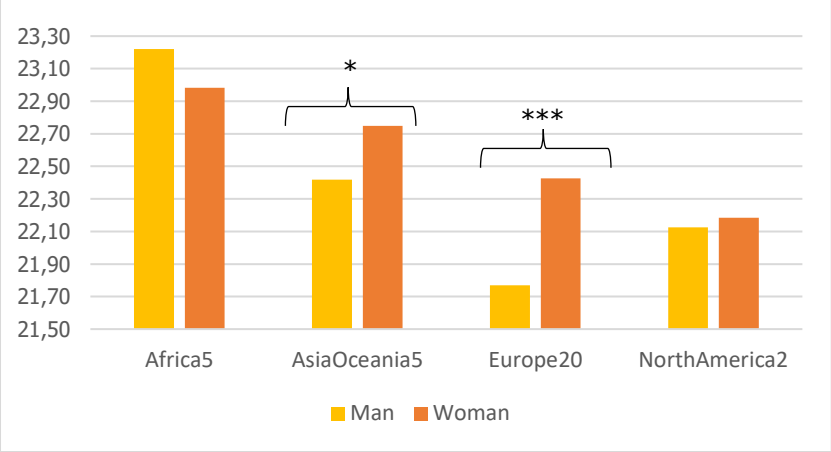

Figure 9: Mean values for 'social desirability and intention to comply' by gender and region

4.2.10. Compliant law perception

A limited sample of countries had questions posed about compliant law perception (N = 10). For those, participants had to indicate to what extent they agreed with statements concerning their opinions with respect to traffic laws, on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). As Table 25 shows, significant main effects of gender, $F(1,7809) = 32.50$, $p < .001$, $\eta^2 < .01$, age, $F(5, 7809) = 9.95$, $p < .001$, $\eta^2 = .01$ and region, $F(3, 7809) = 142.96$, $p < .001$, $\eta^2 = .05$, were revealed. Significant interactions between region and gender, $F(3, 7809) = 6.05$, $p < .001$, $\eta^2 < .01$, between age and gender, $F(5, 7809) = 2.26$, $p = .046$, $\eta^2 < .01$, and age and region, $F(15, 7809) = 7.13$, $p < .001$, $\eta^2 = .01$, were found as well.

Table 25: Means and standard deviation of compliant law perception according to gender and region

Region	Gender	Law perception		
		Mean	SD	η²
Africa5	Male	17.20	3.22	<.01
	Female	17.26	3.45	
	Total	17.23	3.32	

AsiaOceania5	Male	14.30	3.24	.02
	Female	15.30	3.30	
	Total	14.76	3.30	
Europe20	Male	15.27	3.56	.01
	Female	15.83	3.41	
	Total	15.54	3.50	
NorthAmerica2	Male	15.47	3.34	.01
	Female	16.16	3.30	
	Total	15.80	3.34	
TOTAL	Male	16.05	3.52	<.01
	Female	16.43	3.48	
	Total	16.23	3.51	

Figure 10 shows females perceived traffic laws as more important to follow than males did, except in Africa, where the law support was high and independent of gender. The effect size of the gender gap in Asia-Oceania was particularly important.

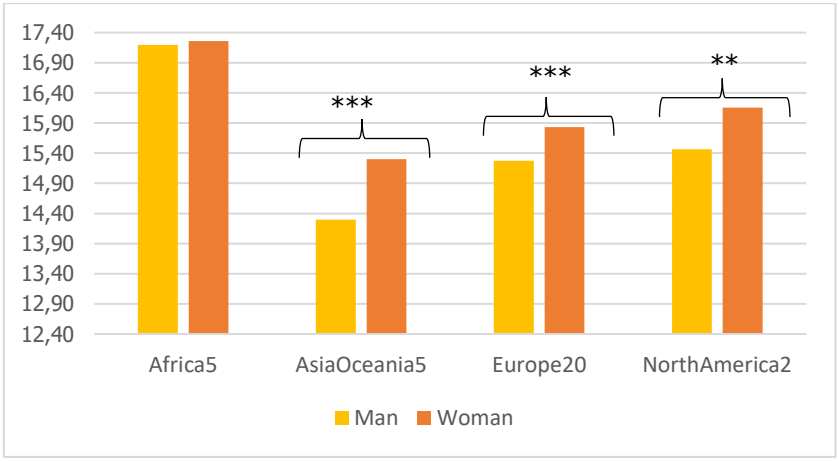

Figure 10: Mean values for 'compliant law perception' by gender and region

4.2.11. Risky social norms

Participants were asked to indicate how likely their friends would be to engage in some risky behaviours, on a Likert scale from 1 (disagree) to 5 (agree). As Table 26 shows, ANOVA revealed a significant main effect of gender, $F(1,25426) = 39.01$, $p < .001$, $\eta^2 < .01$, age, $F(5, 25426) = 29.87$, $p < .001$, $\eta^2 = .01$ and region, $F(3,25426) = 81.95$, $p < .001$, $\eta^2 = .01$ and only a significant interaction between age and region, $F(15, 25426) = 2.48$, $p = .001$, $\eta^2 < .01$.

Table 26: Means and standard deviation of the risky social norms according to gender and region

Region	Gender	Descriptive Norms		
		Mean	SD	η²
Africa5	Male	4.42	2.11	<.01
	Female	4.28	2.24	
	Total	4.36	2.17	
AsiaOceania5	Male	3.67	1.71	<.01
	Female	3.47	1.70	

	Total	3.58	1.71	
Europe20	Male	4.04	1.77	<.01
	Female	3.83	1.74	
	Total	3.94	1.75	
NorthAmerica2	Male	4.06	1.96	.01
	Female	3.75	1.79	
	Total	3.90	1.88	
TOTAL	Male	4.04	1.83	<.01
	Female	3.83	1.82	
	Total	3.94	1.83	

As Figure 11 shows, the social norms are riskier in Africa and, regardless of region, males perceived their friends to act more in a risky manner than females perceived, except in Africa where the gender gap was not significant. The maximum gender gap appeared in North America.

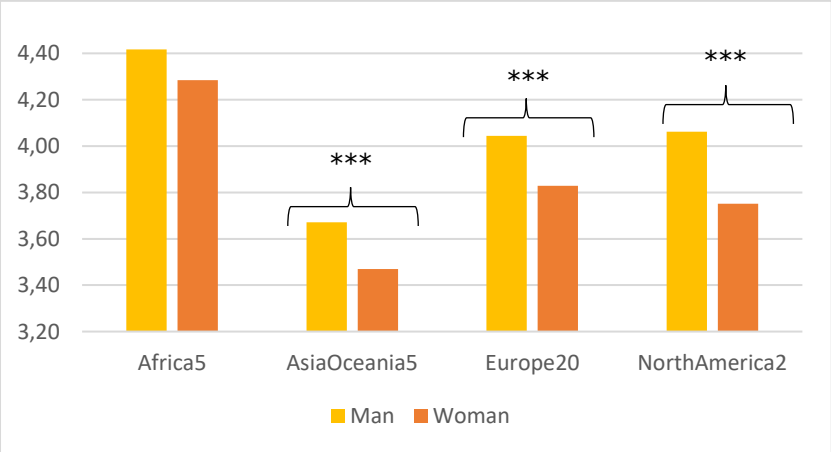

Figure 11: Mean values for 'risky social norms' by gender and region

4.2.12. Perceived probability of enforcement

These items were meant to evaluate the perceived probability of enforcement from the public authorities for different transgressions, on a Likert scale from 1 (very unlikely) to 7 (very likely). ANOVA revealed a significant main effect of gender, $F(1, 25426) = 137.85$, $p < .001$, $\eta^2 = 0.01$, age, $F(5, 25426) = 41.50$, $p < .001$, $\eta^2 = 0.01$, and region, $F(3, 25426) = 123.84$, $p < .001$, $\eta^2 = 0.01$. The interaction between region and age, $F(15, 25426) = 1.80$, $p = .029$, $\eta^2 < 0.01$, was the only one significant (Table 27).

