Infrastructure use & safety feeling of different road user types globally results from the ESRA 3 project

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Outline

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Background and Objectives

Background (1/2)

- Most road crashes occur due to human errors.
- However, other factors that should not be ignored are environmental issues (Theofilatos, 2017) and the road infrastructure (Papadimitriou et al., 2019).
- Intersection design, road surface condition, lack of guardrails/barriers, inadequate lighting, and absence of traffic signals/signs can cause a crash.
- Road infrastructure should be designed and operated to eliminate or reduce risks for all road users (WHO, 2023).
- In Europe, over 10,600 people were killed on EU rural roads in 2022, with the highest share of fatalities occurring on rural roads (52%) and the lowest share on motorways (9%). The respective percentage for urban roads is 39%.

Background (2/2)

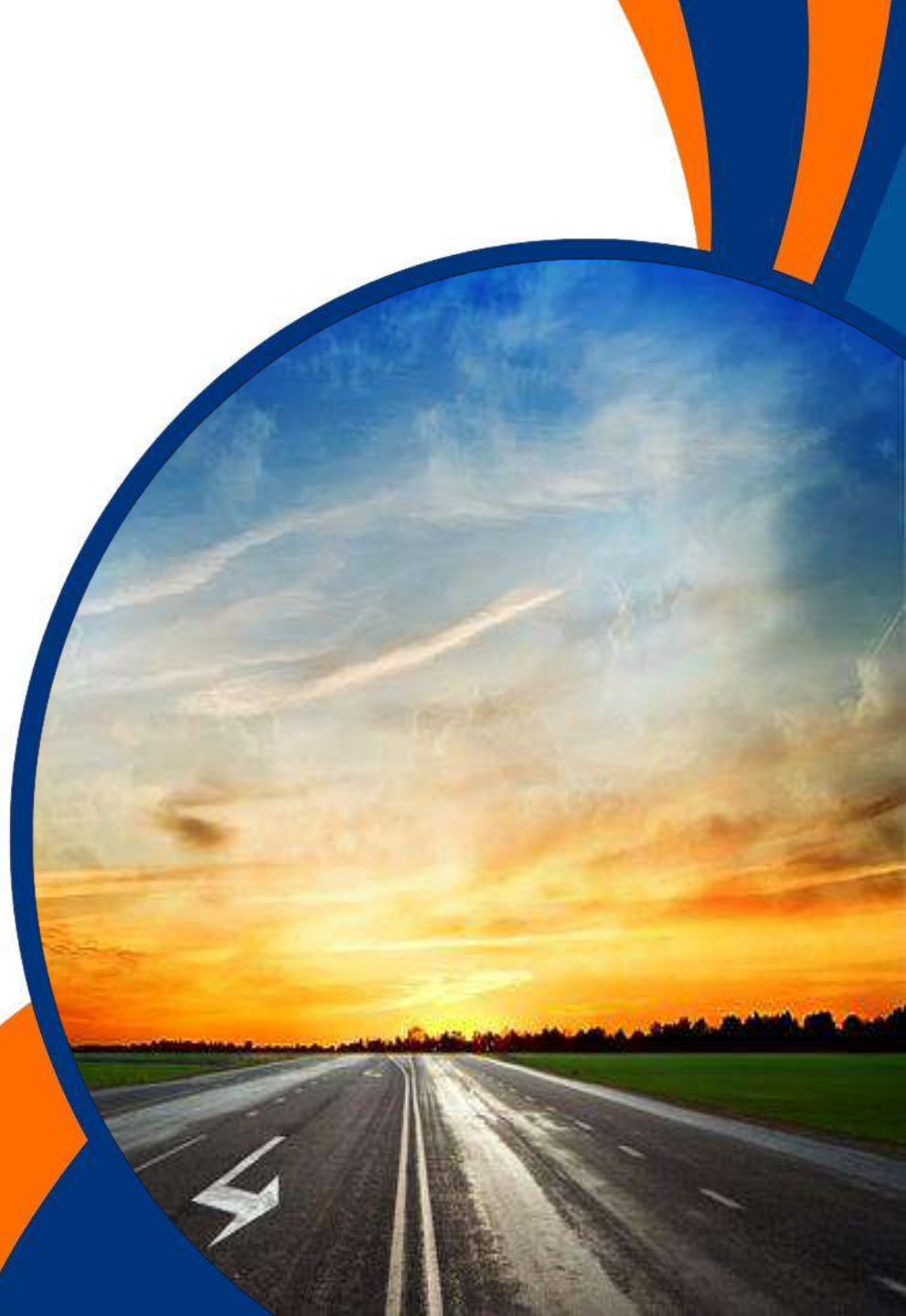
- These alarming numbers of potentially avoidable deaths highlight the need for increased attention to infrastructure (ETSC, 2024).
- Transportation systems play a vital role in contributing to urban areas' economic growth and social development (Lee & Yoon, 2021).
- In urban areas, the quality of road infrastructure directly influences the citizens' quality of life (Hanák et al., 2014).
- Infrastructure investments typically significantly impact economically integrated and intermediate rural areas (Asher et al., 2019).
- Due to constraints imposed by annual budgets for construction, maintenance, and repairs, prioritizing projects becomes one of the most critical and challenging aspects of public decision-making.

