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Research article

Searching for relationships between self-reported familiarity and road safety based on surveys with geographic variability

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Abstract: The study is aimed at understanding if (*a*) declared driving behavioural changes due to familiarity can be observed through surveys; (*b*) self-reported route familiarity can be related to negative safety performances (crashes and fines); (*c*) the relationships are stable across different countries. Driving on habitual routes could imply different behaviours than on generic routes, and possibly different safety performances. The relationships between route familiarity and safety performances are often searched through experimental studies or accident data analyses. Surveys were spread to young Italian and Norwegian drivers, asking both general and specific questions on the habitual route travelled and the recently experienced crashes and fines. 316 answers, 235 Italian and 71 Norwegian, were analysed. Comparisons of self-reported driving scores between generic and habitual routes were performed. Logistic regressions having as response variables negative outcomes (crashes and fines) on frequent routes, different behaviour on habitual routes, and nationality were developed. Different relationships were highlighted, concerning differences in perceived ability on the habitual route, a possible excess of self-confidence, which however are differently related to crashes and fines. Different tendencies were found for the same variables in the two countries, sometimes opposite. Surveys are suggested as useful to reveal familiarity-behavioural changes/negative outcomes relationships. Considering international studies may reveal significant driving behavioural differences and patterns. The results have some potential applications for driver education, since some relationships between familiarity effects in young drivers and negative safety outcomes were noted.

Keywords: driver behaviour, familiarity, international study, road safety, survey

1 Introduction

The familiarity of drivers with routes can influence safety-related driving aspects and performances (Yanko & Spalek 2013; Martens & Fox 2007). Being more familiar with given routes

can lead to an increased confidence, and in turn to more aggressive behaviours (Rosenbloom *et al.* 2007), speeding tendencies (Colonna *et al.* 2016), while driving operations are mostly automated (Charlton & Starkey 2013) and allows for mind wandering (Burdett *et al.* 2016). Whereas the drivers' unfamiliarity can possibly lead to some unexpected on-road situations due to the ignorance of the road environment, such as those caused by inconsistent horizontal and vertical road alignments (Intini *et al.* 2019a), possibly leading to specific crash types (Intini *et al.* 2019b; Yannis *et al.* 2007). Hence, both drivers' familiarity and unfamiliarity can influence driving behaviour and, potentially, the related safety performances, such as traffic crashes or violations.

It is quite arduous to accurately measure the actual drivers' route familiarity, whether if this is based on frequency-based (e.g. monthly, daily driving) or distance-based measures (travel close/far from home), which may be considered objective measures (Harms *et al.* 2021). The difficulty in measuring route familiarity particularly emerges when conducting experimental studies in which it should be artificially recreated. For instance, this may happen when asking drivers to repeatedly drive on the same route (Colonna *et al.* 2016; Martens & Fox 2007) or by trying to reconstruct familiarity information as based on crash datasets (e.g. based on travel purposes or drivers' residence, see (Intini *et al.* 2018; Blatt & Furman 1998). Considering these issues, a possible identification measure both frequency- and distance-based was proposed (Intini *et al.* 2019b), based on a review of results obtained from previous research.

However, in most cases, trying to identify the familiarity of drivers based on indirect measures (i.e. frequency or distance-based measures) can be affected by errors. The optimal choice could be the use of naturalistic driving data, in which familiarity effects are directly observed (Wu & Xu 2018). Since naturalistic data are often hard to obtain, research studies can rely on other methods. Another possibility is searching for relationships between drivers' familiarity and road safety based on self-reported experiences and judgements made by drivers themselves (i.e. 'subjective' measures of familiarity, see Harms *et al.* (2021)). This approach was actually used in some previous studies, even if they may have been not specifically focused on driving familiarity (Liu & Ye 2011). Surveys were indeed previously used to link self-reported behavioural aspects (e.g. based on the Driving Behaviour Questionnaire, Reason (1990)) and the occurrence of crashes (de Winter & Dodou 2010). In this study, the use of surveys is entirely dedicated to the familiarity issue and its influence on safety.

Moreover, road safety aspects may largely vary when different cultural and geographic contexts are considered (see e.g. Van den Berghe *et al.* (2020); Nordfjærn *et al.* (2014)). However, it was largely demonstrated that route familiarity effects can be noted regardless of the specific context (see e.g. the reviews by Harms *et al.* (2021); Intini *et al.* (2019b)), being the familiarity effect a worldwide condition of million drivers who, for example, commute each working day. Nevertheless, commuting patterns may vary among different countries (Intini *et al.* 2019b), and, while general effects of familiarity were noted across countries (i.e. low attention, mind wandering, some aggressive driving tendencies), those effects may be partly influenced by the specific local context. For this reason, in this article, an international study was conducted, by disseminating the same survey in two different countries, in order to add another level of complexity to the relationship between familiarity and safety.

1.1 Research questions

This study was conceived for trying to inquire into possible relationships between familiarity and road safety performances (in particular negative outcomes such as crashes and fines, and behavioural changes), based on self-reported experiences. Hence, it is based on surveys submitted to drivers, in which they were asked about their driving habitudes and past experiences of crashes and fines.

The main research questions underlying this study are listed as follows:

- Is it possible to detect any significant declared driving behavioural change due to familiarity, as based on surveys? In other words, are surveys useful to inquire into familiarity-related behavioural changes?
- Can the self-reported route familiarity (and associated behavioural tendencies) be related to negative safety performances (crashes/fines) or different self-reported behaviours on the same routes?
- Are these relationships dependent on the specific considered context, i.e. are they variable across countries?

Data collected from surveys submitted to young drivers in two European countries: Italy and Norway, were analysed with the aim of answering these research questions. The two countries show significant differences in terms of safety performances. For example, considering traffic deaths, Italy shows a death rate of 5.6 deaths per 100 000 people, more than double of the Norwegian rate (2.8), as based on data from the WHO (2018). The differences between death rates of pedestrians and motorcyclists are even higher: Italian rates are about triple with respect to Norwegian rates. For this reason, the comparison between these countries can be particularly relevant, in light of the specific research question about country differences.

2 Methods

2.1 Participants

This study is based on an international survey submitted to young drivers. Participants were mainly recruited through students at the Polytechnic University of Bari (Italy) and the Norwegian University of Science and Technology (Norway). The data collection was organized into two subsequent stages. A first preliminary round of surveys was run in both countries to test the questionnaire effectiveness, comprehension and explanatory power. After this preliminary stage, 96 answers were collected in Italy and 85 answers in Norway (181 in total). Once the second round of surveys was completed, 166 answers were further collected in Italy (262 total Italian surveys) and 16 in Norway (101 total Norwegian surveys). In total, the entire dataset is composed of 363 compiled surveys.