Table 27: Means and standard deviations of perceived probability of enforcement according to gender and region

Region	Gender	Enforcement		
		Mean	SD	η²
Africa5	Male	17.74	8.11	.01
	Female	15.70	8.63	
	Total	16.79	8.40	

AsiaOceania5	Male	14.63	8.19	.01
	Female	13.23	8.35	
	Total	13.97	8.29	
Europe20	Male	15.92	7.32	.01
	Female	14.19	7.34	
	Total	15.09	7.37	
NorthAmerica2	Male	12.78	7.59	.01
	Female	11.19	7.17	
	Total	11.98	7.42	
TOTAL	Male	15.78	7.66	.01
	Female	14.04	7.72	
	Total	14.95	7.73	

Figure 12 shows, in all regions, males perceived their probability to encounter enforcement related to different transgressions higher than females did. The perceived probability was lowest in North America and highest in Africa.

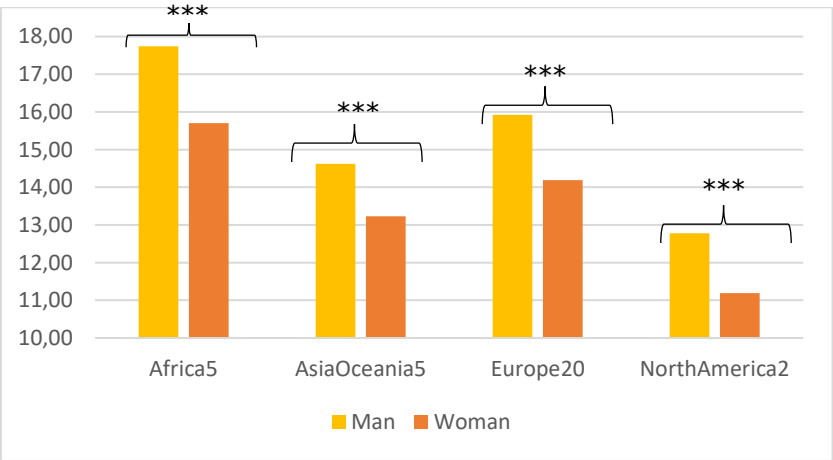

Figure 12: Mean values for 'perceived probability of enforcement' by gender and region

4.2.13. Positive perception of automated vehicles

Participants indicated how likely some benefits could occur if every driver drove a semi- or a fully-automated car, on a Likert scale from 1 (very unlikely) to 7 (very likely) and how interested they were in semi- and fully-automated vehicles, on a Likert scale from 1 (not at all interested) to 7 (very interested). The aggregated score of "positive perception of automated vehicles" includes all the items concerning the potential benefits and interest in these two types of vehicles. The results indicated a significant main effect of gender, $F(1, 25426) = 115.06$, $p < .001$, $\eta^2 < .01$, age, $F(5, 25426) = 72.57$, $p < .001$, $\eta^2 = .01$, and region, $F(3, 25426) = 159.41$, $p < .001$, $\eta^2 = .02$. Significant interactions between gender and region, $F(3, 25426) = 5.16$, $p = .001$, $\eta^2 < .01$, gender and age, $F(5, 25426) = 2.48$, $p = .03$, $\eta^2 < .01$ and age and region, $F(15, 25426) = 3.99$, $p < .001$, $\eta^2 < .01$, were found as well (Table 28).

Table 28: Means and standard deviation of the positive perception of automated vehicles according to gender and region

Region	Gender	Automated vehicle perception		
		Mean	SD	η²

Africa5	Male	87.33	21.88	<.01
	Female	84.62	24.92	
	Total	86.07	23.29	
AsiaOceania5	Male	83.40	23.33	.01
	Female	78.94	23.46	
	Total	81.31	23.49	
Europe20	Male	77.20	23.80	.01
	Female	71.25	23.35	
	Total	74.36	23.75	
NorthAmerica2	Male	75.82	26.69	.01
	Female	69.02	28.37	
	Total	72.39	27.76	
TOTAL	Male	79.59	23.94	<.01
	Female	74.15	24.43	
	Total	77.00	24.31	

Globally, automated vehicles are less positively perceived in North America and Europe and males have more positive judgments than females. The gender gap was higher in Europe and North America (Figure 13).

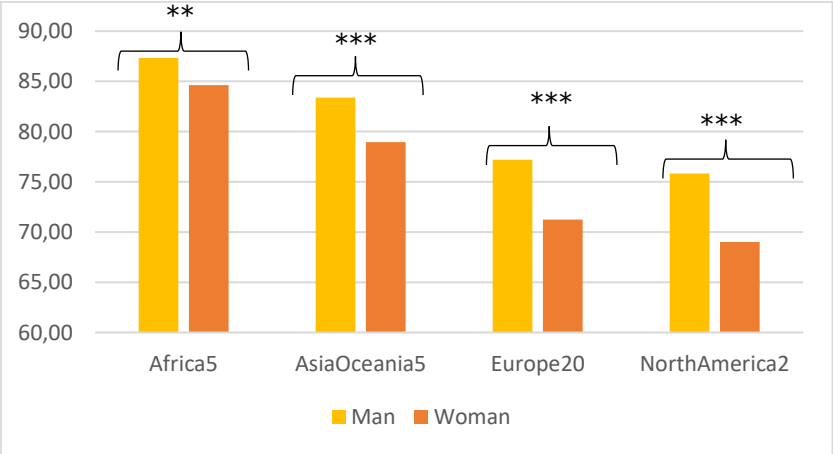

Figure 13: Mean values for 'positive perception of automated vehicles' by gender and region

4.3. Analysis of the role of gender and culture on attitudinal and behavioural variables

In this section, we analyse the effects of gender, age and culture on constructed attitudinal and behavioural variables. To do so, we conducted linear regression analyses of each constructed variable as a function of gender (0=male, 1=female), age (continuous) and culture. The effect of culture is examined via proxy variables for each country: the country's income category and the gender equality indexes constructed by the World Bank (WEF, 2018). These indices assess progress towards gender parity in four dimensions: Health and Survival (gender ratio at birth and gender gap in healthy life expectancy), Political Empowerment (gender ratio in ministerial and parliamentary positions and in years of national executive power), Educational Attainment (gender ratio in primary, secondary and tertiary education), and Economic Participation and Opportunities (wage levels and gender gaps in promotion). For theses analyses, we used the Global Gender Equality Index (GGEI) aggregating these 4 indices. The

effect of these variables is examined for the total sample and for countries in the European region. The analysis could not be carried out on the other 3 regions. The strong correlations between the Gender Equality indices of the component countries of the non-European regions did not allow linear regression analyses to be carried out.

4.3.1. For the whole sample

For the whole ESRA32 sample, all the models are statistically significant, but the R^2 values were low indicating that the variation in the data is not well explained by the models (Table 29).

The linear regression analyses did confirm the relation between gender and age and the aggregated variables constructed. Scores of social acceptability, personal acceptability, descriptive norms, self-efficacy, perceived safety, perceived enforcement, positive perception of automated vehicles, number of crashes and risky declared behaviours were higher among males and younger drivers. Scores of social desirability, road safety policy support and risk perception were higher among females and older drivers.

