



ESRA

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E-Survey of Road users' Attitudes



ESRA3 methodology

ESRA3 Thematic report Nr. 1



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ESRA3 methodology

ESRA3 Thematic report Nr. 1

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List of abbreviations

Country codes (in accordance with ISO 3166-1 alpha-2 (International Organization for Standardization (ISO), 2024))

AM	Armenia	KG	Kyrgyzstan
AU	Australia	LV	Latvia
AT	Austria	LU	Luxembourg
BE	Belgium	MX	Mexico
BA	Bosnia and Herzegovina	NL	Netherlands
BR	Brazil	PA	Panama
CA	Canada	PE	Peru
CL	Chile	PL	Poland
CO	Colombia	PT	Portugal
CZ	Czech Republic	RS	Republic of Serbia
DK	Denmark	SI	Slovenia
FI	Finland	ES	Spain
FR	France	SE	Sweden
DE	Germany	CH	Switzerland
EL	Greece	TH	Thailand
IE	Ireland	TR	Türkiye
IL	Israel	UK	United Kingdom
IT	Italy	US	United States
JP	Japan	UZ	Uzbekistan
KZ	Kazakhstan		

Other abbreviations

CAPI	Computer-Assisted Personal Interviews
ESRA	E-Survey of Road users' Attitudes
EU	European Union
HIC	High Income Countries based on World Bank classification 2023 (The World Bank Group, 2023)
ICW	Individual Country Weight used in ESRA3
IRF	International Road Federation
LMIC	Lower-Middle Income Countries based on World Bank classification 2023 (The World Bank Group, 2023)
LOI	Length Of the Interview
OECD	The Organisation for Economic Co-operation and Development
Q	Question
UMIC	Upper-Middle Income Countries based on World Bank classification 2023 (The World Bank Group, 2023)
WHO	World Health Organization
Y	Years of age

Executive summary

This report provides an overview on the ESRA3 methodology, in particular the fieldwork, data processing and reporting procedures. The report also presents information on the survey sample and on the quality assurance arrangements for the common ESRA3 outputs.

Aim and objectives of the ESRA initiative

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

Vias institute in Brussels (Belgium) initiated and coordinates ESRA, in cooperation with ten steering group partners: BAST (Germany), DTU (Denmark), IATSS (Japan), ITS (Poland), KFV (Austria), NTUA (Greece), PRP (Portugal), SWOV (the Netherlands), TIRF (Canada), and University Gustave Eiffel (France).

Three editions of the ESRA survey have already been conducted since 2015. The present report is based on the third edition of this global survey (ESRA3), which was conducted simultaneously in 39 countries in 2023. In total this survey collected data from more than 37000 road users in 39 countries, across five continents. An overview of the ESRA initiative and the project results is available on: www.esranet.eu.

For ESRA3 the overall aim was to stay as close as possible to the ESRA2 study design. This includes method of data collection, formulation of items, sampling procedure, data processing and data cleaning. Some small adaptations were done in order to improve the study design, but efforts were done to maintain a high level of comparability with ESRA2.

Data collection and scope of the questionnaire

ESRA data are collected through online panel surveys, using a representative sample of the national adult populations in each participating country (aiming at n=1000 per country). A few exceptions exist¹.

At the heart of this survey is a jointly developed questionnaire, which was translated into 49 national language versions in ESRA3. The themes covered include self-declared behaviour, attitudes and opinions on unsafe traffic behaviour, enforcement experiences and support for policy measures. The survey addresses different road safety topics (e.g., driving under the influence of alcohol, drugs and medicines, speeding, distraction) and targets car occupants, moped riders and motorcyclists, cyclists, pedestrians, and riders of e-scooters. In ESRA3 the questions related to vulnerable road users (moped riders and motorcyclists, cyclists, pedestrians, and riders of e-scooters) have been expanded and questions on e-scooters and infrastructure have been added.

Hard quota are used for gender and age² distribution during the sampling procedure (United Nations Statistics Division, 2023). The geographical spread of the sample across the country was at least monitored (soft quota). Three market research agencies (Dynata, Ipsos and Punto de Fuga) organised the fieldwork under the supervision of Vias institute. The fieldwork was conducted simultaneously in all 39 participating countries between May and September 2023.

Data processing

Vias institute predefined hard quota for gender and age distribution per country as well as a series of minimum criteria for data cleaning, which the market research agencies had to respect. The provided data files of the market research agencies had to respect a specified database template. All the national

¹ In four countries, the targeted sample size had to be reduced to 500 respondents due to limitations of the national panel or too high costs (Armenia, Kyrgyzstan, Luxembourg, and Uzbekistan). In three countries the data was collected through another method (Armenia, Kyrgyzstan, and Uzbekistan).

² Six age groups: 18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65-74y.

data files were merged into one file, including the answers of all respondents in 39 countries. Vias institute checked the quality of the data and carried out a second data cleaning, which included checking for duplicate entries, removing inconsistencies with panel information, checking for the length of the interview (identifying and eliminating 'speeders' and 'turtles'), removing straightliners (respondents who give the same answers for many questions), and deleting respondents who answered wrong on instructed response items (trick items)³. From the original, pre-cleaned sample provided by the market research agencies (n=42835), 5742 respondents were removed from the dataset. The final sample consists of n=37093 respondents.

In view of facilitating dissemination of ESRA3 results, some original answer categories (mainly 5-point and 7-point scales) were dichotomized (two answer categories, binary variables). The dichotomization process was conducted centrally by Vias institute and used in presenting all descriptive analyses of the ESRA3 reports. The dichotomizations and reference categories for each question are indicated in the ESRA3 questionnaire in Appendix 1 (see information on binary variable).

A weighting of the data was applied in the analyses. This weighting took into account small corrections with respect to national representativeness of the sample based on gender and six age groups: 18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65-74y (United Nations Statistics Division, 2023). For the regional means, the weighting also took into account the relative size of the population of each country within the total set of countries from this region.

Sample characteristics

In total the ESRA3 survey collected data from more than 37000 road users across 39 countries. The samples (after applying a weighting factor) are representative for the national adult population based on interlaced quota of gender and six age groups (United Nations Statistics Division, 2023). The survey addresses several types of road users (e.g., car occupants, moped riders and motorcyclists, cyclists, pedestrians, and riders of e-scooters). Distribution of the national samples according to transport mode, gender, age groups, and education level are presented in this report.

Reporting and quality control

The common results of the ESRA3 survey will be published in a Main Report, the present Methodology Report, 13 Thematic Reports (Table 5; page 29) and the ESRA3 dashboard. Furthermore, 39 country fact sheets have been produced in which national key results are compared to a regional mean (benchmark). Scientific articles, national reports and many conference presentations are currently in progress. All common ESRA3 reports are peer-reviewed within the consortium, following a pre-defined quality control procedure.

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

³ "Please, select the answer option number 5"

1 The ESRA initiative

1.1 Monitoring road safety attitudes and performance

Trends in road safety performance and the success of policy measures can be monitored using road safety performance indicators, based on accident statistics, roadside observations, or (questionnaire) surveys.

There is a broad consensus amongst road safety experts that roadside observations are the golden standard to produce road safety performance indicators since they are based on observed behaviour in traffic. But observation-based studies have also limitations. The number and nature of variables that are observable are limited. Moreover, roadside observations require a sophisticated study design and protocol. They are very time intensive and cost consuming. At present, moreover, due to methodological differences, results of such studies are often not comparable across countries.

An alternative is to use questionnaire surveys. Such surveys, when properly designed and with an adequate sampling approach, can yield very useful information on road safety performance and road safety culture as well. Moreover, when online panels are used, such surveys appear to be a relatively inexpensive way for obtaining indicators on safety practice and road users' behaviour. A further advantage of such surveys is that they allow to collect data on many additional factors as well and hence can provide insights into socio-cognitive determinants of behaviour: attitudes, perceived social norm, risk perception, or existing habits. Socio-cognitive factors can help to understand the underlying motivations of certain behaviour (e.g. Ajzen, 1991; Rogers, 1975; Rosenstock, 1974; Vanlaar & Yannis, 2006). In the current literature those factors are often closely linked with assessing road safety culture (e.g. N. J. Ward et al., 2019).

Hence, it is tempting to use road safety indicators based on surveys for benchmarking purposes. However, the results of national surveys are seldom comparable across countries because of differences in aims, scope, methodology, questions used, or sample population being surveyed.

Therefore, in 1991 the European Commission initiated the European project SARTRE (Social Attitudes to Road Traffic Risk in Europe (Cestac & Delhomme, 2012)). A common questionnaire and study design were developed, and face-to-face interviews were conducted among a representative sample of the national adult population. Four editions of the SARTRE survey were completed (1991, 1996, 2002, 2010). In the first three editions of the SARTRE project, surveys were directed only to car drivers. In the fourth edition, the target group was extended to powered two-wheelers, pedestrians, cyclists, and users of public transport (Cestac & Delhomme, 2012). SARTRE4 involved 19 European countries. It was the last of the SARTRE series that was funded by the European Commission.

In 2015, Vias institute (formerly the Belgian Road Safety Institute) launched the ESRA (E-Survey of Road users' Attitudes) initiative to build on the SARTRE experience and extend scope and coverage, initially with partners from a number of EU countries. In a few years, the project evolved into a global initiative. Already three editions of ESRA have taken place. ESRA1 was conducted in 2015-2017, ESRA2 in 2018-2020 and ESRA3 in 2023. In total, 68 countries have already participated in at least one of the ESRA editions. Overall, the ESRA initiative has demonstrated the feasibility and the added value of joint data collection on road safety attitudes and performance by partner organizations in many countries across the world.

1.2 Aim and objectives

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

The main objectives of the ESRA initiative can be summarized as follows:

- Provide scientific support for road safety policy at national and international levels.
- Make internationally comparable data available on the current road safety situation in countries all over the world.
- Develop a series of reliable, cost-effective and comparable road safety performance indicators.
- Develop time series on road safety performance.

The intention is to repeat this survey every three to four years and extend it to an increasing number of countries.

1.3 Consortium and evolution

The ESRA initiative was initiated by Vias institute (Belgium) in 2015 (Torfs et al., 2016). Three editions of the ESRA survey have already been conducted and data was collected in a total of 68 countries across six continents. The number of countries is still growing.

Figure 1 gives an overview of the geographical coverage of the three ESRA editions (2015-2023).

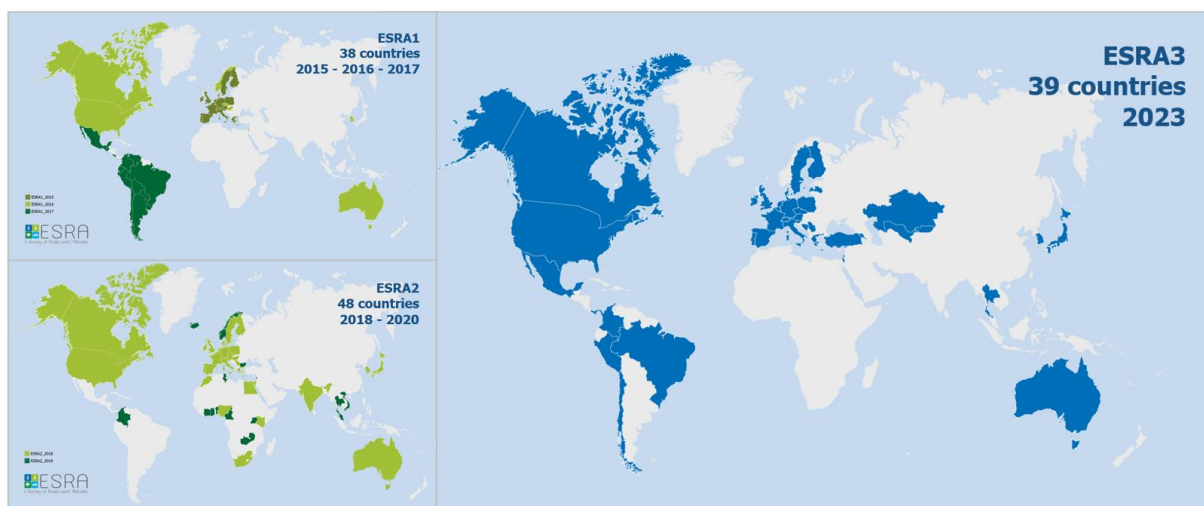


Figure 1: Evolution geographic coverage of the different ESRA editions (2015-2023)

The first edition of the ESRA survey (ESRA1) was carried out in three waves (2015, 2016, 2017) and collected data from almost 40000 road users in 38 countries across five continents (Meesmann et al., 2018). The second edition (ESRA2) was conducted in two waves (2018, 2019-2020) and collected data from more than 45000 road users in 48 countries across six continents (Meesmann, Wardenier, et al., 2022). In the most recent edition (ESRA3) data was collected simultaneously in 39 countries in 2023. In total this third edition collected data from more than 37000 road users in 39 countries across five continents.