With reference to the entire dataset, Italian and Norwegian participants are, namely, about 24 and 22 years old, on average, with comparable standard deviations of ages (namely about 3 and 2 years). The vast majority (more than 70%) of participants from both countries are male drivers. This gender difference was not deliberately searched by the authors but it is not surprising considering that the use of private transport for commuting is significantly higher for young males (in the age range 16–29 years) than females, according to the study conducted by Sánchez & González (2016), based on Spanish data.

2.2 Questionnaire

The questionnaire was organized into four main sections, in which respondents had to report about: (*1*) general information (14 questions), (*2*) habitual routes (16 questions), (*3*) crashes (2 questions and some templates), and (*4*) fines (2 questions and some templates). The main information about the items included in the questionnaire are reported as follows in Table 1, while the whole questionnaire is reported in the Appendix. In particular, in the first section, drivers had to report about general demographic information, their exposure to car driving, their self-assessment with respect to several driving-related behaviours. In the second section, drivers had to describe their habitually travelled route and to report about both their exposure to it and their behaviour with respect to the same questions asked for their general driving behaviour. In the

last two sections, detailed information about crashes and fines experienced in the last two years are asked to the respondents.

Table 1 **Synthetic description of the items composing the questionnaire**

Item	Section							
	1: General info	**A***	**2: Habitual route (HR)**	**A***	**3: Crashes**	**A***	**4: Fines**	**A***
x.1	Age	F	Origin and destination	F	Crash involvement in the last 2 years	Y	Fines received in the last 2 years	Y
x.2	Gender	F	Length	#	Number of crashes	#	Number of fines	#
x.3	Years of driving license	#	Car driving on the HR: (*1*) days per week (*2*) hours per week (*3*) % on urban/rural roads (*4*) % on congested roads	#	Details about crashes (type, consequences, environment, road familiarity, dynamics, fault)	T	Details about fines (type, environment, road familiarity)	T
x.4	Car driving: (1) days per week (2) hours per week (3) % on urban/rural roads	#	Car driving ability (HR)	5p				
x.5	Car driving ability	5p	Road rules abidance (HR)	5p				
x.6	Road rules abidance	5p	Prudent driving tendency (HR)	5p				
x.7	Prudent driving tendency	5p	Aversion to high-speed driving (HR)	5p				
x.8	Aversion to high-speed driving	5p	Perception of different behaviour on the HR	Y/ F				
x.9	Aversion to drink and drive	5p	Perception of increased confidence on the HR	Y/ F				
x.10	Use of protection systems	5p						
x.11	Driving pleasure	5p						

Note: *A = Answer type legend; F = Field to be freely filled; # = Field to be freely filled with a number; 5p = Answer to be chosen among five possible answers, which can be ordered according to a 5-points scale; Y = Yes/No answer, Y/F = Combination of Yes/No answer and a field to be freely filled to further explain the answer; T = Specific template to be filled.

2.3 Procedure

Questionnaires were spread to respondents in two subsequent stages in both Italy and Norway, as previously anticipated. In the first stage, started in 2017, questionnaires were spread among students of university classes. First results obtained from this preliminary stage are described in Intini *et al.* (2020), in which some analyses, mainly qualitative, were conducted. These preliminary analyses were useful to successfully proof the questionnaire effectiveness, comprehension and explanatory power. In the second stage, questionnaires were spread among other university classes and social networks (Italy) and by interviewing people in university common spaces (Norway), between 2018 and early 2019.

Due to the international nature of the study, the questionnaire was developed in English. However, it was coherently translated into Italian and Norwegian (Bokmål) for increasing its comprehension in the two countries.

Data cleaning was necessary before proceeding to analysing results. In the second stage of data collection, respondents were also reached outside university classes. Hence, an age threshold (35 years old) was fixed to ensure the sample coherence with first stage answers. This is because crash involvements (besides of driving behaviour) could change with age (Massie *et al.* 1995), and then results could have been altered. For the same reason, novice drivers (holding a driving license since < 2 years) were excluded as well, to avoid the lack of experience altering answers regarding familiarity. Other reasons for discharging data were due to significant missing information and/or clearly illogical and inconsistent data. After data cleaning, the final dataset is composed of 316 surveys (about 87% of the initial dataset): 235 Italian 'I' surveys, 71 Norwegian 'N' surveys.

2.4 Data analysis

A preliminary data analysis stage has consisted of providing descriptive statistics for the collected data and in trying to describe the main characteristics of the self-reported habitual routes and behavioural changes. In a second stage, specific data analysis techniques were selected. In detail:

- Scores obtained through questions 1.5–1.8 for the reported behaviour on generic routes were compared with those obtained through questions 2.4–2.7 (Table 1) related to the same behavioural tendencies on habitual routes. This was aimed at revealing possible behavioural differences on familiar routes based on surveys. Hence, reported scores related to driving ability (question Q 1.5), respect of road rules (Q 1.6), aggressive driving tendency (Q 1.7), and high-speed tendency (Q 1.8) on generic routes were compared with the corresponding scores on habitual routes (Q 2.4–2.7) through pairwise statistical tests. In order to allow comparisons, each score was converted into a 5-points scale (1–5). In all cases, the score 1 was associated to the worst behaviour in terms of road safety (i.e. awful driving ability, very rare abidance to road rules, very aggressive behaviour, very frequent high-speed driving), while the score 5 was associated to the safest behaviour (i.e. outstanding driving ability, very frequent abidance to road rules, very prudent behaviour, very rare high-speed driving). Moreover, given that the frequency distribution of the four scores in both country samples was not normally distributed (based on Shapiro-Wilk tests, 5% significance level), non-parametric tests were selected for pairwise comparisons. The Wilcoxon signed-rank test was used since the four pairs of scores were measured on the same drivers.
- Familiarity-related variables and other personal variables (i.e. age, gender, other driving tendencies) were used to predict the likelihood of being involved in crashes or fined on habitual routes (answers in sections 3–4 of the questionnaire), or to report a different behaviour on them. This was aimed at finding relationships between self-reported familiarity and (*1*) negative safety outcomes (crashes and fines), (*2*) self-reported different behaviours, while controlling for personal variables. For this aim, logistic regressions were separately performed on both the Italian and Norwegian datasets. In each model, personal and familiarity-related variables were set as predictors and a Yes/No response variable based on:
    a. Having reported at least one crash or fine on frequently travelled routes or not. The response variable 'Negative outcome on habitual routes', assuming value 1 if the driver was involved in at least one crash or fine in the last 2 years on frequently travelled roads ('habitual routes'), 0 otherwise (response variable obtained by combining

information on the reported crashes or fines in the last 2 years and the type of roads travelled).

b. Reporting a different behaviour on the habitual route or not (based on the Yes/No answer to the direct question identified as item 2.8 in Table 1). Hence, in this second model, the different behaviour refers to the specific habitual route described by respondents, while in the first model habitual routes are generally intended as the frequently travelled roads.