The linear regressions also showed attitudinal and behavioural variables are linked to GGEI and country income level and their effects are not identical. Thus, the level of income seems to have a positive effect on road safety, by decreasing the level of social acceptability of risky behaviours, the feeling of self-efficacy in risky situations, the perceived safety of driving, the number of crashes and the risky behaviours declared, but it also had negative effect by increasing the personal acceptability of violations, lowering the perception of risk, weakening the support for road safety policies and lowering the perceived enforcement likelihood. Countries level of GGEI also shows positive and negative effects on attitudinal and behavioural variables. GGEI seems to have positive effects, by lowering social and personal acceptability of violating behaviours and crash number, and by increasing support for road safety policies and risk perception. But it also has negative effects, by increasing self-efficacy feeling in risky situations and perceived safety of driving, by weakening perceived enforcement likelihood and increasing risky behaviours declared.

Table 29: Standardized betas and R^2 for the linear regression analyses for each attitudinal and behavioural constructed variable by gender, age, global gender equality index and income for entire ESRA32 sample

	Gender (0=man; 1=woman)	Age	GGEI	Income	R^2
Social acceptability of risky driving behaviours	-.066***	-.186***	-.041***	-.081***	.060***
Personal acceptability of risky driving behaviours	-.131***	-.220***	-.028***	.086***	.065***
Declared risky driving behaviours	-.160***	-.199***	.060***	-.022**	.067***
Self-efficacy in risky driving behaviours	-.188***	-.213***	.095***	-.050***	.087***
Perceived safety in driving	-.089***	-.052***	.094***	-.081***	.017***
Road safety policy support	.151***	.228***	.029***	-.193***	.089***
Perception of risky driving behaviours	.097***	.094***	.144***	-.113***	.032***
Number of crashes	-.022***	-.077***	-.107***	-.197***	.091***
Social desirability and intention to comply	.047***	.141***	.001	-.161***	.038***
Risky social norms	-.051***	-.109***	-.011	-.072***	.025***
Perceived probability of enforcement	-.104***	-.108***	-.027***	-.078***	.037***
Positive perception of automated vehicles	-.100***	-.126***	-.089***	-.111***	.069***

*Notes: ***p<.001, **p<.01, *p<.05.*

4.3.2. For Europe20

For the Europe region sample, all the models were again statistically significant, but R^2 were low for all the models indicating that the variation in the data is not well explained by the models (Table 30).

The linear regression analyses confirmed the relation between gender and age and the aggregated variables constructed for the Europe region. Scores of social acceptability, personal acceptability, descriptive norms, self-efficacy, perceived safety, perceived enforcement, positive perception of automated vehicles, number of crashes and risky declared behaviours were higher among males and younger drivers. Scores of social desirability, road safety policy support and risk perception were higher among females and older drivers.

The linear regressions also showed attitudinal and behavioural variables are linked to GGEI and country income level. However, in contrast to the whole sample, for the Europe20 region, their effects are quite similar. The country level of gender equality and income seem to have positive effects on road safety, by decreasing the risky descriptive norms, but also the social acceptability of risky behaviours concerning the income level and lowering the number of crashes for the GGEI.

The level of income as the country level of gender equality seems to have a negative effect on road safety, with higher incomes increasing the personal acceptability of risky behaviours, the feeling of self-efficacy in risky situations, the perceived safety of driving, and by decreasing the intention to comply to Highway code, the support of road safety policies, the perceived enforcement, but also by lowering the perception of risk and increasing the risky behaviours declared for the GGEI.

Table 30: Standardized betas and R^2 for linear regression analyses for each attitudinal and behavioural constructed variable by gender, age, global gender equality index and income for Europe

	Gender (0=man; 1=woman)	Age	GGEI	Income	R^2
Social acceptability of risky driving behaviours	-,078***	-,236***	-0,013	-,020***	.063***
Personal acceptability of risky driving behaviours	-,150***	-,279***	,038***	,042***	.103***
Declared risky driving behaviours	-,180***	-,261***	,048***	0,009	.104***
Self-efficacy in risky driving behaviours	-,212***	-,260***	,024**	,020**	.114***
Perceived safety in driving	-,092***	-,041***	,069***	,016*	.015***
Road safety policy support	,164***	,295***	-,087***	-,031***	.122***
Perception of risky driving behaviours	,100***	,145***	-0,012	-,023**	.032***
Number of crashes	-,032***	-,161***	-,029***	0,011	.028***
Social desirability and intention to comply	,058***	,207***	-,110***	-,041***	.059***
Risky social norms	-,065***	-,130***	-,139***	-,041***	.044***
Perceived probability of enforcement	-,107***	-,135***	-,162***	-,051***	.061***
Positive perception of automated vehicles	-,115***	-,138***	-,072***	-,023**	.039***

****p<.001, **p<.01, *p<.05*

4.4. Effect of gender, age, culture and attitudinal variables on declared behaviours

4.4.1. Effect of gender, age and attitudinal variables on declared behaviours in each country

Linear regression models were estimated for each country (Table 31 and Table 32), to understand the attitudinal and demographic variables explaining the risky behaviours declared by drivers. The linear regression models are statistically significant for all the countries in the ESRA2 sample. The R^2 are high for all models, ranging from .387 for Nigeria to .732 for Canada indicating that they explain a significant amount of the variation in the data. The models show gender, after controlling for the effects of attitudinal variables, has no further effect in a majority of samples. However, the effect of gender is still significant for 13 out of the 32 countries of the ESRA sample: Austria, Belgium, Germany, Greece, India, Italy, Japan, Nigeria, Portugal, Serbia, Slovenia, South Africa and Spain. In all cases, risky behaviours are still more frequently declared by male drivers than female drivers after controlling for other

demographic variables and attitudinal variables. In the same way, age, after controlling for the effect of the other variables included in the models, still has an effect on declared behaviours in 6 out of 32 countries: Belgium, Canada, Japan, Morocco, Republic of Korea and Sweden. In two countries (Belgium and Morocco), younger drivers report higher rates of risky driving behaviours. In four countries however (Canada, Japan, Republic of Korea and Sweden), after controlling for the effect of gender and attitudinal variables, older drivers report higher rates of risky driving behaviours.

Concerning the attitudinal variable effects on declared behaviours, the regression analyses show some variables systematically affect the risky behaviours declared. Higher personal acceptability of risky behaviours and higher driving self-efficacy in risky situations are linked to higher risk behaviours declared in all the countries of the sample. Some other variables affect risky behaviours in the same way but are not significant in all the countries. Riskier descriptive norms are linked to riskier behaviours in 28 countries but not for Czech Republic, the Netherlands, Nigeria and United States. In the same way, the greater the intention to comply with traffic laws, the lower is the rate of reported risky driving behaviours, in all countries except for Egypt. Driver's number of crashes is linked to risky behaviours for 22 countries, but not for Australia, Canada, Czech Republic, France, Israel, Italy, Japan, Republic of Korea, Serbia and Spain. Risky behaviours increase with the perceived enforcement for half of the countries and had no significant effect for the other half of the countries. Crash risk perception has some links with risky behaviours for less than the half of the countries. Perceived safety of driving has a significant effect only in few countries, with higher rates of risky driving behaviours when driving is perceived as safe.