Vias institute in Brussels (Belgium) initiated and coordinates ESRA, in cooperation with ten steering group partners: BAST (Germany), DTU (Denmark), IATSS (Japan), ITS (Poland), KFV (Austria), NTUA (Greece), PRP (Portugal), SWOV (the Netherlands), TIRF (Canada), and University Gustave Eiffel (France).

For each country that participates in ESRA, there is a national partner to support the initiative. The national partner is responsible for the funding of the survey, the translation of the survey questionnaire into the national language(s) and interpretation of the findings. Funding for ESRA3 data collection in six Latin American countries was provided by Mapfre Foundation and for six additional European/Asian countries by WHO Regional office for Europe. A list of all partners (organisations and contact persons) supporting the ESRA3 survey can be found on page 3 of this report.

For ESRA3 the overall aim was to stay as close as possible to the ESRA2 study design (for an overview see Meesmann, Torfs, et al., 2022). This includes method of data collection, formulation of items, sampling procedure, data processing and data cleaning. Some small adaptations were done in order to improve the study design, but efforts were done to maintain a high level of comparability with ESRA2. To further improve the comparability between the editions some recalculations of data from previous editions will be done for comparisons (e.g., limit to age 18-74 years, adjustments to stricter data cleaning in ESRA3).

1.4 Costs and resources

From the beginning the intention was to keep costs as low as possible. The main principles to achieve this are: (1) using online panel services; and (2) sharing the analysis work amongst the ESRA partner organisations.

In most countries, the total cost for conducting the national survey with a sample of 1000 respondents was below €15000⁴. The costs differed between countries and were mainly determined by the local cost for conducting the survey and the sample size. The financial resources for the national survey costs and the staff time needed for the analyses were secured by the ESRA3 partners' own sources or regional sponsors.

The ESRA3 questionnaire was developed by Vias institute in collaboration with the ESRA3 steering group partners. National partners were responsible for the translations of the master version into their national language version(s). Furthermore, they were responsible for the validation of the national results and provided the contextual information necessary for the interpretation of the results. The analyses of the common data were a joint effort of the ESRA3 steering group members and Vias institute, who spend over 85 person months on analysing and producing the common ESRA3 outputs.

⁴ National survey cost including contribution to ESRA3 project management and administration.

2 Data collection and scope of questionnaire

2.1 Scope

The ESRA3 questionnaire was largely based on the ESRA2 and ESRA1 questionnaires. Efforts were done to keep formulation of common questions and items with ESRA2 the same or highly comparable.

The following list gives an overview of targeted road user groups, main themes, and road safety topics of the ESRA3 questionnaire.

Main target groups:

- Car drivers and passengers
- Moped riders and motorcyclists
- Cyclists
- Pedestrians
- E-scooters (electric stand-up scooters) (new)

Main themes:

- Mobility & Exposure
- Self-declared safe and unsafe behaviour in traffic
- Acceptability of safe and unsafe traffic behaviour
- Attitudes towards safe and unsafe traffic behaviour
- Subjective safety and risk perception
- Support for policy measures
- Enforcement
- Road crash involvement
- Regional questions (new)
- Socio-demographic information
- Infrastructure (new)

Main road safety topics:

- Driving under the influence of alcohol, drugs, and medication
- Speeding
- Protective systems (e.g., seat belt use, helmet use)
- Distraction and fatigue

The ESRA questions were derived from other road safety surveys that have been conducted in the past. Most of the questions were based on validated questionnaires from Belgium (Vias institute (former: BIVV/IBSR), the Three-yearly Road Safety Attitude Survey (Meesmann et al., 2014)), other European countries (SARTRE – Social Attitudes to Road Traffic Risk in Europe (Cestac & Delhomme, 2012)), and the US (Traffic Safety Culture Index (AAA Foundation for Traffic Safety, 2016)). The questions reflect common topics related to road user behaviour, referred by the WHO as priorities in road safety (World Health Organization, 2023) and by the European Commission as suggested road safety performance indicators (European Commission, 2019).

Furthermore, for the interpretation of the results additional contextual information on country level was gathered via external data sources (e.g., CARE, Eurostat, IRF, OECD, WHO, World bank).

Figure 2 gives an overview of the scope of the ESRA3 survey.

ESRA3 survey content (over 400 variables collected)

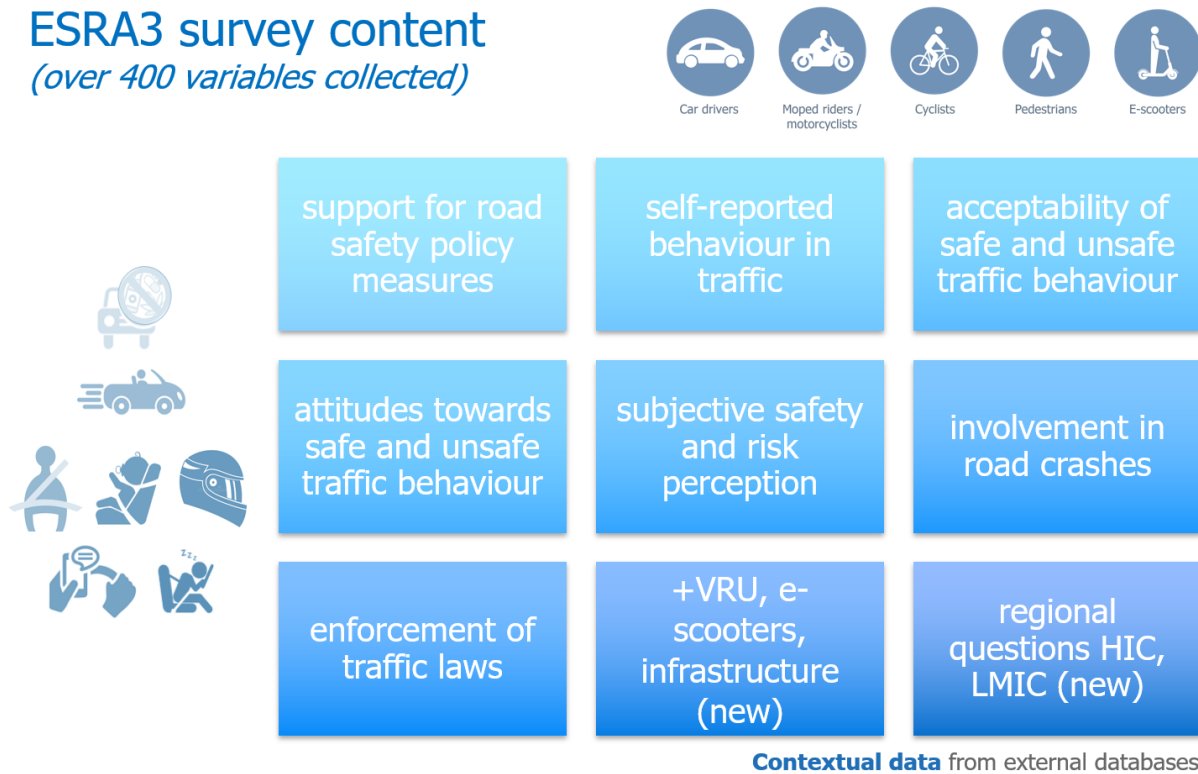


Figure 2: Scope of ESRA3 questionnaire

The median length of the interview was 23 minutes. The questionnaire was first developed in English by the ESRA3 steering group, based on the experience with ESRA2 and ESRA1 and subsequently translated into 49 national language versions by the ESRA3 partners. The survey was programmed in seven different character sets: Armenian alphabet, Cyrillic, Greek, Hebrew, Japanese, Latin and Thai.

2.2 Online panel survey

ESRA data is derived from an extensive online survey amongst a representative sample of the national adult populations in each participating country. More specifically, ESRA3 is based on a web-based survey using internet panels.

This approach has some advantages compared to other survey modes, especially given the international context of the study. These advantages are:

- Self-administered web surveys are less prone to social desirability in responses compared to interviewer-administered surveys (Baker et al., 2010; De Leeuw et al., 2008; Goldenbeld & De Craen, 2013).
- The common study design provides better comparability across countries (i.e., identical criteria in sampling procedure, identical programming of questionnaire; one project management across all countries as the ESRA survey is actually 'one' survey which is linked to different national translations).
- Reduction of time (fieldwork in most countries ca. 2-3 weeks; efficient data processing), workload (e.g., less time for fieldwork and data processing) and costs (national survey costs in most countries was below €15000⁵).

Points of attention of using online panel data are highlighted in section 4.

⁵ National survey cost including contribution to ESRA3 project management and administration.

2.3 Sample and fieldwork

The survey targets all main types of road users. The aim is to cover a representative sample of the national adult population of at least 1000 respondents in each country. Hard quotas are used for gender and age (six age groups: 18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65-74y) distribution during the sampling procedure (United Nations Statistics Division, 2023). In the three countries Armenia, Kyrgyzstan and Uzbekistan, data collection was limited to the three youngest age categories as no hard quota could be guaranteed for the older age groups and because the sample design was limited to 500 respondents. The geographical spread of the sample across the country was at least monitored (soft quota). Three market research agencies (Dynata, Ipsos and Punto de Fuga) organised the fieldwork under the supervision of Vias institute. The fieldwork was conducted simultaneously in all 39 participating countries between May and September 2023.

It should be recognized, however, that internet penetration and computer skills vary between countries (see also section 4.2). Consequently, coverage and sampling may have been suboptimal in some areas. Also, the minimum sample size (aiming at $n=1000$) could not be met in some countries as the size of the available online panels in some countries was too small or the costs too high. In Luxembourg the maximum size for an online sample was 500 respondents. In Armenia, Kyrgyzstan, and Uzbekistan no online panels were available. Therefore, respondents were recruited on the street of different capital areas spread over the country (fact to face recruitment) and invited to participate in a Computer Assisted Personal Interview (CAPI). As this study design is significantly more expensive than online panel survey, sample size had to be reduced to 500 respondents per country. The results of these three countries were not included in regional means due to the different methodology.

The participating countries in ESRA3 were:

- Europe: Austria, Belgium, Bosnia and Herzegovina, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Republic of Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom;
- America: Brazil, Canada, Chile, Colombia, Mexico, Panama, Peru, USA;
- Asia and Oceania: Armenia, Australia, Israel, Japan, Kazakhstan, Kyrgyzstan, Thailand, Türkiye, Uzbekistan.

In total the ESRA3 survey collected data from more than 37000 road users across 39 countries. Figure 3 shows the geographical coverage of the survey. Details on the sample can be found in chapter 4 and a summary of the fieldwork per country in Appendix 2.