Most predictors were taken from the questionnaire without transformations: gender, years of driving license, average days a week driving on generic routes, like to drive score, percentage of habitual route on urban roads, percentage of habitual route on main roads, different behaviour on the habitual route, different confidence on the habitual route. The other variables listed in the following were used after transformations instead:

- Total score: good driver. It was obtained as the sum of scores reported for generic routes to the questions on driving ability, abidance to road rules, driving tendency (aggressiveness), high-speed driving, drinking and driving and use of protection systems. The higher this score, the more the driver is supposed to be a 'good driver'. The maximum score is 30. Mean scores obtained were similar: 19.12 (st. dev. 2.98) for Italy, 19.79 (st. dev. 1.74) for Norway. In fact, Norwegian drivers report lower scores than Italian ones for aggressive tendencies but higher scores for respect of rules (including protection systems). Variables were grouped together to avoid direct correlations with other variables for habitual/generic routes score differences.
- Ratio: average days a week reported on the habitual route to average days a week reported on the generic routes.
- Differences in the scores (habitual routes – generic routes). Four variables were computed, one for each self-reported score: driving ability, abidance to road rules, driving tendency, high-speed driving. However, only significant differences were considered for each model (i.e. driving ability for Italian models, all score differences for Norwegian models), which will be specifically presented in the following section 3.2.
- Other variables were not considered in the models for avoiding collinearity. These are: age (related with years of driving license), habitual route length (other habitual route variables were already considered), hours a week on the generic/habitual routes (days a week were already considered and some inconsistent data about reported days were noted). Information about congestion was discharged due to several missing data in the Italian dataset.

Given the singular nature of this study, there were no similar studies in previous research which could have been used to guide the manual selection of predictors to be included in the final models. Hence, after having run each full model, a stepwise selection of variables was performed in R environment (MASS library, see Venables & Ripley (2002)). Results from the stepwise model were compared to the corresponding complete and null models, to assess improvements in the fit, through likelihood ratio tests. The Akaike Information Criterion (AIC) was used to comparatively assess different models. The Nagelkerke R^2 (range: 0–1) was used as goodness-of-fit measure. Differences with respect to the full model were taken into account, where appropriate.

Based on the coefficient estimates obtained, Odds Ratios (OR) can be computed by exponentiating the coefficients. ORs are used for interpretation of results: for a one-unit increase in the predictor variable, the likelihood of predicting the response 1 over the response 0 is predicted as based on the OR (increasing likelihood of the modality 1 for positive coefficients and vice versa, with different effects based on the coefficients).

Familiarity-related, personal and the crashes/fines variable were used to predict the likelihood of being an Italian or Norwegian respondent. This was aimed at understanding if some patterns highlighted through previous analyses can depend on the different context. For this aim, country datasets were merged. Logistic regression was again used by having the same personal and familiarity-related variables considered for the previous logit models as predictors, together with the additional predictors 'Negative outcomes' (Yes/No, based on the experienced crashes and fines) and 'Different Behaviour' (Yes/No) variables, previously considered as response variables. The response variable is a Yes/No variable based on belonging to the Norwegian dataset or not (i.e. Italian otherwise).

3 Results

Results from the analyses conducted are shown here, by dividing their presentation according to the study steps.

3.1 Descriptive analysis

Descriptive statistics were firstly computed and reported in Table 2. Note that descriptive statistics are related to all questions for which a score can be obtained or derived (e.g. by converting a qualitative judgement scale into a n-points scale). These statistics provide a general portrait of the average Italian and Norwegian 'driver profile' in the samples.

The average Italian interviewed young driver uses the car very often during the week, for almost one hour/day on average, mostly on urban roads. The Italian average habitual route is mainly urban, about 25 km long, often congested. In most cases, no different behaviours, but a greater confidence are reported on the habitual route with respect to generic routes. Almost 20% of Italian drivers were involved in at least one crash as a car driver in the previous 2 years, mostly on frequently travelled routes, typically urban roads, rear-end or angle, at intersections. More than 30% of Italian drivers were fined in the previous 2 years, mostly on frequently travelled routes, typically urban, for illegal parking/speeding.

Whereas the average Norwegian interviewed young driver uses the car less often during the week, for few hours a week on average, on both urban and rural roads. The Norwegian average habitual route can be urban or rural, about 16 km long, mostly free flowing. About half of Norwegian respondents report different behaviours on the habitual route with respect to the generic routes, and about 75% of them a greater confidence as well. Very few drivers were involved in crashes and fines in the previous 2 years.

The most frequent reported reasons of different behaviours on the habitual routes were linked to similar clusters of answers in both cases: speed changes/aberrant behaviours or the increased route knowledge/familiarity. Those reasons account together for more than half of total answers. In the case of the reported different confidence, there is an obvious connection with the knowledge/familiarity with the route. In fact, about 60% of drivers (both Italian and Norwegian) explain the greater perceived confidence with a greater route knowledge/familiarity. Another common explanation for both countries is the knowledge of possible dangers (more frequent for Norway). Moreover, habitude is associated to greater confidence by the 15% of Italian drivers.

3.2 Comparison of scores between generic and habitual routes

Results from the comparison of scores between generic and habitual routes revealed that, in the Italian case, a significant difference was only highlighted for the increased ability as a car driver

on the habitual route with respect to generic routes ($V = 632.5$, $p < 0.001$, mean habitual score – mean generic score = 0.19).

