IRTAD Conference 2026
Better Road Safety Data for Better Safety Performance
15-17 April 2026 Athens, Greece
International Transport Forum
irtad International Traffic Safety Data and Analysis Group
National Technical University of Athens

Evaluating Self-Reported and Attitudinal Indicators as Proxies for Observed Road Safety Behaviour

Peter Silverans, Uta Meesmann & Naomi Wardenier (Vias institute, Belgium)*
Dimitrios Nikolaou & George Yannis (NTUA, Greece)
Helga Mondésir & Manuelle Salathé (ONISR, France)
Sharon Heffernan (RSA, Ireland)
Brayan Gonzalez Hernandez & Francesca Damiani (Sapienza University of Rome, Italy)
Nikolay Naydenov (State Agency Road Safety, Bulgaria)
Wouter Van den Berghe (Tilkon, Belgium)
Agnieszka Stelling (SWOV, Netherlands)

**corresponding author, uta.meesmann@vias.be*

Extended Abstract

Keywords: road safety; self-reported behaviour; attitudes; norms; key performance indicators; ESRA

1. Objective

The main research question is to which extent self-reported indicators can be a useful proxy for the observed prevalence of at-risk behaviour. This comes down to evaluating how self-reported and attitudinal indicators are correlated with behavioural indicators based on observed behaviour at the international level. More specifically, we investigated to which extent the international ranking position of countries for a specific type of behaviour (speeding, distraction, etc) are comparable for self-reported and attitudinal indicators on the one hand and observed KPIs on the other hand. This is an exploratory analysis, as the number of countries with comparable roadside survey data suitable for this comparison is limited (5–10 countries).

2. Methodology

This study combines data from two major international sources: the ESRA survey (E-Survey of Road users' Attitudes) and the Baseline project on Road Safety Key Performance Indicators (KPIs). The ESRA initiative, a collaboration among research institutes, public authorities, and private partners worldwide, employs nationally representative online surveys (≥1,000 respondents per country) using a standardized, multilingual questionnaire covering attitudes, self-reported behaviour, and policy support (Meesmann et al., 2025). For this analysis, data from ESRA2 (wave 2018) were used, encompassing over 35,000 road users across 32 countries, including 20 EU Member States. Observed behavioural data were obtained from the Baseline project, which collects harmonized KPI estimates across EU countries (Silverans & Vanhove, 2023). Cross-national regression analyses were conducted to examine correlations between self-reported and attitudinal indicators (from ESRA2) and observed KPIs (from Baseline) in five domains: speeding, distraction, drink driving, protective equipment use, and cross-topic comparisons. In the analysis, scatterplots and simple linear regression were used to assess associations between self-reported and observed indicators. Potential outliers or atypical national patterns were assessed through visual inspection of the scatterplots. The coefficient of determination (R^2) is used to measure how well the statistical model predicts the outcome. The number of countries for this analysis was limited, ranging from 6 to 10 countries, depending on the topic. This was due to the small number of countries with comparable national roadside survey data in Baseline as well as self-declared behaviour in ESRA. Therefore, the presented results should be considered preliminary, and the analysis could be extended to additional countries, e.g. using data from the follow up project Trendline.

3. Results

The regression analyses for the different topics are reported in five dedicated working documents that describe the methods used to analyse international correlations for the different topics. In this note, the conclusions of the reports are summarized and the main results highlighted (Silverans et al., 2025).

3.1. Speeding

Ten countries reported both observed and self-reported indicators on speeding. On motorways and rural roads, countries with the lowest and highest observed compliance also had the lowest and highest self-reported speeding (R^2 = 0.55 and 0.87). No correlation was found for urban roads. Attitudinal analyses, both

dichotomous and compound (scale averages), showed similar trends across five subcategories: attitudes, personal norm, perceived behavioural control, habits, and intentions, with higher R^2 values in the dichotomous analysis (0.17 for attitudes to 0.78 for personal norms). Differences likely stem from methodological distinctions: self-reported data capture behaviour at least once in 30 days (period prevalence), whereas roadside observations measure specific moments (point prevalence). Nonetheless, self-reports are valuable complements, enabling assessment of correlations with socio-demographics, risk perception, enforcement experience, and road safety attitudes.