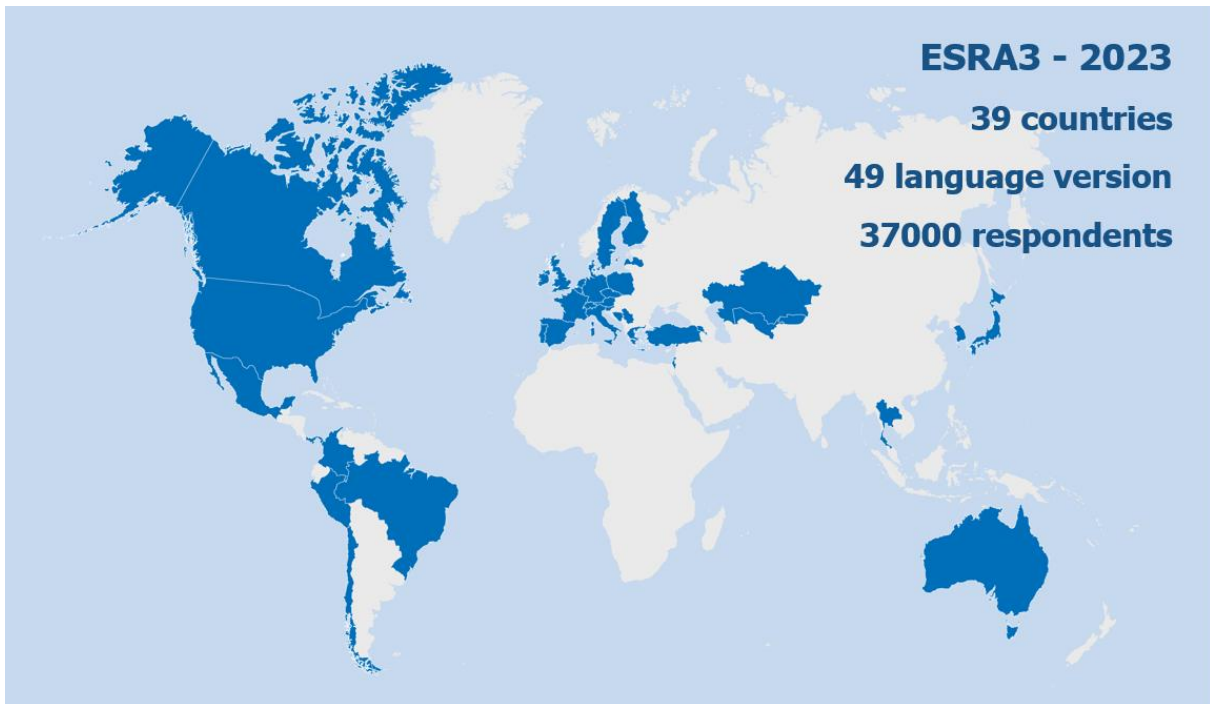


Figure 3: Geographical coverage of the ESRA3 survey

3 Data processing

3.1 Data preparation

The market research agencies that had been selected for collecting the data had to respect minimum criteria for data cleaning which had been defined by Vias institute. They also had to provide the data in a custom-made database template. The cleaned data files provided by the market research agencies were merged into one database which include all the answers of all respondents in 39 countries. The statistical software used in the further processing, analyses and output of the data were SPSS 26.0 (IBM Corp., 2019) and R 4.3.1 (R Core Team, 2023).

After receiving the cleaned data file from the market research agencies, Vias institute conducted the following steps of quality control before data cleaning:

1. check received data from market research agency against predefined ESRA3 codebook;
2. merge datasets from the three market research agencies;
3. check programming consistency (i.e., compare predefined filters in the questionnaire with the expected number of missing variables for which filters had to be used);
4. check whether the requested quota per country had been respected (national representativity of the sample based on gender and age (United Nations Statistics Division, 2023); a deviation of 5% of quota value was tolerated).

In step 1-3 only minor mistakes were identified and corrected in in the final database, without any further implications on the quality of the data. Concerning step 4 it should be mentioned that in the subcontract with the market research agency we defined that a small deviation from the original quota of less than 5% would be tolerated. Deviations between the population distribution (United Nations Statistics Division, 2023) and the sample distribution were corrected with weighting factors.

3.2 Data cleaning

As mentioned before, Vias institute predefined criteria for data cleaning for the market research agencies before delivering the database. Those data cleaning criteria were as much as possible in line with the criteria in ESRA2. Figure 4 provides an overview of the ESRA3 data cleaning process.

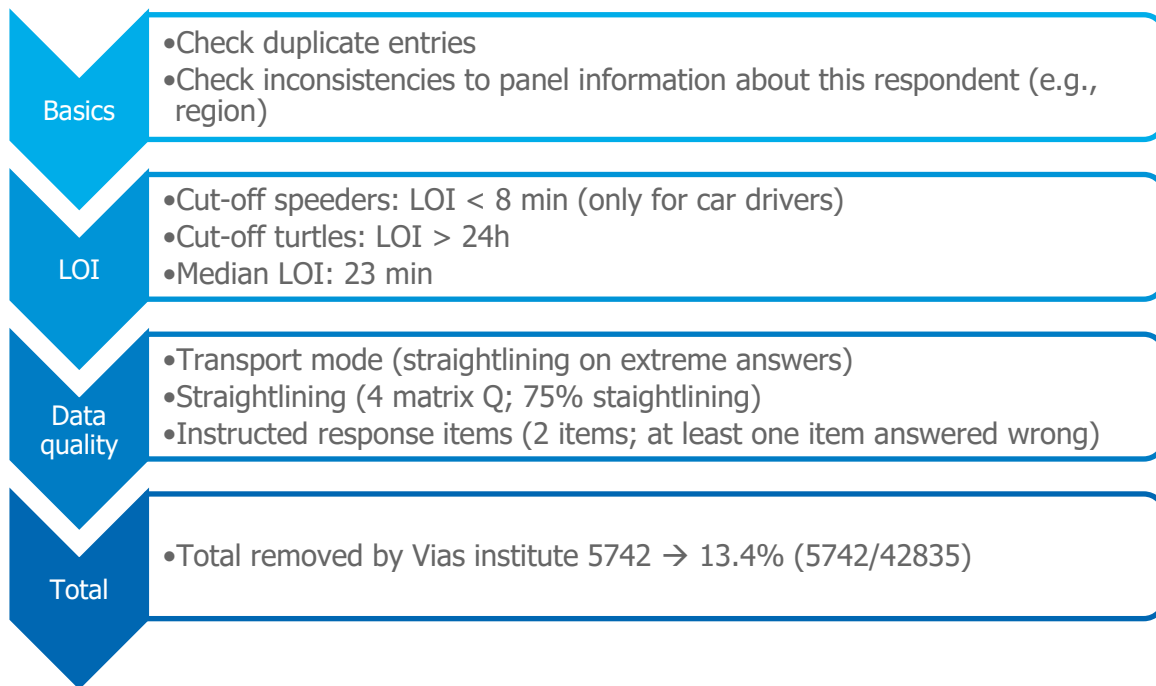


Figure 4: Overview of ESRA3 data cleaning

The following text describes the double checks of Vias institute whether these predefined criteria had been respected.

Step 1 Duplicate entries and inconsistencies

Duplicate entries (mostly based on age, gender, country but also on IP address) had to be removed by the market research agency. Furthermore, the market research agency had to check for inconsistencies to panel information about the respondents (e.g., region).

Step 2 Length of the interview (LOI)

The ESRA3 questionnaire aimed at a median LOI of 20 minutes⁶. Cut-off criteria were defined to clean out for 'speeders' (those who fill out the questionnaire too fast) and 'turtles' (those who fill out the questionnaire too slow). Those cut-offs are based on a pragmatic consensus within the ESRA steering group of the second edition of the ESRA survey (ESRA2). The same principle was used in ESRA3. 'Speeders' were defined as car drivers (at least once in the last month; Q12) who filled in the questionnaire in less than 8 minutes. Respondents that were not defined as car drivers were excluded from this criterion as they had to fill in less questions. 'Turtles' were defined as those respondents who needed more than 24 hours to fill in the questionnaire (independent of road user type). The length of 24 hours was accepted because market agencies stated that respondents do not fill in such questionnaires anymore in one go (e.g., take a break or have difficulties with internet connection). In such cases the timer of the interview keeps on running. However, interruptions of more than one day were excluded to decrease the effect of potential external effects on answering patterns. In the second check by Vias institute, 162 additional respondents were identified as suspect, as they needed more than 24 hours to fill in the questionnaire.

Step 3 Data quality checks

Transport mode (straightlining on extreme answers)

Respondents who answered on Q12 items (use of transport mode) always 'never' or always 'at least 4 days a week' were removed as we consider those replies as impossible.

⁶ Final median LOI was 23 minutes.

Straightlining

So-called straightlining is a response strategy where respondents fill in the same response on a scale on all, or almost all, items of a question. This type of answer patterns was double checked by Vias institute after the check by the market research agencies (who also check for other systematic response patterns). A 'straightliner' is defined as a person who answered on more than 75% of items of a particular question the same answer. This included the following matrix questions:

- Q14_1a (self-declared behaviour as a car driver; except for answering 'never' which is plausible);
- Q16_1 (personal acceptability of unsafe traffic behaviour of car drivers);
- Q17 (attitudes);
- Q21 (support for policy measures).

If a respondent is indicated as straightlining on at least three of these four matrix questions, the respondent was removed from the sample.

In the second check by Vias institute, 589 additional respondents were identified as suspect because of 'straightlining'.

Instructed response items (trick items)

In Q16_1 (personal acceptability of risky car driver behaviour) and in Q26 (social desirability scale) we included two instructed response items (or trick items; e.g., indicate number 5 on the answer scale). Respondents who answered at least one of these instructed response items incorrectly were removed from the sample as we see this as an indication that the respondent is not reading the items properly (careless responding). This criterion was stricter than the original predefined criteria that the market research agencies applied (remove respondents only if they answer wrong on both instructed response items). In the second check by Vias institute, 5081 additional respondents were identified as suspect because of answering at least one of the instructed response items wrong.

Instructed response items (or trick items) are a recommended way of identifying careless respondents (e.g., Goldammer et al., 2020; Malamis & Howley, 2022; M. K. Ward & Meade, 2023). Careless respondents are respondents that "fail to read or give sufficient attention to item content, resulting in data that may not accurately reflect respondents' true levels of the constructs being measured (Meade & Craig 2012, Ward & Meade 2018)" (M. K. Ward & Meade, 2023, p. 578). Kam and Chan (2018) and Meade and Craig (2012) also show that instructed response items are a valid method to detect careless respondents in survey data.

Extra data cleaning in the German sample

As the German ESRA3 partner (BAST) indicated doubts about the quality of the German sample, an additional data cleaning was applied for the German sample. The following three criteria were defined:

- Criteria 1 suspicious answers on the social desirability scale (Q26);
- Criteria 2 very high perceived social acceptability including all items of this question (Q15);
- Criteria 3 very high perceived likelihood to be checked by the police including all items of this question except 'respecting the speed limits' (Q22).

In case the respondent was identified as suspect in at least two out of these criteria the respondent was removed from the sample. In this extra check by BAST, 26 additional respondents were identified as suspect and removed from the German sample.

In total

In total, in all the steps of these data cleaning procedures 5742 respondents were removed from the original sample provided by the market research agencies (n=42835; 13.4%). The final sample consists out of n=37093 respondents.

In ESRA2 we removed 550 of the 45664 respondents (1.2%). The increase of deleted respondents between ESRA2 and ESRA3 is mainly due to the use of a stricter data cleaning criteria for instructed response items (or trick items). In ESRA3 respondents are removed if they answered at least one of

the two instructed response items wrong. In ESRA2 respondents were only removed if they answered two times wrong on the two instructed response items. The data show that the number of careless responders, who have not really read the instructed response items well, increased strongly from ESRA2 to ESRA3. Therefore, the ESRA3 steering group decided to anticipate on this evolution and use the new stricter data cleaning criteria in ESRA3 to improve the data quality. The stricter data cleaning criteria was 'to remove respondents who failed at least one instructed response item (or trick item)'.

3.3 Dichotomisation of the data

In view of facilitating dissemination of ESRA3 results, some original answer categories (mainly 5-point and 7-point scales) were dichotomized (two answer categories; binary variables). The dichotomization process was conducted centrally by Vias institute and used in presenting all descriptive analyses of the ESRA3 output and reports. The dichotomizations and reference categories for each question are indicated in the ESRA3 questionnaire in Appendix 1 (see information on binary variable).

3.4 Regional groups

Three groups were defined in order to compare the results at regional level:

- Europe22: Austria, Belgium, Bosnia and Herzegovina, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Republic of Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom;
- America8: Brazil, Canada, Chile, Colombia, Mexico, Panama, Peru, USA;
- AsiaOceania6: Australia, Israel, Japan, Kazakhstan, Thailand, Türkiye, (Armenia, Kyrgyzstan and Uzbekistan).

Due to different methodology in data collection Armenia, Kyrgyzstan and Uzbekistan are not included in the AsiaOceania6 regional group (face-to-face CAPI instead of online panel).

3.5 Weighting of the data

The following weights were used to calculate representative means on national and regional level (Table 1). They are based on UN population statistics (United Nations Statistics Division, 2023). 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, 65-74y). For the regions, the weighting also took into account the population size of each country in the total set of countries from this region.