Table 2 **Descriptive statistics of results from surveys (related to the samples of data after cleaning procedures: $N_{Italy} = 235$, $N_{Norway} = 71$)**

Item	Questions	Italy	Norway
		Mean (St. dev.) or Percentages[1]	Mean (St. dev.) or Percentages[1]
1.1	Age	24.45 years (2.66 years)	21.73 years (1.72 years)
1.2	Gender	70.21% (males) 29.79% (females)	73.24% (males) 26.76% (females)
1.3	Years of driving license	6.09 years (2.66 years)	3.70 years (1.66 years)
1.4	Time spent driving		
1.4.1	Days a week	4.42 days (1.99 days)	2.43 days (1.79 days)
1.4.2	Hours for each week	5.81 hours (8.65 hours)	2.18 hours (2.32 hours)
1.4.3	% on roads	64.6% (urban) 35.4% (rural)	51.18% (urban) 48.82% (rural)
1.5	Ability as car driver	4.03 (0.76)	3.99 (0.82)
1.6	Abiding to road rules	3.97 (0.77)	4.14 (0.54)
1.7	Driving tendency	3.44 (0.89)	3.00 (0.77)
1.8	High-speed driving	3.20 (0.91)	2.65 (0.94)
1.9	Drinking and driving	4.46 (0.84)	5.00 (0.00)
1.10	Protection systems use	4.06 (1.12)	5.00 (0.00)
1.11	Driving pleasure	3.87 (0.96)	4.01 (0.67)
2.2	Habitual route length	25.14 km (30.68 km)	16.49 km (16.26 km)
2.3	Time spent driving (HR)		
2.3.1	Days a week	3.28 days (1.78 days)	2.02 days (1.62 days)
2.3.2	Hours for each week	3.38 hours (6.93 hours)	1.39 hours (1.62 hours)
2.3.3	% on roads[2]	45.34% (Rural) 54.66% (Urban)	54.22% (Rural) 45.78% (Urban)
2.3.4	% on roads	42.61% (congested) 57.39% (free)	12.61% (congested) 87.39% (free)
2.4	Ability as car driver	4.22 (0.68)	4.37 (0.64)
2.5	Abiding to road rules	3.93 (0.86)	4.00 (0.53)
2.6	Driving tendency	3.44 (0.93)	2.79 (0.72)
2.7	High-speed driving	3.20 (1.03)	2.86 (1.05)
2.8.1	Different behaviour	37.02% (yes) 62.98% (no)	50.70% (yes) 49.30% (no)
2.8.2	Main differences[2,3]	Speed or aberrant behaviour (32.05%) Increased knowledge or familiarity (23.08%) Other (44.87%)	Speed or aberrant behaviour (44.12%) Increased knowledge or familiarity (23.53%) Other (32.35%)
2.9.1	Different confidence	58.30% (yes) 41.28% (no)	73.24% (yes) 25.35% (no)

Table 2 (*cont*.)

2.9.2	Main reasons[2,3]	Route knowledge/familiarity (61.54%) Habitude (14.53%) Other (23.93%)	Route knowledge/familiarity (56.25%) Dangers knowledge (27.08%) Other (16.67%)
3.1	Crash Involvement	19.15% (yes), 80.85% (no)	4.23% (yes), 95.77% (no)
3.2	Number of crashes	51 (to 45 persons)	4 (to 4 persons)
	Type[3]	Rear-end (46.00%) Lateral/Angle (36.00%) Other (18.00%)	Lateral/Angle (50.00%) Run-off (25.00%) Other (25.00%)
	Injuries	Yes (12.00%) No (88.00%)	Yes (25.00%) No (75.00%)
	Road Type[3]	Urban (80.00%) Rural (20.00%)	Urban (75.00%) Rural (25.00%)
	Section Type[3]	Intersection (46.00%) Straight (34.00%) Other (20.00%)	Intersection (50.00%) Curve (25.00%) Other (25.00%)
	Familiarity	Frequently travelled road (76.00%) Rarely travelled (14.00%) Never travelled (10.00%)	Frequently travelled road (75.00%) Rarely travelled (25.00%)
4.1	Involvement in fines	31.49% (yes) 68.51% (no)	9.86% (yes) 90.14% (no)
4.2	Number of fines	118 (to 74 persons)	7 (to 7 persons)
	Type[3]	Illegal parking (50.54%) Speeding (18.28%) Other (31.18%)	Illegal parking (50.00%) Speeding (50.00%)
	Road Type[3]	Urban (79.80%) Rural (20.20%)	Urban (33.33%) Rural (66.67%)
	Familiarity	Frequently travelled road (64.89%) Rarely travelled (22.34%) Never travelled (12.77%)	Frequently travelled road (66.67%) Rarely travelled (33.33%) Never travelled (33.33%)

[1] Descriptive statistics are computed for each variable as based on valid data (i.e. excluding missing values).

[2] In these cases, fields could have been freely filled. Hence, different answers were firstly clustered into some recurrent general concepts, and then percentages were computed.

[3] Aggregated percentages. Detailed answers are provided in the appendix.

Whereas Norwegian drivers report significant different scores for all the questions inquired. They report on average greater driving ability ($V = 42.0$, $p < 0.001$, mean habitual score – mean generic score = 0.38), less abidance to road rules ($V = 119.0$, $p = 0.027$, mean habitual score – mean generic score = -0.14), less prudent driving behaviour ($V = 266.0$, $p = 0.012$, mean habitual score – mean generic score = -0.21) and less high-speed driving ($V = 105.0$, $p = 0.032$, mean habitual score – mean generic score = 0.21) on the habitual route.

3.3 Relations between personal/familiarity predictors, negative outcomes, different behaviours

Results from the logistic regression models are shown in Table 3. Predictors which have resulted to be significantly associated to negative outcomes (at least with $p < 0.10$) on habitual

routes are: gender (male, Italian case 'I'), days a week on generic routes (with days increasing, increasing negative outcomes likelihood, both 'I' and 'N'), percentage of habitual route on main roads (with percentages increasing, decreasing negative outcomes likelihood, 'I'), different driving tendencies scores on habitual routes (with score increasing towards less aggressive tendencies, increasing negative outcomes likelihood, 'N'), greater confidence (associated to increasing/decreasing negative outcomes likelihood, 'I/N').

Table 3 **Results from the different logistic regressions performed**

Italian model – response variable: Negative outcome on HR (at least one crash or fine reported in the last 2 years on frequently travelled routes, Yes=1: 58 cases, No = 0: 177 cases)				
Variables	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	-3.410	0.724	-4.712	<0.001
Gender (Male=1)	*0.747*	*0.419*	*1.781*	*0.075*
Average days a week on the GR	**0.440**	**0.100**	**4.408**	**<0.001**
% of HR on main roads	**-0.012**	**0.006**	**-1.976**	**0.048**
Different confidence on the HR (Yes=1)	*0.578*	*0.347*	*1.664*	*0.096*
Goodness-of-fit tests/measures				
AIC	232.02			
R^2-Nagelkerke	0.207			
Likelihood ratio test (reference: null model)	Deviance = 34.403 (df = 4), p < 0.001			
Italian model – response variable: Different behaviour on the HR (Yes=1: 87 cases, No = 0: 148 cases)				
Variables	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	2.302	0.985	2.337	0.019
Total score: Good driver	**-0.212**	**0.053**	**-3.948**	**< 0.001**
Different confidence on the HR (Yes=1)	**1.839**	**0.347**	**5.307**	**< 0.001**
Goodness-of-fit tests/measures				
AIC	261.42			
R^2-Nagelkerke	0.243			
Likelihood ratio test (reference: null model)	Deviance = 44.68 (df = 2), p < 0.001			
Norwegian model – response variable: Negative outcome on HR (at least one crash or fine reported in the last 2 years on frequently travelled routes, Yes=1: 7 cases, No = 0: 64 cases)				
Variables	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	-5.558	2.883	-1.928	0.054
Average days a week on the GR	**0.492**	**0.230**	**2.133**	**0.033**
Ratio: average days a week (HR)/average days a week (GR)	0.034	0.028	1.246	0.213
Difference in the driving tendency score: HR - GR	*1.385*	*0.778*	*1.779*	*0.075*
Different confidence on the HR (Yes=1)	**-1.887**	**0.952**	**-1.982**	**0.048**
Goodness-of-fit tests/measures				
AIC	43.135			
R^2-Nagelkerke	0.336			
Likelihood ratio test (reference: null model)	Deviance = 12.165 (df = 4), p = 0.016			