Objectives

- Examine the attitudes and opinions of road users in 39 countries concerning their perceptions of safety regarding various types of infrastructure.

- The infrastructure aspects analyzed cover the frequency of use of different road types and the perceived safety of these roads by car drivers and vulnerable road users, including moped riders, motorcyclists, cyclists, and pedestrians.

- Provide certain recommendations for road safety stakeholders at different levels which could be implemented in efforts to enhance road infrastructure safety.



The ESRA project

- ESRA (E-Survey of Road users' Attitudes) is a joint international initiative of research centers and road safety institutes across the world

- Duration of the third edition of the project (ESRA3): 3 years (2022-2024)

- ESRA3 Steering Committee:
  - ESRA coordination: VIAS Institute (BE)
  - ESRA3 steering group partners: BASt (DE), IATSS (JA), UGE (FR), ITS (PO), KFV (AT), NTUA (EL), PRP (PT), SWOV (NL), TIRF (CA), DTU (DK)

ESRA
E-Survey of Road users' Attitudes

https://www.esranet.eu/

Descriptive Statistics

Infrastructure types used & safety perceptions (%) - Car drivers

**Not including Armenia, Kyrgyzstan, Uzbekistan (different methodology),*
(↑) indicates the highest percentages while (↓) the lowest"

In Europe and Asia-Oceania, the highest use scores are recorded for rural roads, while inter-city motorways show the lowest.

For American car drivers, the highest use and safety perception rates are observed for thoroughfares and high-speed roads within cities.

The highest use of inter-city motorways is observed in the Netherlands (85.9%), while the highest safety perception rates are reported in Finland (84.1%).

Regarding thoroughfares and high-speed roads within cities, the highest use is noted in Germany (86.9%), while the highest safety perception in Denmark (77.6%).

For rural roads, the highest use is found in Luxembourg (92.5%), while the highest safety perceptions for these roads are in Finland (78.6%).

For other streets and roads in urban areas, the highest use and safety perception rates are recorded in Denmark (84.7%) and Finland (76.0%) respectively.