On the country level, the major deviations (weights between 2 and 6) were found for women aged 65-74, which were underrepresented in the sample in the following countries: Brazil, Colombia, Peru, Thailand, Bosnia and Herzegovina, Kazakhstan, Türkiye, and Panama. Men aged 65-74 were also underrepresented in Bosnia and Herzegovina and Panama (weights between 2.1 and 3.6).

Table 1: Overview of weights applied in ESRA3 analyses

Weight	Description
Individual country weight	Individual country weight (ICW) is a weighting factor based on the gender*6 age groups (18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65-74y) distribution in a country as retrieved from the UN population statistics.
Europe22 weight	European weighting factor based on all 22 European countries participating in ESRA3, considering individual country weight and population size of the country as retrieved from the UN population statistics.
America8 weight	American weighting factor based on all 8 North and Latin American countries participating in ESRA3, considering individual country weight and population size of the country as retrieved from the UN population statistics.
AsiaOceania6 weight	Asian and Oceanian weighting factor based on the 6 Asian and Oceanian countries participating in ESRA3 with data collected through online panel (Australia, Israel, Japan, Kazakhstan, Thailand, Türkiye - Armenia, Kyrgyzstan, and Uzbekistan were not included due to different methodology in data collection – face-to-face CAPI), considering individual country weight and population size of the country as retrieved from the UN population statistics.

4 Sample characteristics

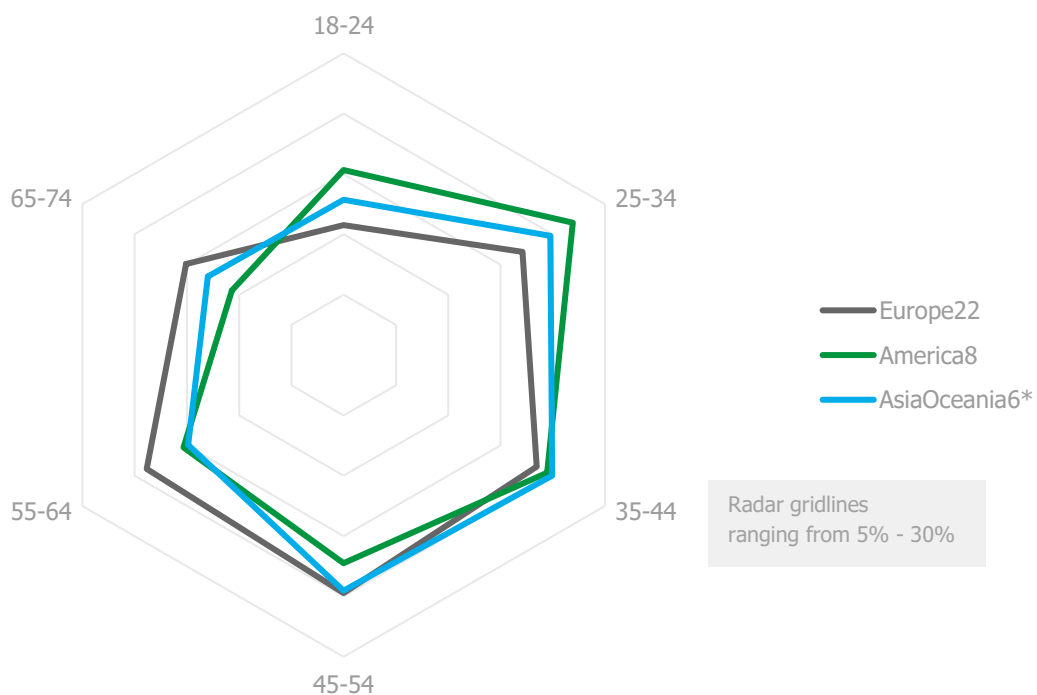
In total the ESRA3 survey collected data from more than 37000 road users across 39 countries. The geographical coverage of the survey can be seen in Figure 3 (page 15).

In the following sections we will discuss sample size, gender and age distribution in the sample, as well as educational level, internet use and the most frequently used transport modes. Additional sociodemographic information of the respondents is also available in the data (e.g., income situation or level of urbanisation). These additional characteristics allow for more in-depth comparisons and provides possibilities for advanced data analyses.

4.1 Sample size, gender and age distribution

Table 2 shows the sample size, gender and age distribution for the different countries and regions. In most countries the ESRA3 survey aimed at a sample size of 1000 respondents per country. In Austria, Belgium, and Canada the national partner decided to increase the samples size to 2000 respondents, as this enables more detailed analysis. In some countries, sample sizes of at least 1000 respondents were not feasible, therefore smaller sample sizes were used.

The gender distribution is very similar between the three regions: on regional level the proportion of men varies between 49% and 49.5%, the proportion of women varies between 50.2% and 50.8% and the proportion of other varies between 0.2% and 0.5%. Figure 5 shows the age distribution by region (weighted means). The sample has been weighted according to gender and age distribution of population statistics (United Nations Statistics Division, 2023). Therefore it represents the demographic characteristics of the regional samples (e.g., older population in the European region compared to the other regions).



* Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

Figure 5: Age distribution by region (weighted means)

The youngest respondents were 18 years old and the oldest respondents 74 years old, both defined in the study design for most of the countries, except for Armenia, Kyrgyzstan and Uzbekistan (age from 18 to 44). In European countries the average age was 46.1 years with a standard deviation of 15.4 and a median age of 46 years. The average age in American countries is 42.4 years with a standard deviation

of 15.3, 40 years is the median age. Lastly, in the Asian-Oceanian countries⁷ the average age of respondents is 43.8 with a standard deviation of 15.3. The median age in this region was 43. The three countries where there was no data collected for the oldest age categories are not included in these numbers.

As mentioned before, in three countries data collection was limited to the three youngest age categories. It should also be noted that the share of the oldest age group 65-74y varies strongly by country in the countries where data was collected for this age group. This is to some extent the result of their real share in the population (United Nations Statistics Division, 2023), but in some cases, it is also due to underrepresentation of this age group within the sample (Brazil, Colombia, Peru, Thailand, Bosnia and Herzegovina, Kazakhstan, Türkiye, and Panama).

Table 2: Sample size, gender and age distribution by country (unweighted) and region (weighted means)

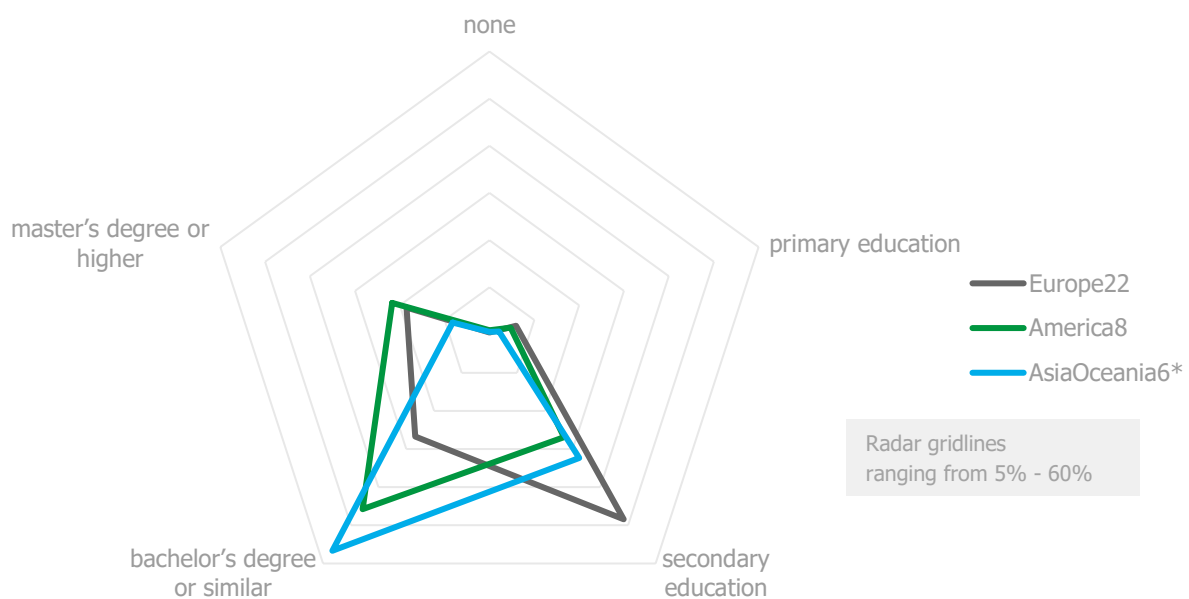
Country	Sample size	Gender			Age group					
		male	female	other	18-24y	25-34y	35-44y	45-54y	55-64y	65-74y
Armenia	467	47.3%	52.5%	0.2%	20.3%	41.3%	38.3%			
Australia	953	49.4%	50.5%	0.1%	10.7%	20.3%	19.1%	18.6%	16.7%	14.7%
Austria	1804	47.8%	51.9%	0.2%	8.9%	17.8%	18.0%	21.5%	20.2%	13.7%
Belgium	1795	47.4%	52.4%	0.2%	9.4%	16.9%	18.1%	20.5%	20.1%	15.0%
Bosnia Herzegovina	914	44.0%	55.5%	0.5%	14.7%	24.8%	22.3%	23.1%	12.1%	3.0%
Brazil	947	47.4%	52.5%	0.1%	15.6%	26.8%	22.4%	18.3%	11.6%	5.3%
Canada	1904	48.2%	51.4%	0.4%	11.0%	17.4%	18.4%	17.8%	20.0%	15.4%
Chile	923	47.1%	52.5%	0.3%	12.1%	24.9%	20.5%	17.7%	16.4%	8.5%
Colombia	909	49.5%	50.3%	0.2%	16.6%	22.4%	22.8%	18.4%	14.5%	5.3%
Czech Republic	965	49.4%	50.6%	0.0%	8.5%	16.4%	21.1%	21.3%	16.6%	16.1%
Denmark	874	49.5%	50.5%	0.0%	10.9%	17.6%	16.1%	19.7%	19.6%	16.1%
Finland	993	47.9%	51.7%	0.4%	9.6%	18.0%	18.6%	17.4%	19.5%	16.8%
France	965	49.8%	50.1%	0.1%	10.9%	16.7%	18.4%	18.9%	18.3%	16.8%
Germany	832	49.3%	50.6%	0.1%	8.5%	14.1%	15.0%	22.6%	23.4%	16.3%
Greece	978	48.2%	51.8%	0.0%	10.1%	14.7%	20.2%	22.7%	20.7%	11.6%
Ireland	901	48.8%	51.2%	0.0%	12.1%	17.1%	21.2%	19.9%	17.2%	12.5%
Israel	965	49.2%	50.7%	0.1%	15.8%	22.0%	20.1%	17.4%	13.2%	11.6%
Italy	1007	50.6%	49.3%	0.1%	9.3%	14.0%	18.6%	23.8%	20.1%	14.2%
Japan	986	49.0%	50.9%	0.1%	10.1%	12.9%	17.0%	21.1%	19.8%	19.1%
Kazakhstan	845	48.5%	49.7%	1.8%	11.4%	27.0%	22.5%	20.4%	14.8%	4.0%
Kyrgyzstan	468	50.6%	49.4%	0.0%	27.1%	42.1%	30.8%			
Latvia	911	47.2%	52.8%	0.0%	8.7%	18.4%	19.0%	18.8%	20.2%	14.9%
Luxembourg	471	50.5%	49.0%	0.4%	10.8%	21.9%	20.4%	18.7%	17.4%	10.8%
Mexico	932	48.1%	51.7%	0.2%	16.3%	23.3%	20.3%	18.1%	15.9%	6.1%
Netherlands	905	47.2%	52.6%	0.2%	10.5%	16.7%	17.5%	19.2%	19.8%	16.4%
Panama	855	46.9%	52.9%	0.2%	17.7%	26.3%	24.3%	20.2%	9.7%	1.8%
Peru	843	51.4%	48.5%	0.1%	17.9%	25.6%	23.3%	18.9%	10.6%	3.8%
Poland	927	48.0%	51.9%	0.1%	10.4%	19.7%	20.2%	17.3%	17.8%	14.7%
Portugal	1032	47.2%	52.8%	0.0%	10.0%	15.6%	20.4%	21.4%	19.1%	13.5%
Serbia	982	49.1%	50.9%	0.0%	9.7%	16.8%	18.5%	18.7%	18.7%	17.5%
Slovenia	945	50.3%	49.7%	0.0%	8.0%	15.1%	19.7%	20.8%	20.1%	16.2%
Spain	935	47.4%	52.4%	0.2%	10.1%	14.2%	22.8%	21.0%	18.2%	13.8%
Sweden	922	48.7%	51.2%	0.1%	9.5%	17.9%	18.2%	19.5%	17.9%	16.9%
Switzerland	979	50.3%	49.4%	0.3%	12.4%	19.2%	18.2%	19.9%	17.7%	12.7%
Thailand	870	50.1%	48.6%	1.3%	13.3%	22.3%	25.1%	21.3%	13.3%	4.7%
Türkiye	897	51.2%	48.6%	0.2%	15.2%	26.1%	22.0%	19.8%	13.4%	3.6%
United Kingdom	921	46.1%	53.2%	0.7%	12.6%	17.9%	18.0%	18.9%	18.3%	14.2%
United States	938	49.3%	50.5%	0.2%	10.6%	22.3%	17.5%	16.4%	18.4%	14.8%
Uzbekistan	433	49.2%	50.8%	0.0%	23.6%	42.5%	33.9%			
Europe22	22000	49.5%	50.3%	0.2%	10.8%	17.1%	18.5%	19.7%	18.8%	15.1%
America8	8000	49.0%	50.8%	0.2%	15.3%	21.9%	19.5%	17.2%	15.3%	10.7%
AsiaOceania6*	6000	49.4%	50.2%	0.5%	12.9%	19.8%	20.0%	19.5%	14.9%	13.0%