Table 31: Standardized betas and R^2 for the linear regression analyses of drivers declared risky behaviours by demographic, attitudinal and cultural variables by country (from Australia to Italy)

	Australia	Austria	Belgium	Canada	Czech Republic	Denmark	Egypt	Finland	France	Germany	Greece	Hungary	India	Ireland	Israel	Italy
Gender (0=man; 1=woman)	.021	-.057*	-.037*	.010	.001	-.022	-.021	.009	.040	-.049**	-.089***	-.032	.050*	-.030	.003	-.051*
Age	-.007	-.046	-.042*	.044*	-.038	-.026	-.013	.045	-.028	-.023	.034	-.002	-.005	.033	-.014	-.047
Social acceptability of risky driving	-.008	-.055*	-.007	-.020	.192***	.008	.003	-.035	-.051	-.033	-.080**	-.071*	.048	-.008	-.042	-.033
Personal acceptability of risky driving	.301***	.387***	.392***	.462***	.255***	.324***	.228***	.450***	.430***	.370***	.149***	.369***	.271***	.377***	.312***	.286***
Self-efficacy in risky driving behaviours	.391***	.310***	.368***	.387***	.372***	.358***	.433***	.239***	.391***	.280***	.390***	.310***	.439***	.285***	.379***	.455***
Perceived safety in driving	.039	-.007	-.003	.020	.033	.051*	.016	.039	.007	.040*	.080**	.058*	.019	.020	.042	-.007
Road safety policy support	.095***	-.003	.060**	.056*	.041	.084**	-.094**	.037	.037	.045*	.005	-.011	-.102***	.012	.021	.039
Perception of risky driving behaviours	.056*	.004	.045*	.006	-.003	.029	.072*	.055*	.015	.042*	.028	-.039	.085***	.043	-.020	-.005
Number of crashes	.031	.099***	.095***	.036	.041	.062*	.073*	.066*	.017	.140***	.060*	.072**	.132***	.169***	.034	.008
Social desirability and intention to comply	-.256***	-.142***	-.139***	-.085***	-.165***	-.161***	-.023	-.173***	-.154***	-.152***	-.315***	-.237***	-.059*	-.168***	-.090**	-.162***
Risky social norms	.144***	.080***	.037*	.099***	.011	.108***	.175***	.134***	.085***	.076***	.142***	.109***	.076**	.103***	.130***	.073**
Perceived probability of enforcement	.026	.027	.069***	.062**	.035	.115***	-.033	.055*	.063**	.080***	.034	.025	.071**	.042	.038	.045*
Adjusted R^2	.606***	.534***	.617***	.732***	.628***	.584***	.545***	.509***	.656***	.555***	.546***	.545***	.668***	.595***	.453***	.565***

****p<.001, **p<.01, *p<.05*

Table 32: Standardized betas and R^2 for the linear regression analyses of drivers declared risky behaviours by demographic, attitudinal and cultural variables by country (from Japan to United-States)

	Japan	Kenya	Morocco	The Netherlands	Nigeria	Poland	Portugal	Republic of Korea	Serbia	Slovenia	South Africa	Spain	Sweden	Switzerland	United Kingdom	United States of America
Gender (0=man; 1=woman)	-.080**	-.042	-.047	-.012	-.122***	-.063*	-.092***	-.037	-.071**	-.080**	-.066**	-.071**	-.002	-.015	-.005	.010
Age	.135***	-.020	-.065*	-.013	-.035	-.049	-.018	.071**	-.008	-.040	.001	-.035	.084**	.037	.029	-.027
Social acceptability of risky driving	-.040	-.026	.009	.061	.087*	-.077*	-.058*	.129***	-.019	-.073**	.026	.017	.000	-.057	.061	-.044
Personal acceptability of risky driving	.367***	.212***	.210***	.380***	.227**	.357***	.280***	.430***	.221***	.348***	.209***	.464***	.425***	.459***	.388***	.371***
Self-efficacy in risky driving behaviours	.263***	.465***	.433***	.357***	.395***	.379***	.340***	.298***	.456***	.346***	.468***	.251***	.338***	.349***	.292***	.443***
Perceived safety in driving	.068*	-.006	.041	-.009	.022	.048	.054*	.034	-.019	.012	.041	.021	.014	.030	.023	.022
Road safety policy support	-.020	.049	-.077*	.036	.015	.083	.004	-.008	.037	.028	.060*	.023	.063*	.068**	-.017	.000
Perception of risky driving behaviours	.063*	.057	.081**	-.006	.064*	.049**	-.055*	-.012	.006	.028	.067**	.003	-.015	.002	.053*	.068**
Number of crashes	-.001	.108***	.096**	.055*	.086**	.095***	.048*	.017	.034	.065**	.125***	.012	.058*	.080**	.100***	.053*
Social desirability and intention to comply	-.173***	-.181***	-.149***	-.170***	-.193***	-.202***	-.196***	-.119***	-.205***	-.232***	-.138***	-.179***	-.207***	-.093***	-.101***	-.165***
Risky social norms	.147***	.093**	.103**	.035	-.002	.108***	.096***	.062**	.083**	.084***	.113***	.065**	.084**	.106***	.092**	.035
Perceived probability of enforcement	.060*	.039	.000	.012	.086**	.004	.058*	.001	.058*	.062**	.054*	.081***	.044	.041	.103***	.037
Adjusted R^2	.450***	.456***	.519***	.638***	.387***	.557***	.525***	.697***	.544*	.587***	.542***	.641***	.648***	.575***	.693***	.668***

****p<.001, **p<.01, *p<.05*

Other variables have different and contradictory effects on behaviours according to countries. Thus, social acceptability reinforces risky behaviours in Czech Republic and Republic of Korea but lowers them in Austria, Greece, Hungary, Poland or Slovenia. Road safety policy support lowers risky behaviours in Egypt, India or Morocco, but increases them in Australia, Belgium, Denmark, Germany, South Africa and Switzerland.

4.4.2. Effect of gender, age, attitudinal variables and culture on declared behaviours for the whole ESRA32 sample and for each gender group

We then analysed the effect of demographic and attitudinal variables as well as the effect of culture on reported risky driving behaviours. As in previous analyses, culture of each country is operationalized by two proxies: the World Bank's Gender Equality Index and the country's income level.

Table 33: Standardized betas and R^2 for the linear regression analyses of drivers declared risky driving behaviours by demographic variables, perception and attitudes toward risky behaviours, gender equality indices and income

Variables included	Whole sample			By gender	
	Model 1	Model 2	Model 3	Model 3 for males	Model 3 for females
Gender (0=man; 1=woman)	-.159***	-.029***	-.030***		
Age	-.196***	-.009*	-.008	-.001	-.018*
Social acceptability of risky behaviours		-.007	-.006	.006	-.019***
Personal acceptability of risky behaviours		.332***	.333***	.336***	.329***
Self-efficacy in risky driving behaviours		.386***	.382***	.371***	.394***
Perceived safety in driving		.032***	.030***	.025***	.037***
Road safety policy support		.029***	.028***	.038***	.014*
Perception of risky driving behaviours		.034***	.031***	.026***	.038***
Number of crashes		.076***	.079***	.075***	.085***
Social desirability and intention to comply		-.164***	-.164***	-.159***	-.174***
Risky social norms		.096***	.097***	.112***	.080***
Perceived probability of enforcement		.044***	.044***	.050***	.038***
GGEI			.035***	.028***	.047***
Country's Income level			-.021***	-.021***	-.019*
Adjusted R^2	.065***	.567***	.568***	.557***	.557***

****p<.0001, **p<.001, *p<.05*

First, this analysis was done on the overall sample by a series of hierarchical multiple linear regression analyses, using the "input" method. In a first model, only the two demographic variables (gender and age) were included. In a second model, attitudinal variables were added and in a third model, cultural variables were added. Table 33 presents the results for these three models. All three models are significant. The integration of the attitudinal variables greatly increases the share of variance explained by the model, compared to the demographic and cultural variables.

As shown in Table 33, gender and age are significant from Model 1, confirming higher reported risk behaviours among males and younger age groups. Their effects remain significant in the following models, but the betas decrease sharply once the effect of the attitudinal variables is controlled for, suggesting that the effect of these two variables is mediated by the latter.

With the exception of the social acceptability of risk behaviours, all attitudinal variables have a significant effect on reported risky driving behaviours. High personal acceptability of risky driving behaviours and high driving self-efficacy are strongly associated with an increase in reported risk behaviours, while high intent to comply strongly decreases these behaviours. Other variables (risky social norms, perceived safety of driving, road safety policy support, perception of risky driving behaviours, number of crashes and perceived probability of enforcement) play a less important role.

The third model also shows an effect of cultural variables. The level of reported risky driving behaviours is higher in countries with a high level of Gender Equality, while all things being equal, risky driving behaviours decrease as income level increases.