Table 3 (*cont*.)

Norwegian model – response variable: Different behaviour on the HR (Yes=1: 36 cases, No = 0: 35 cases)				
Variables	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	14.973	4.657	3.215	0.001
Years of driving license	**-0.700**	**0.242**	**-2.895**	**0.004**
Total score: Good driver	**-0.601**	**0.210**	**-2.868**	**0.004**
% of HR on urban roads	*-0.015*	*0.008*	*-1.757*	*0.079*
Difference in the abidance to road rules score: HR – GR°°	*-1.337*	*0.690*	*-1.937*	*0.053*
Goodness-of-fit tests/measures				
AIC	84.281			
R^2-Nagelkerke	0.354			
Likelihood ratio test (reference: null model)	Deviance = 21.242 (df = 4), $p < 0.001$			

Note: GR = generic route, HR = habitual route/s. Predictors statistically significant at the 5% significance level in bold type, significant at the 10% significance level in italics.

Predictors which have resulted to be significantly associated to behavioural changes (at least with $p < 0.10$) on habitual routes are: good driver score (with score increasing, decreasing reported changes likelihood, both 'I' and 'N'), greater confidence (associated to increasing reported changes likelihood, 'I'), years of driving license (associated to increasing reported changes likelihood, 'N'), percentage of the habitual route on urban roads (with percentage increasing, decreasing reported changes likelihood, 'N'), difference in the abidance to rules score (with difference increasing, decreasing reported changes likelihood, 'N').

3.4 Variability of results within different countries

Results from the further logistic regression model performed, interpreted as made in the previous section, are reported in Table 4.

Predictors which have resulted in significantly predicting an increased likelihood of being Norwegian 'N' with respect to Italian 'I' in the samples are: gender (being male), like to drive score, good driver score, urban percentage of the habitual route, difference in the high-speed score, different behaviour on the habitual route (yes). On the other hand, predictors which have resulted in significantly predicting a decreased likelihood of being Norwegian 'N' are: years of driving license, days a week on generic routes, difference in the driving tendency score, different confidence on the habitual route (yes).

4 Discussion

Results presented in the previous section are here discussed, by differentiating the discussion into the three analysis steps: (*a*) comparison of scores between generic and habitual routes; (*b*) relationships between personal and familiarity-related predictors, negative outcomes (crashes and fines) and different behaviours on the habitual routes; (*c*) variability of results within the different countries considered (Italy and Norway).

4.1 Comparison of scores between generic and habitual routes

Results from the comparison of scores between generic and habitual routes reveal two different tendencies among countries.

Table 4 **Results from logistic regression for predicting nationality on the combined dataset**

Combined model – response variable: Nationality (ITA = 0, NOR = 1)				
Variables	**Estimate**	**Std. Error**	**z value**	**p-value**
(Intercept)	-3.426	2.444	-1.402	0.161
Gender (Male=1)	**1.078**	**0.479**	**2.252**	**0.024**
Years of driving license	**-0.642**	**0.121**	**-5.282**	**< 0.001**
Average days a week on the GR	**-0.580**	**0.123**	**-4.705**	**< 0.001**
Score: Like to drive	**0.679**	**0.265**	**2.565**	**0.010**
Total score: Good driver	**0.186**	**0.095**	**1.971**	**0.049**
% of HR on urban roads	**-0.017**	**0.006**	**-2.643**	**0.008**
Difference in the driving tendency score: HR - GR	**-0.757**	**0.315**	**-2.405**	**0.016**
Difference in the high-speed driving score: HR - GR	**1.034**	**0.299**	**3.456**	**0.001**
Different behaviour on the HR (Yes=1)	**2.194**	**0.449**	**4.884**	**< 0.001**
Different confidence on the HR (Yes=1)	**-0.900**	**0.431**	**-2.086**	**0.037**
Goodness-of-fit tests/measures				
AIC	187.65			
R^2-Nagelkerke	0.618			
Likelihood ratio test (reference: null model)	Deviance = 156.34 (df = 10), p < 0.001			

Note: GR = generic route, HR = habitual route/s. Predictors statistically significant at the 5% significance level in bold type, significant at the 10% significance level in italics.

Most Italian drivers do not report any behavioural difference on the habitual route with respect to generic routes, while they mostly report a different confidence. This is confirmed by the score differences: Italian drivers report on average only a significant greater driving ability score on the habitual route. They do not feel to being more aggressive/prudent, to being more/less prone to respect road rules, to being more/less prone to high-speed driving. However, Italian habitual routes are mostly urban (often congested), and this may prevent reporting behavioural changes, since degrees of freedom in driving are limited on urban congested roads. Hence, it seems that they are aware of the increased route knowledge, but that this does not result in any perceived driving behavioural change.

Half of Norwegian drivers report behavioural differences on the habitual route with respect to generic routes, and most of them report a different confidence. This is confirmed by the score differences: Norwegian drivers report on average significant different scores in the habitual condition. They feel an increased driving ability, a reduced respect for road rules, an increased aggressiveness on the habitual route. Hence, in the Norwegian case, the increased route knowledge and confidence seem to lead to typical familiarity side-effects, such as more aggressive behaviours (Colonna *et al.* 2016; Rosenbloom *et al.* 2007). However, they also report a reduced high-speed driving tendency. Norwegian habitual routes are often rural, and drivers use the 'knowledge of possible dangers' as the second reason after familiarity to explain a greater confidence with the habitual route. Hence, some Norwegian drivers may associate the idea of knowing possible dangers to knowing where speeds cannot be high on the habitual routes (also probably because of speed control), thus leading to a reported lower high-speed tendency. Nevertheless, Norwegian drivers seem aware of the increased habitual route knowledge and confidence, and they coherently perceive behavioural changes.