Note. (1) Reference population: all road users. (2) Unweighted sample for countries, weighted for region. (3) * Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

⁷ Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

4.2 Educational level and internet penetration

In ESRA3 we asked the respondents to indicate the highest qualification or educational certificate that they had obtained. Figure 6 shows the educational level of the respondents by region (weighted means). Table 3 provides an overview of the educational level of the respondents by country and region and the internet use by country. Depending on the country, the largest group is either people with educational level secondary education or bachelor's degree. The educational level of respondents in most Asian-Oceanian and American countries was higher than in European countries. In those countries, most of the respondents had a bachelor's degree. As this might differ from the actual distribution of educational levels in the national populations, this variable should be considered in further analysis and the interpretation of the results.



* Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

Figure 6: Educational level by region (weighted means)

Within the framework of the ESRA3 project contextual data was collected including the internet penetration in the participating countries (The World Bank Group, 2024). The internet penetration is used in the ESRA3 survey as an indicator for the representativity of an online panel sample for the national population. As Table 3 shows, the number of internet-users⁸ is in most participating countries very high, it ranges between 68% and 98% with an average of 87%. It is above 75% in all countries, except for Panama (68%) and Colombia (73%).

⁸ Includes people younger than 18y and above 74y. Internet penetration is shown for the most recent year available. For most countries this is 2022, if this is not 2022, the year is shown between brackets.

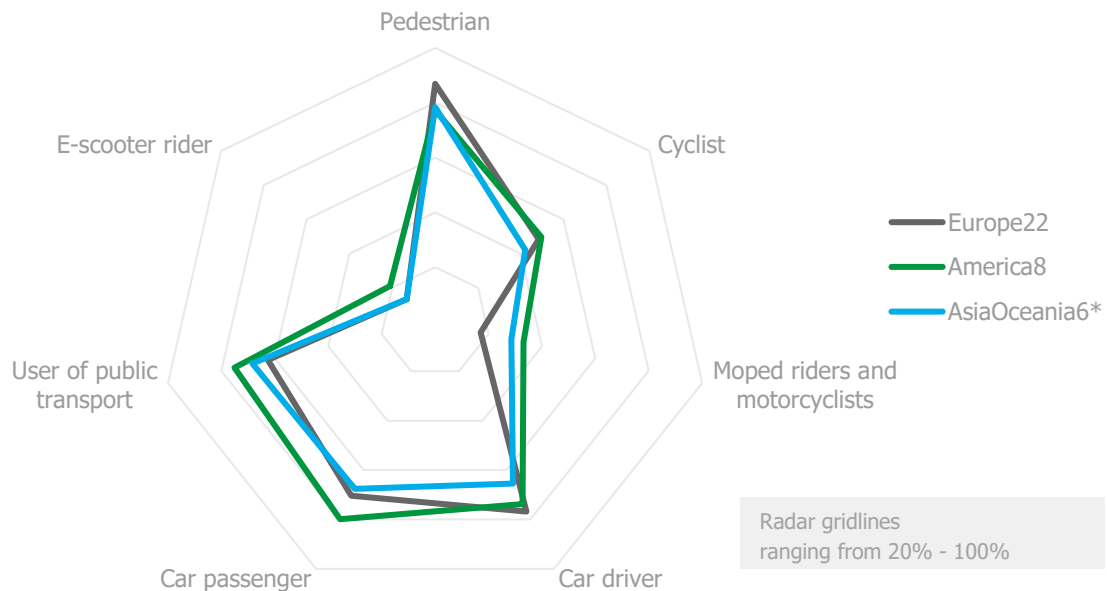
Table 3: Internet penetration and educational level of the respondents by country and region (weighted means)

Country	Internet-users in 2022 (per 100 people)	none	primary education	secondary education	bachelor's degree or similar	master's degree or higher
Armenia	79 (2021)	0.0%	0.4%	37.1%	49.0%	13.5%
Australia	96 (2021)	0.4%	0.8%	40.4%	43.6%	14.8%
Austria	94	0.1%	5.9%	69.6%	10.0%	14.3%
Belgium	94	0.6%	3.3%	45.0%	35.0%	16.1%
Bosnia Herzegovina	79	0.1%	0.3%	51.7%	23.3%	24.5%
Brazil	81	0.0%	2.6%	34.8%	49.5%	13.0%
Canada	93 (2021)	0.8%	2.6%	45.1%	43.0%	8.5%
Chile	90 (2021)	0.1%	0.9%	26.3%	53.1%	19.6%
Colombia	73	0.1%	0.4%	27.3%	47.9%	24.3%
Czech Republic	85	0.1%	4.9%	64.4%	11.2%	19.4%
Denmark	98	0.7%	12.4%	45.9%	30.9%	10.0%
Finland	93	0.1%	9.1%	48.5%	25.5%	16.8%
France	85	1.7%	11.0%	42.8%	30.7%	13.9%
Germany	92	0.3%	14.6%	49.0%	19.4%	16.6%
Greece	83	0.1%	1.3%	34.7%	47.5%	16.5%
Ireland	95 (2021)	0.1%	1.6%	37.3%	43.3%	17.8%
Israel	90 (2021)	1.0%	0.9%	42.7%	40.2%	15.1%
Italy	85	0.1%	3.9%	58.0%	15.0%	23.0%
Japan	83 (2021)	0.5%	2.0%	38.2%	55.8%	3.6%
Kazakhstan	92	2.3%	1.0%	41.1%	43.3%	12.3%
Kyrgyzstan	78 (2021)	0.0%	1.7%	38.5%	43.2%	16.5%
Latvia	91	0.1%	2.8%	36.5%	33.4%	27.2%
Luxembourg	98	2.0%	4.4%	51.8%	21.9%	19.9%
Mexico	76 (2021)	0.0%	0.5%	16.4%	72.9%	10.3%
Netherlands	93	1.3%	1.7%	49.6%	36.6%	10.8%
Panama	68 (2021)	0.0%	0.5%	26.9%	51.4%	21.2%
Peru	75	0.2%	0.1%	19.1%	49.4%	31.1%
Poland	87	0.0%	1.8%	50.9%	12.9%	34.5%
Portugal	84	0.0%	1.7%	43.4%	40.4%	14.6%
Serbia	84	0.0%	1.2%	43.2%	30.8%	24.8%
Slovenia	89	0.4%	2.6%	53.6%	37.1%	6.3%
Spain	94	0.1%	1.9%	38.9%	46.4%	12.6%
Sweden	95	0.3%	8.0%	49.3%	30.6%	11.8%
Switzerland	96 (2021)	0.4%	4.7%	52.2%	27.4%	15.3%
Thailand	88	0.7%	2.4%	28.7%	60.8%	7.3%
Türkiye	83	0.3%	3.1%	19.5%	64.0%	13.1%
United Kingdom	97 (2021)	0.5%	0.7%	48.4%	29.0%	21.3%
United States	92 (2021)	1.9%	8.9%	24.9%	33.0%	31.3%
Uzbekistan	77 (2021)	2.6%	2.4%	53.6%	37.0%	4.4%
Europe22	79 – 98	0.5%	5.9%	48.4%	26.7%	18.5%
America8	68 – 93	0.9%	4.7%	26.9%	45.8%	21.7%
AsiaOceania6*	77 – 96	0.6%	2.2%	32.4%	56.7%	8.2%

Note. (1) Reference population: all road users. (2) Weighted sample. (3) Source internet use per country: The World Bank Group (2024). (4) Internet penetration is shown for the most recent year available. For the countries without indication of year, internet penetration for the year 2022 is shown, for the other countries the year is indicated between brackets. (5) * Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

4.3 Use of transport modes

In ESRA3 we asked the respondents how often they used the following transport modes in the last 12 months. Table 4 presents an overview of percentage of respondents who answered that they use a certain mode of transport at least a few days a month (in our study defined as 'frequent use of transport modes'). Figure 7 presents these results per region (weighted means). An overview of the precise subgroups included in the different main road user types can be found in Appendix 3.



* Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

Figure 7: Frequent use of transport modes by region (weighted means)

The largest difference between the regions is the frequent use of moped and motorcycle, which is in the American and Asian-Oceanian region clearly higher than in Europe. In most countries walking is the most frequent used transport mode (23 countries). Public transport is the most frequent used transport mode in seven countries: Brazil (85.8%), Chile (89%), Colombia (93.4%), Kazakhstan (86.5%), Peru (94.9%), Türkiye (97.1%) and Uzbekistan (82.9%). In six countries being a car driver is the most frequent used transport mode: Australia (84.8%), France (79.7%), Israel (82.5%), Italy (90%), Luxembourg (90%) and United States (83.4%). Thailand is the only country where riding a moped or motorcycle is the most frequent used transport mode (72.6%). Riding an e-scooter is in most countries the least frequent used transport mode (30 countries), except in Armenia, Finland, Israel, Kazakhstan, Kyrgyzstan, Latvia, Poland, Sweden and Uzbekistan where riding a moped or motorcycle is the least frequent used transport mode.