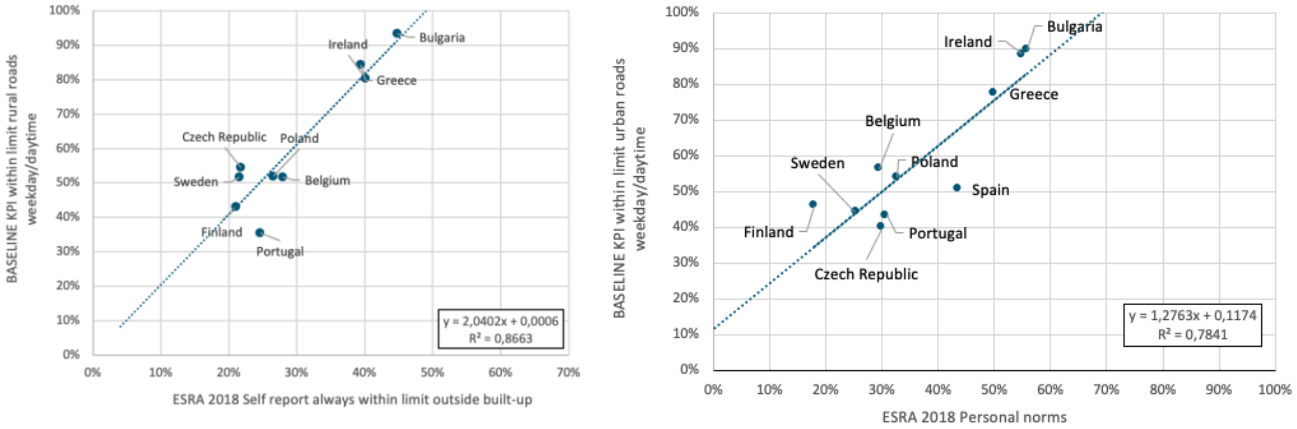

***Figure 1**. International correlation between observed speeding behaviour on urban roads (Baseline) and self-reported speeding behaviour and personal norms (percent unacceptable) regarding speeding (ESRA2).*

3.2. Distraction

In ESRA2, car drivers reported how often they use a handheld mobile phone or read texts/emails while driving, without specifying road type. To ensure comparability with Baseline observations, only countries with data on mobile phone use across all road types and days were included. Six countries met this criterion: Austria, Belgium, Czech Republic, Greece, Poland, and Spain. Spain was excluded due to broader observational criteria (including any electronic device use), leaving five countries for analysis. Observed and self-reported measures showed a strong positive relationship ($R^2 = 0.54$).

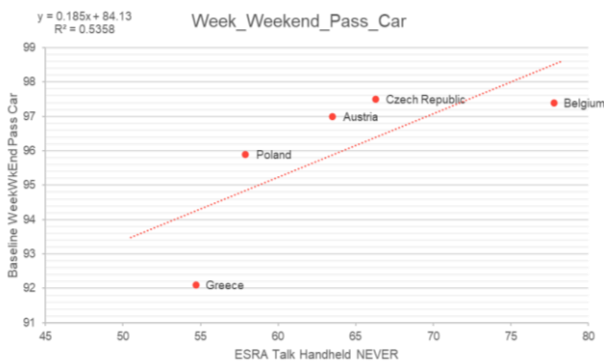

***Figure 1**. International correlation between observed mobile phone use while driving (Baseline) and self-reported talking on a handheld mobile phone use while driving (ESRA2).*

Social norms (perceived acceptability by others) explained a moderate portion of the variation in observed mobile phone use, with single-question R^2 values of 0.50–0.57 and a compound score increasing R^2 to 0.66. The results for personal norm statements differed strongly by specific mobile phone use behaviour. Additional items showed weak correlations with observed behaviour ($R^2 < 0.16$). Perceived behavioural control statements were inconsistently related to observed compliance, with some negative associations. Habit measures were weakly associated ($R^2 = 0.11$), and intentions did not correlate with observed behaviour internationally. Key points include: the limited number of countries constrains robustness; observed and self-reported behaviours are correlated, but association varies by type of mobile phone use; social norms appear more consistently linked to behaviour than personal norms (see for an example Figure 2); perceived behavioural control shows variable correlations, improved slightly by compound scoring, but not always in the expected direction.