Country	Intercity-Motorways		Thoroughfares and high-speed roads within cities		Rural roads and roads connecting towns and villages		Other streets and roads in urban areas	
	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception
Armenia	52.0%	31.8% (↓)	54.9%	38.3%	39.9% (↓)	36.3%	63.6%	39.5%
Australia	65.0%	76.2%	62.0%	74.4%	43.3%	55.8%	62.2%	71.0%
Austria	81.8%	81.3%	79.5%	67.3%	89.7%	68.5%	70.2%	67.7%
Belgium	76.0%	58.0%	75.6%	50.6%	81.2%	47.1%	68.4%	47.0%
Bosnia and Herzegovina	38.5%	24.3% (↓)	42.3%	27.8% (↓)	50.7%	18.4% (↓)	45.6% (↓)	19.4% (↓)
Brazil	68.9%	37.6%	68.5%	38.5%	64.5%	37.4%	60.3%	34.7%
Canada	65.5%	66.2%	64.2%	59.7%	65.0%	65.8%	70.3%	69.5%
Chile	67.4%	51.0%	63.0%	55.3%	65.1%	53.6%	66.5%	42.5%
Colombia	58.2%	39.2%	70.9%	40.3%	65.4%	40.3%	66.0%	31.2%
Czech Republic	66.8%	58.6%	78.8%	47.0%	90.4% (↑)	38.6%	75.6%	34.3%
Denmark	72.6%	81.3%	52.9%	77.6% (↑)	78.9%	69.4%	84.7% (↑)	65.7%
Finland	67.3%	84.1% (↑)	81.2%	74.0%	81.8%	78.6% (↑)	78.1%	76.0% (↑)
France	53.4%	55.2%	59.7%	55.7%	78.6%	39.6%	62.3%	40.7%
Germany	65.4%	76.4%	86.9% (↑)	73.5%	76.5%	70.8%	40.3% (↓)	71.1% (↑)
Greece	60.4%	56.8%	69.3%	34.4% (↓)	70.7%	17.9% (↓)	74.5%	17.5% (↓)
Ireland	66.5%	74.5%	53.6%	59.8%	80.5%	30.3%	66.5%	48.2%
Israel	77.8%	61.1%	71.0%	57.7%	46.0%	42.5%	60.3%	50.8%
Italy	65.0%	45.5%	59.4%	35.1% (↓)	63.4%	36.9%	67.8%	43.5%
Japan	36.2%	43.7%	41.4%	40.5%	83.1%	43.5%	63.9%	34.3%
Kazakhstan	44.5%	33.9%	45.3%	40.6%	42.6%	33.3%	71.9%	30.9%
Kyrgyzstan	12.1% (↓)	71.5%	31.4% (↓)	70.9%	15.9% (↓)	24.9%	68.1%	53.7%
Latvia	63.5%	53.1%	57.6%	51.7%	78.6%	39.1%	77.8%	33.4%
Luxembourg	84.4% (↑)	63.2%	69.6%	57.6%	92.5% (↑)	46.2%	70.6%	51.7%
Mexico	42.4%	50.3%	66.7%	50.8%	55.6%	48.3%	77.1%	44.6%
Netherlands	85.9% (↑)	83.7% (↑)	72.7%	73.7%	82.2%	62.9%	75.9%	66.1%
Panama	59.6%	38.5%	65.3%	38.9%	68.4%	36.5%	62.6%	33.9%
Peru	63.6%	27.6% (↓)	63.8%	38.4%	53.3%	38.4%	61.9%	32.8%
Poland	52.0%	66.8%	56.7%	58.5%	76.0%	45.2%	74.0%	45.9%
Portugal	72.8%	66.1%	71.0%	55.4%	84.0%	32.9%	67.8%	32.6%
Serbia	54.2%	44.9%	59.3%	40.9%	72.8%	23.7% (↓)	76.3%	26.0% (↓)
Slovenia	84.2% (↑)	58.0%	84.7% (↑)	42.6%	91.5% (↑)	38.9%	81.9% (↑)	39.8%
Spain	66.7%	75.1%	56.5%	65.8%	82.4%	53.8%	70.4%	51.1%
Sweden	74.8%	76.2%	70.8%	63.6%	79.0%	55.2%	80.4%	49.8%
Switzerland	79.5%	82.9% (↑)	82.4% (↑)	74.8% (↑)	76.2%	74.7% (↑)	60.9%	69.9%
Thailand	28.6% (↓)	72.9%	33.5% (↓)	52.0%	47.2%	62.4%	61.9%	62.3%
Türkiye	77.4%	72.8%	78.9%	55.8%	59.5%	52.7%	81.7% (↑)	46.4%
United Kingdom	53.0%	67.5%	59.4%	63.2%	66.7%	54.3%	70.3%	64.7%
United States	58.8%	72.8%	72.5%	75.0% (↑)	49.2%	71.8% (↑)	55.5%	73.4% (↑)
Uzbekistan	17.5% (↓)	59.9%	25.5% (↓)	47.0%	23.6% (↓)	33.9%	53.1% (↓)	65.8%
Europe22	62.9%	66.1%	66.5%	59.8%	75.2%	50.8%	64.6%	51.4%
America8	59.3%	57.4%	69.8%	59.8%	55.7%	55.8%	61.4%	55.3%
AsiaOceania6*	50.0%	64.3%	52.8%	53.0%	62.4%	49.6%	68.1%	47.5%

Infrastructure types used and safety perceptions (%) - PTW riders

In Europe, the highest use scores are recorded for rural roads, while inter-city motorways exhibit the highest safety perception rates.