Table 4: Frequent use of transport modes by country and region (weighted means)

Country	Pedestrian	Cyclist	Moped riders and motorcyclists	Car driver	Car passenger	User of public transport	E-scooter rider
	A few days a month						
Armenia	94.4%	8.7%	1.7%	26.2%	82.1%	86.6%	4.7%
Australia	79.4%	41.1%	29.4%	84.8%	80.1%	68.8%	24.7%
Austria	93.2%	48.6%	10.8%	78.7%	64.1%	58.1%	8.4%
Belgium	88.2%	47.5%	12.4%	75.0%	68.1%	52.9%	11.8%
Bosnia Herzegovina	78.3%	40.4%	10.5%	65.3%	91.6%	67.8%	6.6%
Brazil	83.2%	53.7%	31.6%	69.4%	77.3%	85.8%	9.9%
Canada	75.0%	32.0%	11.6%	72.7%	72.1%	52.5%	9.4%
Chile	85.9%	43.4%	11.4%	62.4%	83.8%	89.0%	7.1%
Colombia	88.5%	56.1%	31.2%	51.9%	87.7%	93.4%	9.5%
Czech Republic	87.5%	42.0%	7.8%	61.9%	69.1%	65.0%	7.0%
Denmark	83.4%	59.5%	13.1%	74.0%	74.8%	63.8%	11.9%
Finland	89.5%	55.8%	9.8%	68.8%	76.4%	58.6%	11.8%
France	79.6%	42.3%	19.7%	79.7%	64.8%	54.6%	17.5%
Germany	81.5%	54.9%	16.0%	74.3%	60.3%	59.3%	13.9%
Greece	86.2%	33.2%	20.5%	77.1%	90.8%	76.3%	6.6%
Ireland	82.6%	28.7%	6.9%	78.3%	77.4%	56.9%	6.5%
Israel	79.1%	12.5%	3.4%	82.5%	76.6%	63.7%	5.2%
Italy	87.9%	54.5%	26.4%	90.0%	80.8%	63.1%	12.5%
Japan	75.1%	37.0%	8.5%	57.8%	56.3%	51.0%	1.9%
Kazakhstan	83.6%	28.9%	5.8%	29.5%	82.2%	86.5%	8.4%
Kyrgyzstan	91.7%	14.8%	1.5%	35.4%	73.3%	91.2%	6.5%
Latvia	85.3%	41.5%	4.7%	68.2%	71.5%	57.0%	12.2%
Luxembourg	87.3%	29.9%	9.4%	90.0%	73.9%	57.9%	6.3%
Mexico	84.6%	46.9%	21.1%	69.4%	81.3%	84.5%	9.7%
Netherlands	94.6%	82.2%	16.0%	77.3%	69.8%	49.1%	8.4%
Panama	82.4%	37.2%	9.9%	63.4%	80.7%	80.6%	7.1%
Peru	90.7%	51.5%	25.7%	47.5%	87.2%	94.9%	12.9%
Poland	93.2%	63.0%	10.1%	78.0%	74.5%	67.1%	13.3%
Portugal	88.9%	25.2%	8.8%	81.8%	72.9%	55.6%	7.4%
Serbia	91.0%	49.7%	7.3%	68.8%	81.7%	80.4%	4.3%
Slovenia	89.9%	49.1%	15.4%	85.2%	71.9%	49.6%	9.0%
Spain	92.5%	40.7%	17.0%	75.9%	70.3%	72.4%	12.4%
Sweden	78.8%	48.4%	9.5%	68.7%	71.4%	62.2%	12.9%
Switzerland	93.0%	53.3%	20.4%	79.3%	66.2%	77.1%	17.2%
Thailand	68.0%	55.4%	72.6%	67.4%	63.0%	66.7%	21.8%
Türkiye	92.6%	45.1%	29.4%	77.2%	82.8%	97.1%	23.1%
United Kingdom	89.4%	35.5%	19.4%	69.9%	70.9%	65.5%	16.8%
United States	68.6%	49.9%	43.4%	83.4%	79.8%	63.6%	35.8%
Uzbekistan	66.2%	19.8%	7.0%	19.0%	73.1%	82.9%	9.2%
Europe22	86.9%	48.4%	17.0%	76.8%	70.4%	62.6%	13.3%
America8	77.3%	49.6%	33.1%	73.7%	79.9%	75.1%	21.0%
AsiaOceania6*	78.4%	42.1%	28.5%	65.5%	67.6%	68.4%	13.3%

Note. (1) Reference population: all road users. (2) Weighted sample. (3) * Armenia, Kyrgyzstan, Uzbekistan not included due to different methodology (face-to-face CAPI).

5 Points of attention

For the data comparison and the next ESRA edition the following points of attention should be considered.

Having a standardised methodology and sampling procedure in all participating countries is essential to obtain fully comparable and reliable data (e.g., De Leeuw et al., 2008). Although many efforts were done to achieve this in ESRA3, a few issues arose. In some countries it was not possible to aim for a sample size of at least 1000 respondents. This was the case in Armenia, Kyrgyzstan, Luxembourg, and Uzbekistan and due to limitations of the national panel or too high costs. In Armenia, Kyrgyzstan, and Uzbekistan no online panels were available. Therefore, respondents were recruited on the street of different capital areas spread over the country (face to face recruitment) and invited to participate in a computer assisted personal interview (CAPI). As this study design is significantly more expensive than online panel survey, sample size had to be reduced to 500 respondents per country. Due to the different methodology, we have doubts about the comparability with the other countries. Because of this reason, the results of these three countries were not included in regional means. Lastly, in several countries the share of the oldest age group (65-74y) was underrepresented. This was the case in Brazil, Colombia, Peru, Thailand, Bosnia and Herzegovina, Kazakhstan, Türkiye, and Panama. Doubts about the national representativity of very old participants in ESRA2 was anticipated in ESRA3. In ESRA3 we worked with a maximum age of 74y, aiming for a national representative sample based on gender, six age groups (18-24y, 25-34y, 35-44y, 45-54y, 55-64y, 65-74y) and regional spread. In countries where this was not possible the sample was reduced to three age groups with a maximum age of 44y. This was only done when the sample size was set to 500 respondents. This was the case in three countries: Armenia, Kyrgyzstan and Uzbekistan.

Survey research is fraught with general response tendencies and biases, and this is especially true in cross-national studies (e.g., Lajunen et al., 1997; Tellis & Chandrasekaran, 2010). Road users of countries from Europe, America, Africa, Asia, or Oceania may have different cultural interpretations of the questions in the survey. Factors like social values, capabilities, personality, the role or status of a person, laws, road safety culture, and infrastructural differences vary among the different countries and may influence road users' responses (Pires et al., 2020; Van den Berghe et al., 2020). These biases might lead to erroneous conclusions (i.e., confusing differences in the social desirability with genuine differences in the measured trait). Indeed, the ESRA2 data revealed differences in general response tendencies between countries on several questions. For example, in Greece respondents tend to indicate that 'they themselves' do not accept a certain unsafe traffic behaviour, but that 'the others' do accept this behaviour, whereas in the Netherlands this difference between personal and social acceptability of unsafe traffic behaviour is much smaller.

Other limitations of self-declared data are the tendency of respondents to provide answers which present a favourable image of themselves (desirability bias), the misunderstanding of questions (e.g., questions with difficult words or long questions), or unintentional faulty answers due to memory errors (recall error) (Choi & Pak, 2005; Krosnick & Presser, 2010; Pires et al., 2020). Based on the experiences in ESRA1, a social desirability scale was included in the ESRA2 and ESRA3 questionnaire (for ESRA3 based on Nießen et al., 2019). This social desirability scale can help to correct for desirability-related bias by including this variable as controlling factor in, for example, regression models (Lajunen et al., 1997; Meesmann et al., 2020; Nießen et al., 2019).

In ESRA3, we saw an increase in the number of respondents answering at least one instructed response item (or trick item) wrong compared to ESRA2. This is an indication for careless respondents, which are respondents that "fail to read or give sufficient attention to item content, resulting in data that may not accurately reflect respondents' true levels of the constructs being measured (Meade & Craig 2012, Ward & Meade 2018)" (M. K. Ward & Meade, 2023, p. 578). We anticipated on this evolution by making our data cleaning procedure stricter and removing in ESRA3 all respondents that answered at least one of the two instructed response items (trick items) wrong. This was a common decision by the ESRA3 steering group and we believe this improved the data quality. The experience in ESRA that careless responding is increasing in panels of market research agencies is a problematic evolution that should be monitored and taken care of also in the next ESRA editions.

Finally, as highlighted in this section, some improvements are to be made when envisioning a fourth edition of the ESRA survey in 2026. A core set of questions will be retained in every survey allowing comparisons and the development of time series of road safety performance indicators. If deemed appropriate new questions could be added and some of the existing ones may be modified or removed in view of obtaining a higher response quality. This will be a joint decision of all participating organisations.

6 Reporting and quality control

6.1 ESRA3 outputs

The key results of the ESRA3 survey will be published through a series of reports including the main report, a methodology report, 13 thematic reports (see Table 5), the ESRA3 dashboard and 39 country fact sheets. Already several of the country fact sheets have been translated to the national languages. In the country fact sheets national key results are compared to a regional mean (benchmark) and in the ESRA3 dashboard all national means of key results can be compared with other countries or regions.

Table 5: ESRA3 thematic reports

Driving under influence of alcohol, drugs and medication	Support for policy measures and enforcement	Pedestrians	Young and aging road users
Speeding	Subjective safety and risk perception	Cyclists	Male and female road users
Distraction (mobile phone use) and fatigue	Infrastructure	Riders of e-scooters	
Seat belt & child restraint systems		Moped riders and motorcyclists	

Moreover, the ESRA3 results will be published again in a special issue in IATSS Research (Meesmann & Nakamura, 2025, in preparation) and presented at several conferences in 2024-2025. The final ESRA3 Conference will take place in December 2024 (hybrid event). Furthermore, many ESRA partners will produce reports based on their national dataset, contribute to conferences and write scientific articles. Results and news on the ESRA initiative is available on: www.esranet.eu. The website also offers the opportunity to sign up for the ESRA newsletter to keep informed about updates.

6.2 Quality control

For all common ESRA3 outputs produced by the steering group partners, the consortium defined and implemented a peer-review procedure. A quality control team prepared the quality control procedure, informed ESRA3 task leaders and authors about the review criteria, the report deadlines and the independent reviewers. The quality control team also supervised and facilitated communication between authors and reviewers. The different actors and tasks in the quality procedure were described in an internal working document "Review procedures, work division and planning quality control tasks for ESRA3 outputs" that was discussed and approved by all ESRA3 steering group partners.

As can be seen in Appendix 3, a quality control process was set up, that described step by step the procedure for quality control of ESRA3 output, especially the ESRA3 thematic reports. The main steps of the quality control procedure were:

1. Structured review of ESRA3 reports by independent ESRA3 partners;
2. Author revision of reports and author response to reviews;
3. Acceptance of revisions and finalisation of report
4. Further revisions and acceptance (sometimes after arbitration concerning reviewer-author disagreement).

6.3 Closing remarks

The initial aim of ESRA was to develop a system for gathering reliable and comparable information about people's attitudes towards road safety in several European countries. This objective has been achieved and the initial expectations have even been exceeded. ESRA has become a global initiative which already

conducted surveys in more than 60 countries across six continents. The outputs of the ESRA project have become building blocks of national and international road safety monitoring systems such as the Global Status Report on Road Safety (GSRRS) of the WHO (World Health Organization, 2023), the country profiles (European Commission, 2024a) and thematic reports (European Commission, 2024b) of the European Road Safety Observatory (ERSO) of the European commission (European Commission, 2024c).

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 survey every three to four years, retaining a core set of questions in every wave allowing the development of time series of road safety performance indicators.

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Appendix 1: ESRA3 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.

Socio-demographic information

- Q1) In which country do you live? _____**
- Q2) Are you ... male – female - other**
- Q3) How old are you (in years)? [Drop down menu]**
- Q4_1) Are you currently a student? yes - no**
- Q4_2) What is the highest qualification or educational certificate which you want to achieve?** primary education - secondary education - bachelor's degree or similar - master's degree or higher
- Q4_3) 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
- Q5) Which of the descriptions comes closest to how you feel about your household's income nowadays?** living comfortably on present income - coping on present income - finding it difficult on present income - finding it very difficult on present income
- Q6a) Is the car you regularly drive equipped with seatbelts in the front seat?** yes – no
Only asked to LMIC countries.
- Q6b) Is the car you regularly drive equipped with seatbelts in the back seat?** yes - no
Only asked to LMIC countries.
- Q7) Are you using a carsharing organization (e.g., poppy or cambio⁹)?** yes – no
Only asked to HIC/UMIC countries.
- Q8) Do you have to drive or ride a vehicle during your main professional activity?** yes, I transport mainly other person(s) (e.g., taxi, bus, rickshaw, ...) - yes, I transport mainly goods (e.g., truck, courier, food delivery,...) - yes, I transport mainly myself (e.g., visiting patients, salesperson,...) - no, I drive or ride a vehicle only for commuting or private reasons
- Q9) Which phrase best describes the area where you live?** a farm or home in the countryside - a country village - a town or a small city - the suburbs or outskirts of a big city - a big city
- Q10) In which region do you live?** [List of regions per country]
- Q11a) How far do you live from the nearest stop of public transport?** less than 500 metres - between 500 metres and 1 kilometre - more than 1 kilometre
- Q11b) What is the frequency of your nearest public transport?** at least 3 times per hour - 1 or 2 times per hour - less than 1 time per hour

Mobility & exposure

⁹ The examples in brackets were adapted to national context.