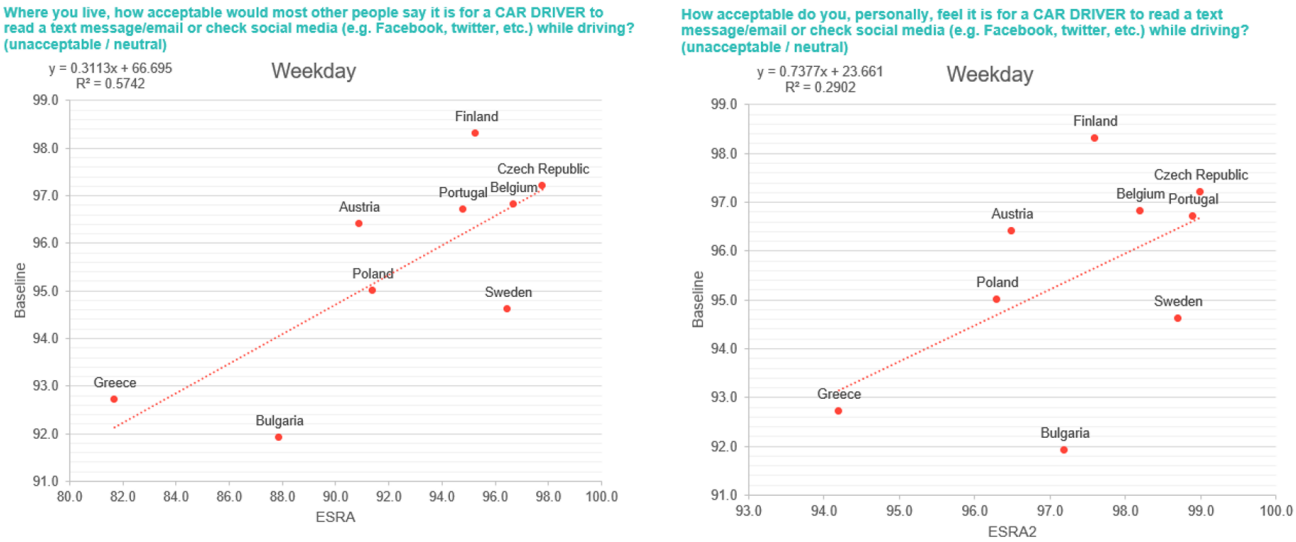

***Figure 2**. International correlation between observed mobile phone use while driving (Baseline) and perceived social norms and personal norms regarding mobile phone use while driving (ESRA2).*

3.3. Driving under the influence of alcohol

The explorative analysis related to drink-driving is based on a comparison of six countries. Self-reported behaviour, was measured as driving at least once over the legal alcohol limit in the last month, showed a clear positive correlation with observed KPIs from Baseline ($R^2 = 0.63$). Systematic correlation analyses were conducted using both dichotomous (e.g., disagree/neutral vs agree, unacceptable/neutral vs acceptable) and mean scale values for car drivers. For certain attitudes, correlations were higher when using mean scale values. For example, alcohol-related habits such as "even when I am a little drunk after a party I drive" ($R^2 = 0.77$ for mean scale vs 0.14 dichotomized) and "I often drive after drinking alcohol" (0.72 vs 0.27) demonstrated stronger associations. Similarly, perceived behavioural control, "I have the ability to drive when I am a little drunk after a party", correlated more strongly with mean scale values (0.56 vs 0.19). These results suggest that mean scores, which capture inter-individual variance in attitudes, better reflect alcohol-related driving behaviour. Based on six countries, findings are indicative, showing that correlations depend on both the attitudinal dimension and the measurement method.