4.2 Relations between personal/familiarity predictors, negative outcomes, different behaviours

Results from the logistic regression having negative outcomes (crashes and fines) and different behaviours as response variables can be interpreted from different perspectives.

In models for negative outcomes, the average number of days per week is a significant predictor of negative outcomes (crashes and fines). This can be clearly explained since the number of travelling days per week by car can be considered as an 'exposure' measure. The more the exposure, the more is the risk of being involved in crashes (Høye & Hesjevoll 2020) or fines (Davey *et al.* 2007) on roads frequently travelled, and this effect can be found in both datasets. Negative outcomes relate in this case to frequently travelled roads. However, since the reported habitual route accounts for a significant share of the total travelling hours per week, then the generic routes exposure measure is intrinsically referred to habitual routes as well.

Only in the Italian case, being male can be statistically associated to an increased likelihood of being involved in crashes and fines. An over-involvement of male drivers in traffic violations was also noted in other studies, such as by González-Iglesias *et al.* (2012). Gender differences were also highlighted especially for very young/old drivers: young male drivers were shown as riskier than female (e.g. with respect to fatal crash rates, see (Massie *et al.* 1995)). This tendency was retrieved only in the Italian sample, as well as the result concerning the percentage of the habitual route on main roads. In this latter case, an increase in this percentage can help in preventing crashes and fines, possibly due to the intrinsic increased safety on main roads rather than on secondary roads. Note also that the Italian main roads travelled during the habitual routes are more frequently urban than in the Norwegian case, and that the Norwegian sample is limited.

A greater declared confidence with the habitual route is differently related to crashes and fines in the two datasets. In the Italian dataset, a higher declared confidence with the habitual route is related to an increase in crashes and fines, while the opposite occurs for the Norwegian dataset (OR is even stronger). This is important for the aims of this study. On one hand, Italian drivers who perceive and report a greater confidence on the habitual route (even not perceiving significant driving behavioural changes) tend also to report at least one crash or fine on frequently travelled routes. This means that an increased self-confidence could lead Italian drivers to more dangerous/aberrant behaviours, associated to crashes and fines, of which however they seem not completely aware. Whereas, Norwegian drivers who report a greater confidence on the habitual route (perceiving also significant behavioural changes) tend to not report crashes/fines. Coupling this result with the decreased high-speed tendencies, it seems that young Norwegian drivers seem more aware of their behavioural change, and that this knowledge is used in a positive way (i.e. being more prudent where needed). This could be partly explained by the innovative Norwegian driving learning program divided into several steps, in which students shall decide (in discussion with teachers) when proceeding to next steps. By this procedure, the student learns to reflect on his own driving performance, capabilities, and weaknesses. However, Norwegian drivers also report an increased aggressiveness and less respect of road rules on the habitual route. This can be explained in two ways: 1) this self-perception is altered or anyway not confirmed by negative outcomes (crashes and fines), 2) they could be generally more aggressive, but their reported 'knowledge of dangers' could be used in a positive way if needed. However, note that the Norwegian model for negative outcomes is severely unbalanced (only 7 crashes and fines out of 71 cases), and this could have influenced results.

The increase in the 'good driver' score, obtained as a sum of scores (answers Q 1.5–1.10) negatively affects reporting a different behaviour on the habitual route in both the Italian and

Norwegian models. Hence, drivers who perceive themselves as good drivers (with high scores of driving ability, respect of rules, low high-speed driving, etc.) tend also to less perceive behavioural changes on habitual routes. Since these changes are often associated by the drivers themselves to more dangerous/aberrant behaviours, then it seems that 'good drivers' report less changes associated with dangerous behaviours than other drivers. However, the good driver score has not resulted as a significant predictor of negative outcomes (i.e. relationship good driver score increasing – no crashes and fines not found). Hence, the 'good driver' self-perception not associated to behavioural changes is not supported by objectively measurable negative outcomes such as crashes and fines: it can be related to an 'optimism' bias in assessing the own driving abilities (DeJoy 1989).

A greater declared confidence is also strongly associated with a different behaviour on the habitual route in the Italian case. Hence, there is a clear perceived relationship between feeling more confident and feeling to behave differently on the habitual route for Italian drivers. This is not valid in the Norwegian case, for which this variable is not a statistically significant predictor of different behaviour. This means that in the Norwegian case, it seems that a direct association between perceived confidence and different behaviours on the habitual routes is not evident. Hence, as already discussed for the negative outcomes, the concept of 'confidence' can be differently perceived than in the Italian case, and it could have positive implications. Furthermore, it was also noted that Norwegian habitual routes can be significantly different than Italian habitual routes, thus influencing results.

In the Norwegian case, as the years of driving license increase, the likelihood of reporting a different behaviour on the habitual route decreases. Note that the sample of Norwegian drivers is slightly younger than the Italian sample. As a result of the model, very young drivers (being licensed for few years) could easily report a different behaviour on habitual routes. However, in this case, familiarity effects could merge with 'experience' effects. This means that, even if novice drivers were excluded (less than 2 years of driving license), drivers being licensed for few years could still be in their driving 'learning' phase in some occasions, which can be confused with behavioural changes due to the route familiarity.

In the Norwegian case, as the percentage of the habitual route lying on urban roads increases, the likelihood of reporting a different behaviour decreases. This was previously explained by the fact that urban environments could prevent different driving behaviours, due to the huge number of constraints and interactions (see Manley *et al.* (2014)), more than on rural roads. This condition could then also lead to not perceiving behavioural changes.

4.3 Variability of results within different countries

Most of the results obtained are intrinsically varying between countries as already discussed. A more precise portrait of country differences emerges by looking at Table 4.

There are some variables which can significantly predict the likelihood of being in the Italian/Norwegian sample which are clearly only dependent on the sample itself. In fact, male drivers are significantly higher in the Norwegian than in the Italian sample, while years of driving license, average days a week and urban percentage of the habitual route are significantly lower. However, these variables were included since they can explain part of the variability and thus the effects of the other variables is revealed by taking into account their influence.