Q12) 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 order): take the train - take the bus or minibus - take the tram/streetcar - take the subway, underground, metro - take a plane - take a ship/boat or ferry - be a passenger on non-motorized individual public transport mode (e.g., bike taxi, animal carriages,...) - be a passenger on motorized individual public transport mode (e.g., car-taxi, moto-taxi, tuk-tuk, auto rickshaw, songthaew,...) - walk or run minimum 200m down the street - cycle (non-electric) - cycle on an electric bicycle / e-bike / pedelec - drive a moped (≤ 50 cc or ≤ 4 kW) - drive a motorcycle (> 50 cc or > 4 kW) - ride an e-scooter (electric-kick style scooter) - drive a car (non-electric or non-hybrid) - drive a hybrid or electric car - be a passenger in a car - be a passenger on a moped or motorcycle - use another transport mode

Q13) Over the last 30 days, have you transported a child (<18 years of age) in a car? yes - no

Items (random order): under 150cm - above 150cm¹⁰

Self-declared safe and unsafe behaviour in traffic

Q14_1a) 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 most items: at least once (2-5) - never (1); only exception: items on protective systems: always wear/transport (1) – not always wear/transport (2-5)

Items (random order):

- drive when you may have been over the legal limit for drinking and driving
- drive after drinking alcohol
- drive within 1 hour after taking drugs (other than prescribed or over the counter medication)
- drive within 2 hours after taking medication that may affect your driving ability
- drive faster than the speed limit inside built-up areas
- drive faster than the speed limit outside built-up areas (except motorways/freeways)
- drive too fast for the road/traffic conditions at the time (e.g., poor visibility, dense traffic, presence of vulnerable road users)
- drive faster than the speed limit on motorways/freeways
- drive without wearing your seatbelt
- transport children under 150cm¹¹ without using child restraint systems (e.g., child safety seat, cushion)
- transport children above 150cm¹² without wearing their seat belt
- talk on a hand-held mobile phone while driving
- talk on a hands-free mobile phone while driving
- read a message or check social media/news while driving
- drive when you were so sleepy that you had trouble keeping your eyes open

Q14_1b_1) You said that you have driven a car when you may have been over the legal limit for drinking and driving. Was this ...? You can indicate multiple answers: in the week during daytime - in the week during night-time - in the weekend during daytime - in the weekend during night-time - on motorways - on urban roads - on rural roads
Only asked to HIC/UMIC countries.

Q14_1b_2) You said that you have driven a car within 1 hour after taking drugs (other than prescribed or over the counter medication). Was this ...? You can indicate multiple answers: cannabis - cocaine - amphetamines (e.g., speed, extasy) - illicit opiates (e.g., morphine, codeine; not prescribed as medication) - other

Q14_1b_3) You said that you have driven a car within 2 hours after taking medication that may affect your driving ability. Was this ...? You can indicate multiple answers¹³: antihistamines and/or cough medicines (such as Claritin, Allegra, Benadryl) - antidepressants (such as Prozac, Zoloft, Wellbutrin) - prescription pain medicines (such as Tylenol with codeine, OxyContin, Percocet, Vicodin/hydrocodone) - muscle relaxants (such as Soma, Flexeril) - sleep aids, Barbiturates, or Benzodiazapines

¹⁰ This question was adapted to national legal regulation.

¹¹ This question was adapted to national legal regulation.

¹² This question was adapted to national legal regulation.

¹³ The examples in brackets were adapted to national context.

(such as Ambien, Lunesta, phenobarbital, Xanax, Valium, Ativan) - amphetamines (such as Adderall, Dexedrine, phentermine) - other

Q14_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 most items: always wear/transport (1) – not always wear/transport (2-5)

Items (random order):

- travel without wearing your seatbelt in the back seat
- travel without wearing your seatbelt in the front seat

Q14_3) Over the last 30 days, how often did you as a MOPED RIDER 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 most items: at least once (2-5) - never (1); only exception: items on protective systems: always wear/transport (1) – not always wear/transport (2-5)

Items (random order):

- ride when you may have been over the legal limit for drinking and driving
- ride faster than the speed limit outside built-up areas (except motorways/freeways)
- not wear a helmet on a moped or motorcycle
- read a message or check social media/news while riding
- ride within 1 hour after taking drugs (other than prescribed or over the counter medication)
- ride too fast for the road/traffic conditions at the time (e.g., poor visibility, dense traffic, presence of vulnerable road users) - Only asked to LMIC countries.
- ride a motorcycle with more than 1 passenger

Q14_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 most items: at least once (2-5) - never (1); only exception: items on protective systems: always wear/transport (1) – not always wear/transport (2-5)

Items (random order):

- 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 message or check social media/news while cycling
- cycle within 1 hour after taking drugs (other than prescribed or over the counter medication)
- cross the road when a traffic light is red

Q14_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 most items: at least once (2-5) - never (1); only exception: items on protective systems: always wear/transport (1) – not always wear/transport (2-5)

Items (random order):

- listen to music through headphones while walking down the street
- walk down the street when you think you may have had too much to drink
- read a message or check social media/news while walking down the street
- text a message while walking down the street
- cross the road when a pedestrian light is red
- cross the road at places other than at a nearby (distance less than 30m¹⁴) pedestrian crossing

Q14_6) Over the last 30 days, how often did you as RIDER OF AN E-SCOOTER (electric-kick style scooter) ...? 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 most items: at least once (2-5) - never (1); only exception: items on protective systems: always wear/transport (1) – not always wear/transport (2-5)

Only asked to HIC/UMIC countries.

¹⁴ This question was adapted to national legal regulation.

Items (random order):

- ride with more than 1 person on board
- ride when you think you may have had too much to drink
- cross the road when a traffic light is red
- ride on pedestrian pavement/sidewalk
- ride without a helmet

Acceptability of safe and unsafe traffic behaviour

Q15) 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 order):

- drive when he/she may be over the legal limit for drinking and driving
- drive faster than the speed limit outside built-up areas (except motorways/freeways)
- drive without wearing the seatbelt
- talk on a hand-held mobile phone while driving
- read a message or check social media/news while driving

Q16_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 order; instructed response item (trick item) as last item):

- drive when he/she may be over the legal limit for drinking and driving
- drive within 1 hour after taking drugs (other than prescribed or over the counter medication)
- drive within 2 hours after taking a medication that may affect the driving ability
- drive faster than the speed limit inside built-up areas
- drive faster than the speed limit outside built-up areas (except motorways/freeways)
- drive too fast for the road/traffic conditions at the time (e.g., poor visibility, dense traffic, presence of vulnerable road users)
- drive faster than the speed limit on motorways/freeways
- drive without wearing the seatbelt
- 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 hands-free mobile phone while driving
- read a message or check social media/news while driving
- drive when he/she is so sleepy that he/she has trouble keeping their eyes open
- Please, select the answer option number 5 "acceptable". (Instructed response item (trick item))

Q16_2) How acceptable do you, personally, feel it is for a MOPED RIDER or MOTORCYCLIST 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 order):

- ride when he/she may have been over the legal limit for drinking and driving
- ride faster than the speed limit outside built-up areas (except motorways/freeways)
- not wear a helmet on a moped or motorcycle
- read a message or check social media/news while riding
- ride a motorcycle with more than 1 passenger - Only asked to LMIC countries.

Q16_3) How acceptable do you, personally, feel it is for a CYCLIST 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 order):

- cycle when he/she may have had too much to drink
- cycle without a helmet
- read a message or check social media/news while cycling
- cross the road when a traffic light is red

Q16_4) How acceptable do you, personally, feel it is for a PEDESTRIAN 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 order):

- walk down the street when he/she may have had too much to drink
- read a message or check social media/news while walking down the street
- cross the road when a pedestrian light is red

Attitudes towards safe and unsafe behaviour in traffic

Q17) 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 order):

Behaviour believes & 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.
- Motorized vehicles should always give way to pedestrians or cyclists.
- 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 = self-efficacy

- I trust myself to drive after drinking a small amount of alcohol (e.g., one glass of wine or one pint of beer).
- I have the ability to drive when I am a little drunk after a party.
- I am able to drive after drinking a large amount of alcohol (e.g., a bottle of wine).
- I trust myself when I drive significantly faster than the speed limit.
- I have the ability to drive significantly faster than the speed limit.
- I am able to drive fast through a sharp curve.
- I trust myself when I check 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.
- I often drive faster than the speed limit.
- I often use my mobile phone while driving.

Intention

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

Subjective safety & risk perception

Q18) 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 Q12 are displayed.

Q19) 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 order):

- driving after drinking alcohol
- driving within 1 hour after taking drugs (other than prescribed or over the counter 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 daydreaming while driving
- driving while tired

Support for policy measures

Q20) Do you oppose or support a legal obligation ...? 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 for all countries (random order):

- forbidding all drivers of motorized vehicles to drive with a blood alcohol concentration above 0.0 ‰ (zero tolerance)
- forbidding all drivers of motorized vehicles to use a hand-held mobile phone while driving
- limiting the speed limit to 30 km/h in all built-up areas (except on main thoroughfares)
- requiring all cyclists to wear a helmet
- limiting the speed limit to a maximum of 80 km/h on all rural roads without a median strip
- forbidding all novice drivers of motorized vehicles (license obtained less than 2 years ago) to drive with a blood alcohol concentration above 0.0 ‰ (zero tolerance)

Items only for HIC/UMIC countries (random order):

- installing 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 a certain limit)
- requiring cyclists under the age of 12 to wear a helmet
- forbidding all cyclists to ride with a blood alcohol concentration above 0,0‰ (zero tolerance)

Items only for LMIC countries (random order):

- forbidding all professional drivers of motorized vehicles (e.g., taxis, vans, trucks, buses, ...) to drive with a blood alcohol concentration above 0.0 ‰ (zero tolerance)
- requiring all moped and motorcycle riders and passengers to wear a helmet
- requiring all car drivers and passengers (front- and back seat) to wear a seatbelt
- making liability insurance mandatory for owners of cars

Q21) Please think of the policy measure: "... " and indicate if you agree or disagree with the following statements about it. This policy measure would ...? disagree - agree

Random selection of one of the first 4 items in Q20 per respondent. All first 4 items in Q20 are be asked equally often in each country.

Items (random order):

- reduce the number of road crashes and injuries
- increase the safety feeling on the streets
- have negative side effects
- restrict people's individual freedom
- reduce the privacy of people
- limit people's mobility
- lead to discrimination
- be fair
- be expensive for people
- be easy to implement
- be difficult to enforce by the police
- be a burden for people
- be an unjustifiable intervention by the state
- be supported by many of my friends

Enforcement

Q22) On a typical journey, how likely is it that you (as a car driver) will be checked by the police (including camera's or radars) 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 order):

- alcohol, in other words, being subjected to a Breathalyser test
- the use of illegal drugs
- respecting the speed limits
- wearing your seatbelt
- the use of hand-held mobile phone to talk or text while driving

Q23_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 - Binary variable: at least once - never

Q23_2) In the past 12 months, how many times have you been checked by the police for using drugs (other than prescribed or over the counter medication) while driving a car? never - 1 time - at least 2 times - Binary variable: at least once - never

Involvement in road crashes

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.

Q24a) In the past 12 months, have you personally been involved in a road crash where at least one person was injured (light, severe or fatal crashes)? yes - no

Q24b) Please indicate the transport mode(s) YOU were using at the time of these crashes. You can indicate multiple answers: as a car driver - as a car passenger - as a moped or motorcycle rider - as a moped or motorcycle passenger - as a cyclist - as a pedestrian - as a rider of an e-scooter (electric-kick style scooter) - other

Infrastructure

Q25_1_a) As a CAR DRIVER, what type of roads do you regularly use in [country]? You can indicate multiple answers: inter-city motorways - thoroughfares and high-speed roads within cities - rural roads and roads connecting towns and villages - other streets and roads in urban areas

Q25_1_b) As a CAR DRIVER, how would you rate the roads that you regularly use in terms of safety? You can indicate your answer on a scale from 1 to 7, where 1 is "very unsafe" and 7 is "very safe". The numbers in between can be used to refine your response.

Binary variable: safe (5-7) – unsafe/neutral (1-4)

Items (random order):

- inter-city motorways
- thoroughfares and high-speed roads within cities
- rural roads and roads connecting towns and villages
- other streets and roads in urban areas

Q25_2_a) As a MOPED RIDER or MOTORCYCLIST, what type of roads do you regularly use in [country]? You can indicate multiple answers: thoroughfares and high-speed roads within cities - rural roads and roads connecting towns and villages - other streets and roads in urban areas

Q25_2_b) As a MOPED RIDER or MOTORCYCLIST, how would you rate the roads that you regularly use in terms of safety? You can indicate your answer on a scale from 1 to 7, where 1 is "very unsafe" and 7 is "very safe". The numbers in between can be used to refine your response.