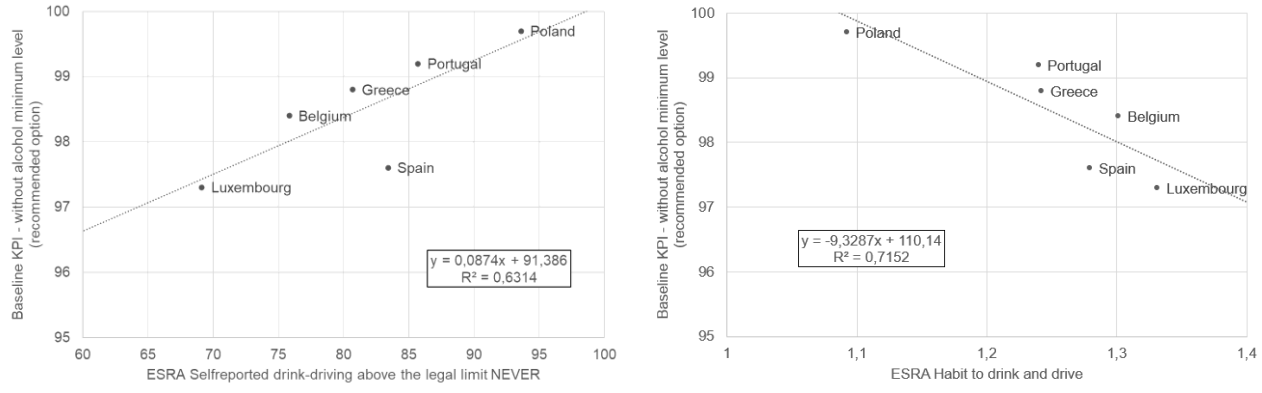

***Figure 2**. International correlation between observed drink-driving behaviour (Baseline) and self-reported drink-driving behaviour and the habit to drink and drive (ESRA2).*

3.4. Protective equipment

Analysis of self-reported seatbelt use across seven countries showed a moderate correlation with observed data ($R^2 = 0.40$), while PTW helmet use displayed a higher correlation ($R^2 = 0.60$), largely driven by Greece's position in both datasets. The self-reported helmet use among cyclists, also showed the highest correlation ($R^2 = 0.63$) with observed data. Personal acceptability of not wearing a seatbelt had little association with observed use ($R^2 = 0.1$), whereas social norms were strongly related ($R^2 = 0.66$), indicating that higher observed seatbelt

use corresponds to lower social acceptability of non-use. Key insights include: self-reported and observed behaviours are reasonably aligned; personal norms show weak correlation with actual behaviour; and social norms strongly influence protective equipment use, underscoring the role of peer and societal expectations in road safety.