Multiple hierarchical linear regression analyses show similar effects for both gender groups. Table 33 shows that the same attitudinal variables play an important role (personal acceptability and self-efficacy

reinforce, while intention to comply inhibits), and that the same effects of culture are observed. However, the results for the female group show that, for this group, age and social acceptability of risk behaviours have a significant inhibitory effect on reported behaviours, which is not the case for the male group.

4.4.3. Effect of Gender Equality Sub-Indexes on declared behaviours

We wanted to deepen our understanding of the influence of the gender equality policies of the countries involved in ESRA2 on reported risk behaviours. To this end, we relaunched the regression analyses, using for each country the sub-indexes of Gender Equality instead of the global index. We recalculated the hierarchical regression analyses for the overall sample, for each gender group and for the European region, using gender, age, the psychological constructs for each individual and GGEI sub-indexes and income level to characterized each country. It was not possible to conduct the analyses separately for the other regions due to the small number of countries within these regions.

Table 34: Standardized betas and R^2 for the linear regression analyses on declared behaviours with gender gap sub-indexes for the whole sample and for Europe20

	Whole sample	Europe20	By Gender	
			Male group	Female group
Gender (0=man; 1=woman)	-.029***	-.037***		
Age	-.007	-.009	.000	-.017*
Social acceptability of risky behaviours	-.008	-.023***	.006	-.021**
Personal acceptability of risky behaviours	.338***	.364***	.341***	.334***
Self-efficacy in risky driving behaviours	.382***	.354***	.370***	.393***
Perceived safety in driving	.030***	.029***	.025***	.036***
Road safety policy support	.029***	.043***	.037***	.017*
Perception of risky behaviours	.026***	.011*	.021***	.034***
Number of crashes	.081***	.071***	.078***	.088***
Social desirability and intention to comply	-.164***	-.179***	-.158***	-.175***
Risky social norms	.094***	.099***	.110***	.078***
Perceived probability of enforcement	.042***	.052***	.047***	.035***
Female Economic Participation and Opportunity	.073***	.033***	.057***	.097***
Female Educational Attainment	.047***	.016*	.017	.087***
Female Health and Survival	-.011	-.012	.011	-.035***
Female Political Empowerment	-.016*	.014	-.008	-.024**
Country's Income level	-.070***	-.024***	-.053***	-.093***
Adjusted R^2	.569***	.581***	.559***	.560***

****p<.0001, **p<.001, *p<.05*

As shown in Table 34, these analyses allow us to specify differentiated effects of the different dimensions of Gender Equality. They show in the overall sample that, among the gender equality indices, national levels of education and economic participation of females are related to higher levels of reported risk behaviours. At the European country level, the national level of female economic participation reinforces the risk behaviours reported by participants.

It is also observed that, while the behaviours reported by the male group are only affected by female economic participation (the more females have economic participation, the higher the level of risk behaviours reported by males), the behaviours reported by females are related to all indices of gender equality: female level of education and economic participation at the national level reinforces the risk behaviours reported by females, while national levels of female health and political involvement are related to lower levels of self-reported risk behaviours among females.

4.4.4. Structural Equation Models (SEM) studying the effect of Gender Equality Sub-Indexes on declared behaviours

The SEM analysis tested a hypothetical model, shown in Figure 14, about the relationship between the respondent's global score of declared risky behaviours and the aggregated scores of number of crashes, perception of risky behaviours, perceived safety in driving, risky social norms, social and personal acceptability of risky driving behaviours, self-efficacy in risky behaviours, road safety policy support, and social desirability and intention to comply. Variables are also included for GGEI for economic participation and opportunity and for educational attainment for the country of origin which vary by

gender. An unobserved latent variable of risk acceptance was also defined. Age (measured in years as a continuous variable), gender (0: male, 1: female), and income group category (1: low, 2: medium, 3: high) of the country of origin of respondents, although not represented in the figure, were included in both models as exogenous variables.

The model results, shown in Table 35, confirmed that the hypothesized indicators were significant to describe the relationships between the global declared behaviour variable and other variables included ($p<0.000$). The goodness-of-fit test indicated that the model has a satisfactory fit with an SRMR of 0.056 (Li-tze and Bentler, 2009). The following statistically significant effects are observed for declared risky driving behaviours:

- Females and older drivers are less likely to report risky driving behaviours.
- Drivers from higher income countries are less likely to report risky driving behaviours.
- Drivers from countries with higher gender equality in terms of economic participation and opportunity are more likely to report risky driving behaviour. The effects for males and females are very close with no statistically significant differences.
- Drivers from countries with higher gender equality in terms of educational attainment are more likely to report risky driving behaviour. In these countries, the effects are higher for females indicating that their reported risky driving behaviours are increasing to be more similar to males in countries with high gender equality for educational attainment.
- Drivers who perceive driving as a safe activity are more likely to report risky driving behaviours.
- Drivers who have experienced road crashes are more likely to report risky driving behaviours.
- Drivers who have a high social desirability score and those who perceive risky driving behaviours as a factor in road crashes are less likely to report risky driving behaviours.

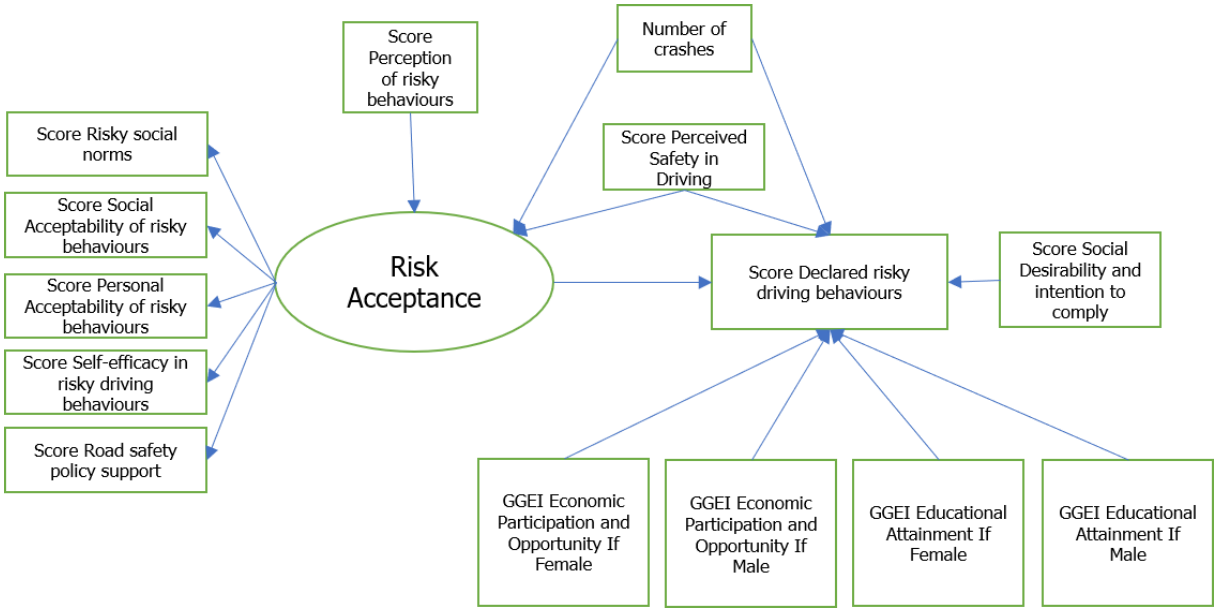

Figure 14: SEM model structure for global score of declared risky driving behaviours