There also other variables which are confirmed as significant in observing differences between Italian and Norwegian sample drivers. An increase in the score of driving pleasure (Q 1.11) can increase the likelihood of being in the Norwegian sample. Norwegian data depict the typical commuting driver aged 35–55 (Hjorthol *et al.* 2014), that is older than all the surveyed Norwegian drivers. Young Norwegian drivers who prefer the car to other means of transport (i.e.

bicycle, buses) may choose it because of great driving pleasure, thus resulting in higher scores than Italian drivers. An increase in the good driver score can increase the likelihood of being in the Norwegian sample. Norwegian drivers may have a stronger self-perception of themselves as good drivers or they may actually be more respectful, less aggressive drivers. Note that all Norwegian drivers have stated to frequently use protection systems and to never drink before driving. These positive driving behaviours are reflected in generally better Norwegian than Italian road safety performances, as reported in the introductory section. A positive difference in driving tendency scores between the habitual and generic routes (that is a one unit increase towards more prudent behaviours) can decrease the likelihood of being in the Norwegian sample. It was indeed previously shown how the Norwegian drivers tend to report more aggressive behaviours on habitual routes, with respect to Italian drivers. This is confirmed as a different tendency between countries, after controlling for several other variables. The same is true for the decrease in the high-speed tendency on habitual routes. A one unit increase in the high-speed score (towards less speeding) can increase the likelihood of being in the Norwegian sample, as previously highlighted after the initial score comparisons. Hence, also this difference between countries is confirmed.

Feeling a different behaviour on the habitual route with respect to generic routes can strongly increase the likelihood of being in the Norwegian sample (coefficient estimate: 2.182, OR = 8.864). This was already highlighted in the logistic regression models run with response variable: different behaviour. It is confirmed as a strong significant difference between countries. As expected, the opposite occurs for the different confidence (negative coefficient estimate: -0.888, OR = 0.411), which leads to a decreased likelihood of being in the Norwegian sample.

Among the variables which cannot be significantly associated to the increased likelihood of being in one nationality sample, it is worth to mention the negative outcomes (crashes and fines). Having been involved in at least one crash or fine in the previous two years cannot significantly be associated to an increased/decreased likelihood of being in the Norwegian sample. Hence, even if Italian drivers report more crashes/fines on frequently travelled routes, the difference is not significant.

5 Conclusions

This study has used surveys to reveal relationships between drivers' familiarity and road safety performances in Italy and Norway. The main research questions were related to: (*a*) detecting significant behavioural changes or negative outcomes in relation to drivers' familiarity based on surveys, (*b*) determine relationships between drivers' route familiarity, declared different behaviours and negative outcomes (crashes/fines), (*c*) explore the geographic variability of results.

Surveys have revealed to be helpful in identifying significant relationships between familiarity and safety/behavioural performances, even based on relatively small datasets. It was possible to observe significantly different declared behaviours on highly familiar routes. Whereas it is difficult to reach several drivers having been involved in crashes/fines when randomly interviewing drivers. These percentages were low in the samples (especially crashes). Percentages are even reduced if crashes/fines in the last two years are referred to frequently travelled routes only. However, significant results were obtained for negative outcomes (crashes and fines) as well.

Drivers may perceive different behaviours on the habitual routes with respect to generic routes. This has resulted from both pairwise comparisons and logistic regressions. In particular, they perceive a higher driving ability on the habitual route, regardless of the country. The drivers'

self-perception as 'good drivers' (in terms of driving ability, rules respect, rare high-speed driving, etc.) is related to reporting less behavioural changes on habitual routes (i.e. less dangerous/aberrant behaviours). However, it was not possible to relate this tendency with less crashes and fines. Hence, the self-perception of being 'good drivers' may not be necessarily linked to good safety performances. Moreover, there are several other variables for which interesting relationships have arisen, for which however differences were noted within countries.

Among country differences, the following results are remarkable: having declared a higher confidence with the habitual route is related to an increase (Italy)/decrease (Norway) in having reported crashes and fines on frequently travelled routes. The higher confidence is also strongly associated with a different reported behaviour on the habitual route. Hence, a higher 'confidence' can be differently perceived: in the Norwegian case it could have positive implications, by preventing crashes and fines, while in the Italian case not. However, Italian and Norwegian habitual routes are notably different and this may have influenced results.

Previous research has shown that the driver behaviour can significantly change with route familiarity and that this may influence safety performances. In this study, it was highlighted that drivers are often not aware of behavioural changes on familiar routes, while they generally feel more confident on them (especially Norwegian drivers). Hence, as a general practical consequence, more emphasis should be given during driver education and training on possible problems caused by route familiarity. The switch to a familiarity condition is often unconscious and then train drivers on possible familiarity-related problems for their everyday driving could potentially have positive effects.

Those results encourage using surveys for relating drivers' familiarity with road safety. However, clearly, this international study is based on a relatively small dataset. Only young drivers (mainly students) were sampled. Moreover, the two samples are unbalanced, due to some difficulties in replicating the same Italian sample size in Norway. In particular, this has affected the crashes reported by Norwegian drivers, which are significantly low. These limitations could be overcome by searching for similar relationships on greater datasets, possibly considering other variables almost blocked in this study (e.g. income or age, by extending the study to drivers of different ages). However, even based on relatively small samples, both significant relationships between familiarity and other variables and differences between countries were noted. This may either be explained by unstable familiarity-safety relationships found from surveys or by the influence of cultural differences. Hence, further studies are needed to confirm the general trends found and/or enlarge results to other contexts, to better assess if local conditions are influential on reporting driving familiarity effects, as found here.

CRediT contribution statement

Paolo Intini: Conceptualization, Data curation, Investigation, Methodology, Software, Visualization, Writing—original draft, Writing—review & editing. **Nicola Berloco**: Methodology, Visualization, Writing—original draft, Writing—review & editing. **Pasquale Colonna**: Methodology, Writing—original draft, Writing—review & editing. **Damiano De Gennaro**: Data curation, Investigation, Software, Visualization, Writing—original draft, Writing—review & editing. **Vittorio Ranieri**: Methodology, Writing—original draft, Writing—review & editing. **Eirin Ryeng**: Conceptualization, Methodology, Writing—original draft, Writing—review & editing.

Declaration of competing interests

The authors have no interests to declare.

Data availability

The data are available upon reasonable request to the authors.