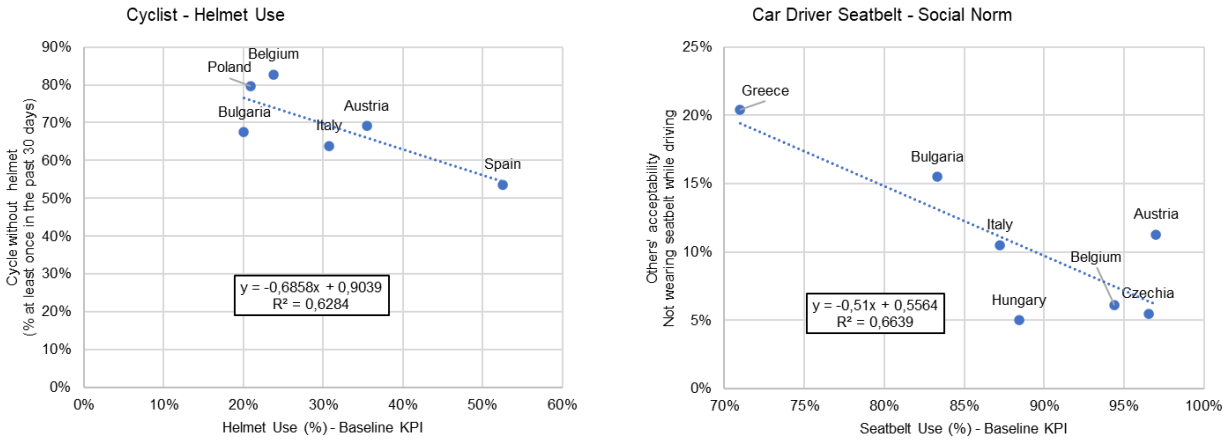

***Figure 3**. International correlation between observed helmet use among cyclists (Baseline) and self-reported helmet use and perceived social norms regarding helmet use (ESRA2).*

3.5. Cross-topic comparisons

A complementary analysis examined international correlations between different types of self-reported behaviours, assessing whether countries with high prevalence in one risk area also report high prevalence in others. Fifteen European countries from ESRA2 were included. For example, driving above the speed limit outside urban areas and driving while sleepy showed a strong positive correlation ($R^2 = 0.56$), indicating similar country rankings for these behaviours. However, correlations varied across behaviours. Some were very weak, and others strongly negative; for instance, driving after taking drugs and hand-held mobile phone use were strongly negatively correlated ($R^2 = 0.71$), suggesting that countries with high drug-driving prevalence have low mobile phone use while driving. Overall, these findings confirm that international correlations between observed KPIs and self-reported or attitudinal indicators are not uniform. The strength and direction of correlations depend on the attitudinal dimension and the type of behaviour analysed.

4. Discussion

This exploratory analysis examined whether self-reported and attitudinal indicators can serve as proxies for objectively observed KPIs of at-risk behaviour. Some indicators showed strong positive correlations internationally, while others were weak. The limited number of countries in this comparison means these findings are exploratory and cannot support definitive conclusions. The main reason for the small number of countries in this study was the limited number of countries with comparable national roadside survey data in Baseline as well as self-declared behaviour in ESRA. This analysis could be extended using updated information from the follow-up project Trendline, which provides comparable data for a larger number of countries. Moreover, self-reported indicators cannot directly replace observed KPIs, as they follow different logic and measure distinct concepts. Baseline and Trendline KPIs quantify the proportion of distance travelled while in infraction, whereas ESRA self-reported KPIs reflect the share of drivers admitting at least one infraction over a given period. Consequently, period-prevalence indicators identify the population responsible for observed point prevalence but not the frequency of infractions. Attitudinal indicators (e.g., norms, habits, perceived control) are predictors of behaviour rather than direct behavioural measures. Nevertheless, self-reported and attitudinal KPIs provide complementary information on demographics, attitudes, and support for measures, which is useful for targeted policy and communication strategies. They should therefore be collected alongside, not instead of, objective observations (Silverans & Meesmann, 2025; Silverans et al., 2025).

References

Meesmann, U., Wardenier, N. & Pires, C. (2025). Global Road Safety Insights. Synthesis from the ESRA3 survey across 39 countries. (2025-R-02–EN). ESRA project (E-Survey of Road users' Attitudes). Vias institute. https://www.esranet.eu/storage/minisites/esra3-main-report.pdf

Silverans, P., & Vanhove, S. (2023). Baseline conclusions and recommendations. Baseline project, Brussels: Vias institute.

Silverans, P., Meesmann, U., Wardenier, N., Mondésir, H., Salathé, M., Heffernan, S., Gonzalez Hernandez, B., Damiani, F., Nikolaou, D., & Naydenov, N. (2025). Experimental KPI Self-reported behaviour and attitudes. Summary results of pilot trials. Report produced as part of the Trendline project, supported by the European Union.

Silverans, P. & Meesmann, U. (2025). Experimental KPI Self-reported behaviour and attitudes. Methodological guidelines. Report produced as part of the Trendline project, supported by the European Union.