Table 35: SEM model estimates for global score of declared behaviours

Parameter	Coef.	P-value	[95% Conf. Interval]	
Score Declared Behaviours				
Gender	-8.599	0.001	-13.759	-3.440
Age	-0.073	<0.001	-0.081	-0.066
Income Group Category	-0.497	<0.001	-0.743	-0.250
Risk Acceptance	1.890	<0.001	1.798	1.981
GEI Economic Participation and Opportunity If Male	7.624	0.010	6.282	8.966
GEI Economic Participation and Opportunity If Female	7.201	<0.001	5.749	8.654
GEI Educational Attainment If Male	5.508	<0.001	1.320	9.696
GEI Educational Attainment If Female	12.335	<0.001	7.341	17.329
Number of crashes	0.856	<0.001	0.737	0.975
Score Social desirability and intention to comply	-0.262	<0.001	-0.283	-0.241
Score Perceived safety in driving	0.194	<0.001	0.162	0.225
Score Perception of risky driving behaviours	-0.024	<0.001	-0.033	-0.016
Risk Acceptance				
Gender	-1.095	<0.001	-1.185	-1.004
Age	-0.052	<0.001	-0.055	-0.048
Income Group Category	0.353	<0.001	0.272	0.434
Number of crashes	0.331	<0.001	0.284	0.377
Score Perceived safety in driving	0.067	<0.001	0.054	0.081
Score Perception of risky driving behaviours	-0.013	<0.001	-0.018	-0.008
Score Social acceptability of risky driving behaviours				
Risk Acceptance	1 (constrained)			
Gender	-1.095	<0.001	-1.185	-1.004
Age	-0.052	<0.001	-0.055	-0.048
Income Group Category	0.353	<0.001	0.272	0.434
Number of crashes	0.331	<0.001	0.284	0.377
Score Perceived safety in driving	0.067	<0.001	0.054	0.081
Score Perception of risky driving behaviours	-0.013	<0.001	-0.018	-0.008
Score Personal acceptability of risky driving behaviours				
Risk Acceptance	1.799	<0.001	1.761	1.836
Gender	-1.969	<0.001	-2.129	-1.808
Age	-0.093	<0.001	-0.099	-0.087
Income Group Category	0.635	<0.001	0.486	0.783
Number of crashes	0.595	<0.001	0.511	0.679
Score Perceived safety in driving	0.121	<0.001	0.097	0.145
Score Perception of risky driving behaviours	-0.023	<0.001	-0.032	-0.014
Score Risky social norms				
Risk Acceptance	0.238	<0.001	0.225	0.251
Gender	-0.261	<0.001	-0.287	-0.235
Age	-0.012	<0.001	-0.013	-0.011
Income Group Category	0.084	<0.001	0.065	0.104
Number of crashes	0.079	<0.001	0.067	0.090
Score Perceived safety in driving	0.016	<0.001	0.013	0.019
Score Perception of risky driving behaviours	-0.003	<0.001	-0.004	-0.002
Score Self-efficacy in risky driving behaviours				
Risk Acceptance	1.306	<0.001	1.249	1.363
Gender	-1.429	<0.001	-1.563	-1.295
Age	-0.068	<0.001	-0.072	-0.063
Income Group Category	0.461	<0.001	0.353	0.568
Number of crashes	0.432	<0.001	0.371	0.492
Score Perceived safety in driving	0.088	<0.001	0.070	0.105

Score Perception of risky driving behaviours	-0.017	<0.001	-0.023	-0.011
Score Road Safety Policy Support				
Risk Acceptance	-1.467	<0.001	-1.544	-1.389
Gender	1.605	<0.001	1.454	1.756
Age	0.076	<0.001	0.070	0.082
Income Group Category	-0.517	<0.001	-0.642	-0.392
Number of crashes	-0.485	<0.001	-0.553	-0.417
Score Perceived safety in driving	-0.099	<0.001	-0.118	-0.079
Score Perception of risky driving behaviours	0.019	<0.001	0.012	0.026

5. Limitations of the data

In general, self-reported data are vulnerable to a number of biases (Choi & Pak, 2005; Krosnick and Presser, 2010): bias through misunderstanding of questions (e.g. questions with difficult words, long questions); or recall error – unintentional faulty answers due to memory errors; 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. Women tend to have greater social desirability. However, in the specific area of driving behaviour, men may perceive social desirability in reporting risky behaviour that they may not have had, in order to display "typically male" behaviour.

One limitation of the results presented above is the fact that, even if gender differences are overall significant, they are also generally small in effect size (with some exceptions), which had to be considered. This is problematic as we have a large sample, which increases the probability to find significant differences.

Furthermore, the 13 psychological constructs were only subject to separate factor analyses on each hypothetical construct identified in the questionnaire. An exploratory factorial analysis on the whole set of variables would be necessary in order to observe whether this set could be reduced to fewer constructs that are better differentiated from each other.

Despite the advantages of online surveys, the representativeness of the surveyed populations may be a problem, mainly for countries with low rates of internet use. That is the case 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 low 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. This seems particularly important to consider as some results of African countries (especially Morocco and Kenya) were opposite to the others. For example, in Morocco, there were only three women aged 65 or older but they had a high rate of recent crashes (M = 12.67, SD = 6.80) which can explain that we find a higher probability of women to have crashes than men do.

6. Conclusions

This thematic ESRA report on gender issues analyses gender differences in self-report data concerning driving behaviours, attitudes and beliefs by region, and by comparing countries among themselves. The purpose of this thematic report is to explore the cultural effect on gender differences in reported risky behaviours while driving. The four regions based on a geographical criterion, were used to distinguish potential cultural differences on a meso-level, while gender differences were also investigated on a microlevel, by analysing the differences by country.

Rather than going into detail about each of the behaviours included in the ESRA questionnaire, a Principal Component Analysis was undertaken on each psychological construct studied, to calculate aggregate scores on each construct. The focus was on the items concerning psychological constructs on which we can expect gender differences, according to literature. The variables considered and the corresponding question number from the survey found in Appendix 1 are:

- Social acceptability of risky behaviours (Q13.1)
- Personal acceptability of risky behaviours (Q14.1)
- Declared risky behaviours (Q12.1b and Q12.1a). Note that behaviours concerning children's use of seat-belt were excluded
- Self-efficacy in risky behaviours (Q15.i.j.k.l.m.n.o.p)
- Perceived safety in driving (Q16). We used only items concerning safety feeling in cars
- Road safety policy support (Q18)
- Perception of risky driving behaviours (factors causing a crash) (Q17)
- Number of crashes (Q23.1a.2a.3a)
- Social desirability and intention to comply (Q28)
- Compliant law perception (bonus question used by 20 countries of the ESRA2 sample)
- Risky social norms (15.a.b)
- Perceived probability of enforcement (Q20)
- Positive perception of automated vehicles (Q24, Q25.1, Q25.2)

For the more sophisticated analyses, age was also included in addition to gender and regional effects. Gender equality indices used were those indicated by the World Economic Forum (2018). They benchmark progress toward parity in four dimensions: Health and Survival (gender ratio at birth and gender gap in healthy life expectancy); Political Empowerment (gender ratio in ministerial and parliamentary positions and in years in national executive office) and Educational Attainment (gender ratio in primary, secondary and tertiary level of education); and Economic Participation and Opportunity (employment remuneration and advancement gaps between males and females).

For the descriptive comparison at the country by country level (see 4.1), the results show that gender differences are evident in most countries, dependent on the question being asked. However, while these observed differences are statistically significant, the magnitude of these differences is typically small. For the countries where gender differences are statistically significant, males typically report higher rates of risky driving behaviours, perceived social acceptability, personal acceptability, self-efficacy, perceived safety of driving, reported crash involvement, riskier social norms, perceived probability of encountering enforcement and a favourable perception of automated vehicles. Conversely, males typically have lower support for road safety enforcement, perception of risky behaviours, declared intention to conform to rules, and a declared importance for respecting traffic rules.