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Submitted questionnaire

Item	Question	Field 1	Field 2	Field 3	Field 4	Field 5	Footnotes provided
#1	**General information**						
1.1	Age	Field to be freely filled with years					
1.2	Gender	M	F				
1.3	Years of Driving License	Field to be freely filled with years					
1.4	In an average week of the last two years, how much time have you dedicated on average to driving a car?	(No fields, refer to specific questions below)					
1.4.1	Average number of days a week	Field to be freely filled with days					
1.4.2	More precisely, for each week	Hours	Minutes				
1.4.3	Divide this time into percentages on roads	Urban	Rural				The sum of the two percentages should be 100 %
1.5	Assess your ability as a car driver	Awful (1)	Bad (2)	Average (3)	Good (4)	Outstanding (5)	
1.6	Assess your usual tendency to abide to road rules, in normal conditions	Awful (1)	Bad (2)	Average (3)	Good (4)	Outstanding (5)	
1.7	Assess your average driving tendency, in normal conditions	Very Aggressive (1)	Aggressive (2)	Average (3)	Prudent (4)	Very Prudent (5)	Driving tendency relates to speed, acceleration, braking, headways, curves
1.8	Which is the frequency of your high-speed driving?	Very Frequent (1)	Frequent (2)	Average (3)	Rare (4)	Very Rare (5)	
1.9	Which is the frequency of your drinking and driving attitude?	Very Frequent (1)	Frequent (2)	Average (3)	Rare (4)	Very Rare (5)	
1.10	Which is the frequency of your protection systems use?	Very Frequent (5)	Frequent (4)	Average (3)	Rare (2)	Very Rare (1)	
1.11	Do you like to drive?	I love driving (5)	Yes (4)	Indifferent (3)	No (2)	I hate driving (1)	

(*cont*.)

#2	**Habitual route**						
2.1.1	The route is from	Field to be conditionally filled (see footnote)					Provide name of general (not specific) places, such as town, cities
2.2.2	The route is to	Field to be conditionally filled (see footnote)					Provide name of general (not specific) places, such as town, cities
2.2	Length	Field to be freely filled with km					This should be an estimate of the one-way travel
2.3	In an average week of the last two years, how much time have you dedicated on average to driving a car on this route?	(No fields, refer to specific questions below)					
2.3.1	Average number of days a week	Field to be freely filled with days					
2.3.2	More precisely, for each week	Hours	Minutes				
2.3.3	Divide this time into % on roads	Main Rural	Secondary Rural	Main Urban	Secondary Urban		The sum of the four percentages should be 100 %
2.3.4	Divide this time into % on roads	Congested	Uncongested				The sum of the two percentages should be 100 %
2.4	Assess your ability as car driver on this route	Awful (1)	Bad (2)	Average (3)	Good (4)	Outstanding (5)	
2.5	Assess your usual tendency to abide to road rules on this route, in normal conditions	Awful (1)	Bad (2)	Average (3)	Good (4)	Outstanding (5)	
2.6	Assess your average driving tendency on this route, in normal conditions	Very Aggressive (1)	Aggressive (2)	Average (3)	Prudent (4)	Very Prudent (5)	Driving tendency relates to speed, acceleration, braking, headways, curves
2.7	Which is the frequency of your high-speed driving on this route?	Very Frequent (1)	Frequent (2)	Average (3)	Rare (4)	Very Rare (5)	
2.8.1	Do you think you behave differently on this route, with respect to other routes?	Yes	No				
2.8.2	If yes, which are the main differences?	Lines to be freely filled					
2.9.1	Do you feel more confident with this route, with respect to other routes?	Yes	No				
2.9.2	If yes, why?	Lines to be freely filled					

(*cont*.)

#3	**Crashes**			
3.1	Have you ever been involved in crashes as car driver in the last two years?	Yes	No	If the 'No' answer is provided, it is possible to skip the next question
3.2	How many crashes?	Field to be freely filled with number of crashes		The provided number should be independently reported from the potential fault in the crash causation
3T	Templates for crashes	For each crash, a template is provided for reporting the type of crash (run-off-road, head-on, rear-end, lateral, with pedestrians/cyclists, other), the consequence (injured or not), the road crash environment (main rural, secondary rural, main urban, secondary urban road), the crash section (tangent, curve, intersections, ramp, other), the familiarity with the crash place (road frequently travelled, rarely travelled or never travelled before), and a description of the dynamics and eventual fault (lines to be freely filled).		
#4	**Fines**			
4.1	Have you ever been fined as car driver in the last two years?	Yes	No	If the 'No' answer is provided, the questionnaire ends
4.2	How many fines?	Field to be freely filled with number of fines		
4T	Templates for fines	For each fine, a template is provided for reporting the type of fine (lines to be freely filled), the road environment (main rural, secondary rural, main urban, secondary urban road), the familiarity with the place of the fine (road frequently travelled, rarely travelled, never travelled before).		

Note: The number in brackets after each possible answer (e.g. awful-1, bad-2, average-3, good-4, outstanding-5) refers to how qualitative judgements are converted into numeric scores for further analyses. Numbers in brackets were not printed in the questionnaire submitted.

Detailed answers to questionnaire items regarding time spent driving on the habitual route, different reported behaviour and confidence, crashes and fines

Item	Questions	Italy	Norway
		Mean (St. dev.) or Percentages[1]	**Mean (St. dev.) or Percentages[1]**
Time spent driving (HR)			
2.3.3	% on roads	26.99% (main rural), 18.35% (secondary rural), 34.85% (main urban), 19.81% (secondary urban)	33.40% (main rural), 20.82% (secondary rural), 28.30% (main urban), 17.48% (secondary urban)
	Different behaviour		
2.8.2	Main differences	Speed or aberrant behaviour (32.05%), Increased knowledge or familiarity (23.08%), Traffic/local conditions (10.26%), Increased safety (10.26%), Other (24.36%)	Speed or aberrant behaviour (44.12%), Increased knowledge or familiarity (23.53%), Habitude, automation or less attention (8.82%), Increased prudence or calmness (8.82%), Other (14.71%)
Different confidence			
2.9.2	Main reasons	Route knowledge/familiarity (61.54%), Habitude (14.53%), Dangers knowledge (11.97%), Other (11.97%)	Route knowledge/familiarity (56.25%), Dangers knowledge (27.08%), Self-confidence/safety sensation (6.25%), Other (10.42%)
	Crashes		
3T	Type	Rear-end (46.00%), Lateral/Angle (36.00%), Run-off (8.00%), Other (10.00%)	Lateral/Angle (50.00%), Run-off (25.00%), Other (25.00%)
3T	Injuries	Yes (12.00%), No (88.00%)	Yes (25.00%), No (75.00%)
3T	Road Type	Local urban (52.00%), Main urban (28.00%), Local rural (16.00%), Main rural (4.00%)	Local urban (75.00%), Main rural (25.00%)
3T	Section Type	Intersection (46.00%), Straight (34.00%), Curve (16.00%), Other (4.00%)	Intersection (50.00%), Curve (25.00%), Other (25.00%)
Fines			
4T	Type	Illegal parking (50.54%), Speeding (18.28%), Transit in prohibited areas (10.75%), Seat belt (5.38%), Other (15.05%)	Illegal parking (50.00%), Speeding (50.00%)
4T	Road Type	Local urban (58.65%), Main urban (21.15%), Main rural (17.31%), Local rural (2.88%)	Local urban (33.33%), Main rural (33.33%), Local rural (33.33%)