Binary variable: safe (5-7) – unsafe/neutral (1-4)

Items (random order):

- thoroughfares and high-speed roads within cities
- rural roads and roads connecting towns and villages
- other streets and roads in urban areas

Q25_3_a) As a CYCLIST, what type of roads/cycle lanes do you regularly use in [country]? You can indicate multiple answers: rural roads and roads connecting towns and villages with cycle lanes - rural roads and roads connecting towns and villages without cycle lanes - streets and roads in urban areas with cycle lanes - streets and roads in urban areas without cycle lanes

Q25_3_b) As a CYCLIST, how would you rate the roads/cycle lanes that you regularly use in terms of safety? You can indicate your answer on a scale from 1 to 7, where 1 is "very unsafe" and 7 is "very safe". The numbers in between can be used to refine your response.

Binary variable: safe (5-7) – unsafe/neutral (1-4)

Items (random order):

- rural roads and roads connecting towns and villages with cycle lanes
- rural roads and roads connecting towns and villages without cycle lanes

- streets and roads in urban areas with cycle lanes
- streets and roads in urban areas without cycle lanes

Q25_4_a) As a PEDESTRIAN, what type of roads/sidewalks do you regularly use in [country]? You can indicate multiple answers: rural roads and roads connecting towns and villages with sidewalks - rural roads and roads connecting towns and villages without sidewalks - streets and roads in urban areas with sidewalks - streets and roads in urban areas without sidewalks

Q25_4_b) As a PEDESTRIAN, how would you rate the roads/sidewalks that you regularly use in terms of safety? You can indicate your answer on a scale from 1 to 7, where 1 is "very unsafe" and 7 is "very safe". The numbers in between can be used to refine your response.

Binary variable: safe (5-7) – unsafe/neutral (1-4)

Items (random order):

- rural roads and roads connecting towns and villages with sidewalks
- rural roads and roads connecting towns and villages without sidewalks
- streets and roads in urban areas with sidewalks
- streets and roads in urban areas without sidewalks

Social desirability scale

Introduction: The survey is almost finished. Some of the following questions¹⁵ have nothing to do with road safety, but they are important background information. There are no good or bad answers.

Q26) 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.

Items (random order; instructed response item (trick item) as last item):

- In an argument, I always remain objective and stick to the facts.
- Even if I am feeling stressed, I am always friendly and polite to others.
- When talking to someone, I always listen carefully to what the other person says.
- It has happened that I have taken advantage of someone in the past.
- I have occasionally thrown litter away in the countryside or on to the road.
- Sometimes I only help people if I expect to get something in return.
- Please, select the answer option number 5 "agree". (Instructed response item (trick item))

Closing comment: Thank you for your contribution!

¹⁵ Q26 is asked together with some last questions on sociodemographic information, which have already been listed in the beginning of the questionnaire.

Appendix 2: Summary of ESRA3 fieldwork per country

Country	Market research agency	National language versions	Type of interview	Sample size	Median LOI (minutes)	Start date field (yyyy-mm-dd)	End date field (yyyy-mm-dd)
Armenia	Dynata	Armenian (AM)	Face to face CAPI	467	17.30	2023-08-12	2023-08-31
Australia	Punto de Fuga	English (AU)	Online panel	953	23.75	2023-05-02	2023-05-06
Austria	Punto de Fuga	German (AT)	Online panel	1804	23.63	2023-05-02	2023-05-22
Belgium	Punto de Fuga	Dutch (BE), French (BE)	Online panel	1795	21.23	2023-05-04	2023-05-12
Bosnia Herzegovina	Dynata	Bosnian (BA), Serbian (BA), Croatian (BA)	Online panel	914	16.99	2023-07-28	2023-08-30
Brazil	Punto de Fuga	Portuguese (BR)	Online panel	947	28.48	2023-05-02	2023-05-10
Canada	Punto de Fuga	English (CA), French (CA)	Online panel	1904	22.41	2023-05-04	2023-06-01
Chile	Punto de Fuga	Spanish (CL)	Online panel	923	28.03	2023-05-02	2023-05-12
Colombia	Punto de Fuga	Spanish (CO)	Online panel	909	28.65	2023-05-02	2023-05-08
Czech Republic	Punto de Fuga	Czech (CZ)	Online panel	965	22.92	2023-05-02	2023-05-30
Denmark	Punto de Fuga	Danish (DK)	Online panel	874	21.97	2023-05-02	2023-05-16
Finland	Punto de Fuga	Finnish (FI)	Online panel	993	22.63	2023-05-02	2023-05-31
France	Punto de Fuga	French (FR)	Online panel	965	22.50	2023-05-02	2023-05-30
Germany	Punto de Fuga	German (DE)	Online panel	832	21.31	2023-05-02	2023-05-30
Greece	Punto de Fuga	Greek (EL)	Online panel	978	24.38	2023-05-02	2023-05-31
Ireland	Ipsos	English (IE)	Online panel	901	16.33	2023-05-04	2023-05-26
Israel	Dynata	Hebrew (IL)	Online panel	965	15.45	2023-07-31	2023-08-25
Italy	Punto de Fuga	Italian (IT)	Online panel	1007	22.55	2023-05-03	2023-05-12
Japan	Punto de Fuga	Japanese (JP)	Online panel	986	19.63	2023-05-02	2023-05-31
Kazakhstan	Dynata	Kazakh (KZ), Russian (KZ)	Online panel	845	18.81	2023-07-28	2023-08-29
Kyrgyzstan	Dynata	Russian (KG), Kyrgyz (KG)	Face to face CAPI	468	22.88	2023-08-08	2023-09-02
Latvia	Ipsos	Latvian (LV)	Online panel	911	20.22	2023-05-04	2023-05-24
Luxembourg	Ipsos	French (LU), German (LU), Luxembourgish (LU)	Online panel	471	21.37	2023-05-04	2023-06-27
Mexico	Punto de Fuga	Spanish (MX)	Online panel	932	27.29	2023-05-02	2023-05-16
Netherlands	Punto de Fuga	Dutch (NL)	Online panel	905	21.87	2023-05-02	2023-05-13
Panama	Punto de Fuga	Spanish (PA)	Online panel	855	30.80	2023-05-02	2023-05-16
Peru	Punto de Fuga	Spanish (PE)	Online panel	843	30.12	2023-05-02	2023-05-12
Poland	Punto de Fuga	Polish (PL)	Online panel	927	24.45	2023-05-02	2023-05-30
Portugal	Punto de Fuga	Portuguese (PT)	Online panel	1032	25.49	2023-05-02	2023-05-30
Serbia	Ipsos	Serbian (RS)	Online panel	982	20.70	2023-05-04	2023-05-22
Slovenia	Punto de Fuga	Slovenian (SI)	Online panel	945	24.92	2023-05-02	2023-05-20
Spain	Punto de Fuga	Spanish (ES)	Online panel	935	22.75	2023-05-02	2023-05-18
Sweden	Punto de Fuga	Swedish (SE)	Online panel	922	21.80	2023-05-04	2023-05-30
Switzerland	Punto de Fuga	French (CH), German (CH), Italian (CH)	Online panel	979	22.33	2023-05-04	2023-05-22
Thailand	Dynata	Thai (TH)	Online panel	870	18.42	2023-07-27	2023-08-31
Türkiye	Punto de Fuga	Turkish (TR)	Online panel	897	22.25	2023-06-02	2023-06-09
United Kingdom	Punto de Fuga	English (UK)	Online panel	921	20.27	2023-05-02	2023-05-19
United States	Punto de Fuga	English (US)	Online panel	938	26.06	2023-05-02	2023-05-30
Uzbekistan	Dynata	Uzbek (UZ)	Face to face CAPI	433	10.74	2023-08-05	2023-09-02
39	3	49		37093	22.63	2023-05-02	2023-09-02

Appendix 3: Overview of subgroups per main road user type

- Q12) 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

User of public transport

- take the train
- take the bus or minibus
- take the tram/streetcar
- take the subway, underground, metro
- take a plane
- take a ship/boat or ferry
- be a passenger on non-motorized individual public transport mode (e.g., bike taxi, animal carriages,...)
- be a passenger on motorized individual public transport mode (e.g., car-taxi, moto-taxi, tuk-tuk, auto rickshaw, songthaew,...)

Car as a driver

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

Car as a passenger

- be a passenger in a car

Motorcyclist/ moped rider

- drive a moped (≤ 50 cc or ≤ 4 kW)
- drive a motorcycle (> 50 cc or > 4 kW)

Cyclist

- cycle (non-electric)
- cycle on an electric bicycle / e-bike / pedelec

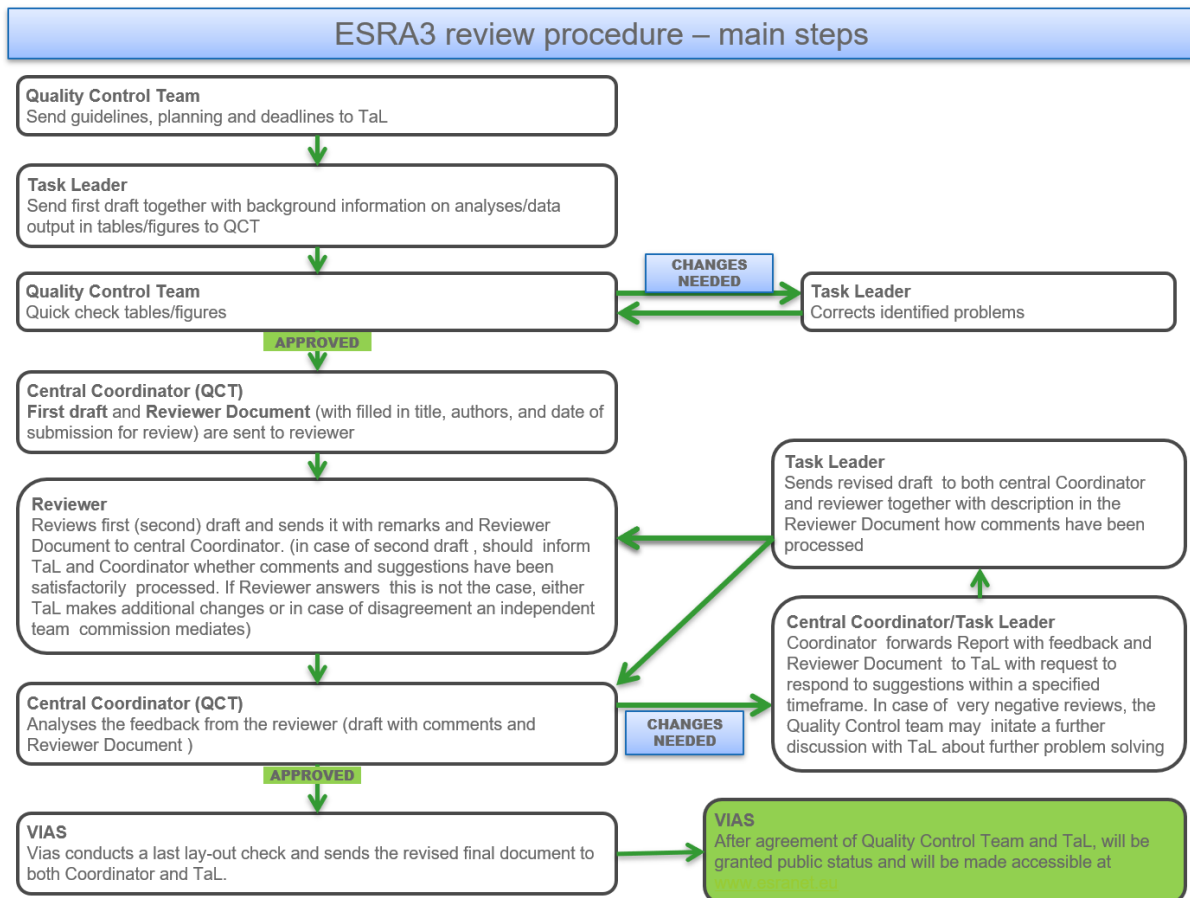
E-scooter

- ride an e-scooter (electric-kick style scooter)

Pedestrian

- walk or run minimum 200m down the street

Appendix 4: Schematic presentation ESRA3 review procedure





ESRA

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E-Survey of Road users' Attitudes