To further investigate the role of gender, the same variable constructs were again analysed, controlling for age and comparing results across regions (see 4.2). Results confirmed that regardless of region, males reported higher rates of perceived social acceptability, which was highest for both genders in Africa. For personal acceptability, males accepted significantly more risky behaviours at a personal level, especially in Europe and North America. The gap between males and females was lowest in Africa. The number of transgressions reported by males was higher in all regions, compared to females. The gender gap was largest in Europe, while Africa and North America showed the highest score for male transgressions. In all regions, with the exception of Africa, males perceived their friends to act more in a risky manner than females perceived, except in Africa where the gender gap wasn't significant. The maximum gender gap appeared in North America. Males consistently perceived themselves as more capable of engaging in risky behaviours compared to what females perceived. This effect was significant in all regions, but the effect size was larger in Europe and in North America. Males always felt more secure than females, especially in Europe, where the effect size was the largest. The level of perceived safety was smaller in Asia-Oceania for both genders. Females were more likely to support road safety policies than males were, in all regions, except in Africa, where the support was similar for both genders. However, in Europe and North America, the gender gap was bigger, with a lower general support, especially in North America. In each region, except in Africa, females perceived a higher risk of driving in a risky manner compared to males. Regional differences are also evident, as Asia-Oceania perceived

lower risk compared to the three other regions. The number of crashes was particularly high in Africa and Asia-Oceania, where no gender differences were found. However, a significant gender gap was observed in Europe and North America. Females had a higher social desirability score than males in Asia-Oceania and in Europe. Although not statistically significant, the results were reversed in Africa, with a higher social desirability for male. Females perceived traffic laws as more important to follow than males did, except in Africa, where the law support was high and independent of gender. The effect size of the gender gap in Asia-Oceania was particularly important. In all regions, males perceived their likelihood to encounter enforcement related to different transgressions more likely than females did. The perceived likelihood was lower in North America. Globally, males judged the likelihood of benefits of semi- and fully-automated cars more likely than females did. The gender gap was higher in Europe and North America, where benefits were seen as more unlikely in these regions.

Linear regression models for the constructed attitudinal variables (see 4.3.1.) also confirmed that scores of social acceptability, personal acceptability, social risky norms, self-efficacy, perceived safety, perceived probability of enforcement, positive perception of automated vehicles, number of crashes and risky declared behaviours were higher among males and younger drivers. Scores of social desirability, road safety policy support and perception of risky behaviours were higher among females and older drivers. The linear regressions also showed that attitudinal variables are linked to Gender Equality Indices and country income level and their effects are not identical. The level of income seems to have positive effect on road safety, by decreasing the level of social acceptability of risky behaviours, the feeling of self-efficacy in risky situations, social risky norms, the perceived safety of driving, the number of crashes and the risky behaviours declared, but it also had negative effect by increasing the personal acceptability of violations, lowering the perception of risk, weakening the support for road safety policies and lowering the perceived enforcement likelihood. Countries level of gender equality also shows positive and negative effects on attitudinal and behavioural variables. Gender equality seems to have positive effects, by lowering social and personal acceptability of violating behaviours and crash number, and by increasing support for road safety policies and risk perception. But it also has negative effects, by increasing self-efficacy feeling in risky situations and perceived safety of driving, by weakening perceived enforcement likelihood and increasing risky behaviours declared.

A similar analysis restricted to European countries found similar results (see 4.3.2.). However, in contrast to the whole sample, for the Europe region, the country level of income seems to have a negative effect on road safety, with higher incomes increasing the feeling of self-efficacy in risky situations, the perceived safety of driving, and increasing the risky behaviours declared. Linear regression models for the constructed behavioural variable confirmed that risky declared behaviours were higher among males and younger drivers. The analysis also showed that the level of income seems to have positive effect on road safety, by decreasing the level of risky behaviours declared, although the effect is opposite when looking at Europe alone. Gender equality seems to have negative effects, by increasing risky behaviours declared.

Linear regression models were estimated for each country (see 4.4.1.), to understand the attitudinal and demographic variables explaining the risky behaviours declared by drivers. The models show gender, after controlling for the effects of attitudinal variables, has no further effect in a majority of samples, except for Austria, Belgium, Germany, Greece, India, Italy, Japan, Nigeria, Portugal, Serbia, Slovenia, South Africa and Spain, where risky behaviours are still more frequently declared by male drivers than female drivers after controlling for other demographic variables and attitudinal variables.

We then analysed the effect of demographic and attitudinal variables as well as the effect of culture on reported risky driving behaviours (see 4.4.2.), with culture operationalized through the World Bank's Gender Equality Index and the country's income level. Results showed that the significant effect of gender and age decreased once the effect of the attitudinal variables is controlled for, suggesting that the effect of these two variables is mediated by the latter. With the exception of the social acceptability of risk behaviours, all attitudinal variables have a significant effect on reported risky driving behaviours. Furthermore, reported risky driving behaviours was higher in countries with a high level of Gender Equality, while all things being equal, risky driving behaviours decrease as income level increases. When separate linear regression models are developed by gender, analyses show that the same attitudinal variables play an important role and that the same effects of culture are observed. However, the results for the female group show that, for this group, age and social acceptability of risk behaviours have a

significant inhibitory effect on reported behaviours, which is not the case for the male group. Considering these results, we can assume that women are more sensitive to social norms than men.

Additional linear regression models using the sub-indexes of Gender Equality instead of the global index (see 4.4.3.) show that, among the gender equality indices, national levels of education and economic participation of females are related to higher levels of reported risk behaviours. At the European country level, the national level of female economic participation reinforces the risk behaviours reported by participants. It is also observed that, while the behaviours reported by the male group are only affected by female economic participation (the more females have economic participation, the higher the level of risk behaviours reported by males), the behaviours reported by females are related to all indices of gender equality: female level of education and economic participation at the national level reinforces the risk behaviours reported by females, while national levels of female health and political involvement are related to lower levels of self-reported risk behaviours among females.

A Structural Equation Model (see 4.4.4.) was developed for the relationship between the respondent's global score of declared behaviours and the aggregated scores of attitudinal variables, age, gender, country gender equality indices and country income. These results confirmed those found in the linear regression models but further indicated that for countries with higher gender equality in terms of educational attainment the increase in risky driving behaviours are higher for females than for males indicating that their reported risky driving behaviours are increasing to be more similar to males in countries with high gender equality for educational attainment.

Globally, an effect of gender on psychological constructs was found, as a significant effect of region. More occasionally, an interaction between gender and region was revealed, leading us to conclude that gender is indeed culturally constructed. This was the case for personal acceptability, declared behaviours, self-efficacy, perceived safety, road safety policy support, social desirability, law perception and positive perception of automated vehicle. The fact that some constructs are only explained by gender can be interpreted in two manners. Firstly, we can understand that the biologic aspect of gender cannot be denied when trying to explain gender differences in attitudes and other related constructs in safety road theme. However, we can also argue the fact that the way people are socialized as men and women all around the world is not different enough to find cultural differences on gender's effect. This impact of culture needs to be approached in further analyses, for example by using Schwarz values (Schwartz et al., 2012) as a proxy for culture.

One of the main take-aways from this research is that equality between the sexes in this context can also have negative consequences if it means that women also adopt risky driving behaviours that are typically more often displayed by men. It is therefore essential to tailor countermeasures to better address risks and needs of men versus women, especially as a society becomes more equal. Moreover, effect sizes were small in all cases and the results showed that effects of gender, age and culture on risky behaviours seem also to be mediated by attitudinal variables and that those 3 variables interacted in explaining attitudes and behaviours. Furthermore, the 13 psychological constructs used in this report still are hypothetical since we did not conduct an exploratory factorial analysis on all the items aimed at identifying the distinct dimensions that make up the questionnaire for the population surveyed. This should be examined in depth in subsequent studies using these data.

Recommendations

Policy recommendations at national and regional level

- Continue to study the impact of gender on crash risk and aim programs at those most at risk. In this study males were found to be more at risk than females. Even in Europe and North America, whereas crashes are less common, men are still more at risk than women.

- A reduction in the gap of equality measures between men and women is associated with a reduction of the gender differences in road risky behaviours, with women becoming more prevalent in typical riskier "masculine" behaviours. Explanations for this behavioural adaptation should be identified and strategies for mitigating this outcome implemented.
- To reduce risky driving behaviours in risk prone subsets of the population (especially men but also young drivers), target psychological constructs that have the greatest impact on risky driving, such as personal acceptability and self-efficacy.

Specific recommendations to particular stakeholders

- *[To Non-Governmental Organizations (NGOs)]* Contribute to education and awareness campaigns and events aimed at reducing risk behaviours, especially among males. The strong influence of personal acceptability on risk behaviours calls for action on the perception of risks and rules. In particular, "male" values that influence individual behaviour should be targeted, including among women in countries where gender equality is high.
- *[To vehicle manufacturers, other companies and research organisations]* Develop research aimed at understanding the psychological mechanisms by which gender influences risk behaviours and those aimed at influencing this relationship.

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. The ESRA has become a global initiative which already conducted surveys in 46 countries across 6 regions. The outputs of the ESRA project have become building blocks of a global road safety monitoring system that goes beyond monitoring road traffic casualties and also includes indicators for possible underlying causal factors.

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. This will become a solid foundation for a joint global monitoring system on road safety attitudes and behaviour.

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Appendix 1: ESRA2_2018 Questionnaire

Introduction

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

Thank you for your contribution!

Socio-demographic information

Q1) In which country do you live? _____

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

Q3a) In which year were you born? Dropdown menu

Q3b) In which month were you born? Dropdown menu

Q4_1) What is the highest qualification or educational certificate that you have obtained? none - primary education - secondary education - bachelor's degree or similar - master's degree or higher

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

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

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

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

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

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

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

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

Mobility & exposure

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

Q10) During the past 12 months, how often did you use each of the following transport modes in [country]? How often did you …? at least 4 days a week - 1 to 3 days a week - a few days a month - a few days a year - never
Items (random): walk minimum 100m (pedestrian; including jogging, inline skate, skateboard, …) - cycle (non-electric) - cycle on an electric bicycle/e-bike/pedelec - drive a moped (≤ 50 cc or ≤ 4 kW; non-electric - drive a motorcycle (> 50 cc and > 4 kW non-electric) - drive an electric moped (≤ 4 kW) - drive an electric motorcycle (> 4 kW) - drive a powered personal transport device such as an electric step, hoverboard, solowheel,… - drive a car (non-electric or non-hybrid) - drive a taxi - drive a bus as a driver - drive a truck/lorry - drive a hybrid or electric car - take a taxi or use a ride-hail service (e.g. Uber, Lyft) - take the train - take the bus - take the tram/streetcar - take the subway - take the aeroplane - take a ship/boat or ferry - be a passenger in a car - use another transport mode

Q11) Over the last 30 days, have you transported a child (<18 years of age) in a car? yes - no
Items: below 150cm - above 150cm

Self-declared safe and unsafe behaviour in traffic

Q12_1a) Over the last 12 months, how often did you as a CAR DRIVER …?
You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.
Binary variable for all items: at least once (2-5) - never (1)
Items (random):

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

Q12_1b) Over the last 30 days, how often did you as a CAR DRIVER …?
You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.
Binary variable for all items: at least once (2-5) - never (1)
Items (random):

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

Q12_2) Over the last 30 days, how often did you as a CAR PASSENGER …? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.
Binary variable for all items: at least once (2-5) - never (1)
Item:

- travel without wearing your seatbelt in the back seat

Q12_3) Over the last 30 days, how often did you as a MOPED DRIVER OR MOTORCYCLIST …? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.
Binary variable for all items: at least once (2-5) - never (1)
Items (random):

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

Q12_4) Over the last 30 days, how often did you as a CYCLIST …? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.
Binary variable for all items: at least once (2-5) - never (1)
Items (random):

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

Q12_5) Over the last 30 days, how often did you as a PEDESTRIAN …? You can indicate your answer on a scale from 1 to 5, where 1 is "never" and 5 is "(almost) always". The numbers in between can be used to refine your response.
Binary variable for all items: at least once (2-5) - never (1)
Items (random):

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

Acceptability of safe and unsafe traffic behaviour

Q13_1) Where you live, how acceptable would most other people say it is for a CAR DRIVER to….? You can indicate your answer on a scale from 1 to 5, where 1 is "unacceptable" and 5 is "acceptable". The numbers in between can be used to refine your response.
Binary variable: acceptable (4-5) – unacceptable/neutral (1-3)
Items (random):

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

Q14_1) How acceptable do you, personally, feel it is for a CAR DRIVER to…? You can indicate your answer on a scale from 1 to 5, where 1 is "unacceptable" and 5 is "acceptable". The numbers in between can be used to refine your response.
Binary variable: acceptable (4-5) – unacceptable/neutral (1-3)
Items (random)

- drive when he/she may be over the legal limit for drinking and driving
- drive 1 hour after using drugs (other than medication)

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

Attitudes towards safe and unsafe behaviour in traffic

Q15) To what extent do you agree with each of the following statements? You can indicate your answer on a scale from 1 to 5, where 1 is "disagree" and 5 is "agree". The numbers in between can be used to refine your response.
Binary variable: agree (4-5) – disagree/neutral (1-3)
Items (random):
Normative 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: Correlation matrix of the investigated psychological constructs for the whole sample

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Social acceptability of risky driving behaviours	1	.610**	.397**	.356**	.038**	-.239**	-.029**	.151**	-.189**	-.123**	.251**	.073**	.064**
2. Personal acceptability of risky driving behaviours	.610**	1	.615**	.523**	.107**	-.408**	-.105**	.172**	-.314**	-.241**	.223**	.103**	.033**
3. Declared risky driving behaviours	.397**	.615**	1	.650**	.117**	-.291**	-.037**	.212**	-.364**	-.201**	.339**	.150**	.064**
4. Self-efficacy in risky driving behaviours	.356**	.523**	.650**	1	.128**	-.333**	-.051**	.155**	-.264**	-.229**	.363**	.121**	.068**
5. Perceived safety in driving	.038**	.107**	.117**	.128**	1	-.014*	.024**	.072**	.060**	.037**	0.007	.062**	.125**
6. Road safety policy support	-.239**	-.408**	-.291**	-.333**	-.014*	1	.203**	-.060**	.314**	.370**	-.050**	-0.006	.122**
7. Perception of risky behaviours	-.029**	-.105**	-.037**	-.051**	.024**	.203**	1	-.077**	.099**	.171**	.044**	.037**	.018**
8. Number of crashes	.151**	.172**	.212**	.155**	.072**	-.060**	-.077**	1	-.042**	-.034**	.115**	.100**	.086**
9. Social desirability and compliance intention	-.189**	-.314**	-.364**	-.264**	.060**	.314**	.099**	-.042**	1	.283**	-.112**	0.01	.071**
10. Compliant law perception	-.123**	-.241**	-.201**	-.229**	.037**	.370**	.171**	-.034**	.283**	1	-.058**	.039**	.151**
11. Risky social norms	.251**	.223**	.339**	.363**	0.007	-.050**	.044**	.115**	-.112**	-.058**	1	.107**	.082**
12. Perceived probability of enforcement	.073**	.103**	.150**	.121**	.062**	-0.006	.037**	.100**	0.01	.039**	.107**	1	.132**
13. Positive perception of automated vehicles	.064**	.033**	.064**	.068**	.125**	.122**	.018**	.086**	.071**	.151**	.082**	.132**	1

***p<.01, *p<.05*