In America, the highest use rates are for thoroughfares and high-speed roads within cities, while in Asia-Oceania, other streets and roads in urban areas show the highest.

For thoroughfares and high-speed roads within cities, the highest use and safety perception rates are observed in the United States (73.0% and 88.6%).

For rural roads, the highest use is noted in Luxembourg (82.7%) and the respective safety perception in the United States (83.1%).

Regarding other streets and roads in urban areas, the highest use is found in Serbia (78%), while the highest perceived safety is in the USA (84%).

**Not including Armenia, Kyrgyzstan, Uzbekistan (different methodology), (↑) indicates the highest percentages while (↓) the lowest"*

Country	Thoroughfares and high-speed roads within cities		Rural roads and roads connecting towns and villages		Other streets and roads in urban areas	
	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception
Armenia	29.5%	19.8% (↓)	23.7% (↓)	0.0% (↓)	70.7%	33.6%
Australia	67.5% (↑)	81.6% (↑)	38.2%	72.5% (↑)	41.0%	77.0% (↑)
Austria	58.7%	53.3%	79.8% (↑)	62.1%	56.1%	59.3%
Belgium	64.6%	65.0%	64.5%	52.0%	46.9%	47.2%
Bosnia and Herzegovina	17.9% (↓)	17.6% (↓)	36.0%	14.0% (↓)	61.7%	10.8% (↓)
Brazil	61.0%	35.2%	53.1%	39.9%	60.3%	37.1%
Canada	40.5%	49.8%	53.8%	62.5%	53.0%	67.3%
Chile	48.9%	49.8%	50.3%	40.1%	59.4%	38.8%
Colombia	57.9%	35.8%	58.1%	38.4%	63.1%	31.7%
Czech Republic	45.9%	38.6%	73.3%	38.2%	62.2%	40.2%
Denmark	37.3%	82.8% (↑)	60.6%	63.1%	70.4%	68.2%
Finland	47.8%	46.9%	56.0%	57.0%	57.6%	58.9%
France	55.5%	76.9%	47.9%	52.7%	56.5%	55.9%
Germany	72.5% (↑)	77.3%	54.6%	68.0%	22.8% (↓)	55.9%
Greece	44.8%	22.1%	40.8%	14.9%	73.3% (↑)	13.9% (↓)
Ireland	50.4%	54.6%	66.6%	50.5%	33.0% (↓)	57.5%
Israel	58.6%	42.5%	48.1%	39.3%	39.7% (↓)	48.1%
Italy	40.2%	36.3%	54.7%	34.4%	63.3%	34.3%
Japan	27.0%	23.4%	79.3% (↑)	35.3%	59.8%	28.3%
Kazakhstan	26.1%	29.7%	34.7% (↓)	28.7%	58.6%	28.9%
Kyrgyzstan	15.0% (↓)	50.2%	38.7%	20.4%	53.8%	14.0% (↓)
Latvia	36.2%	53.8%	52.5%	35.3%	63.8%	43.6%
Luxembourg	40.1%	29.3%	82.7% (↑)	33.0%	60.6%	30.4%
Mexico	45.3%	48.4%	53.8%	45.7%	71.4%	42.8%
Netherlands	51.9%	73.5%	54.6%	51.7%	47.8%	64.1%
Panama	48.4%	38.3%	56.2%	35.3%	59.1%	34.2%
Peru	49.6%	35.9%	52.6%	34.4%	61.3%	31.5%
Poland	26.9%	35.3%	62.9%	43.2%	60.7%	38.2%
Portugal	35.1%	52.4%	69.4%	33.6%	55.6%	21.7%
Serbia	20.1% (↓)	18.2% (↓)	39.8%	14.5% (↓)	78.0% (↑)	17.6%
Slovenia	43.6%	32.1%	62.4%	34.7%	64.2%	29.0%
Spain	41.4%	53.2%	61.2%	40.3%	64.0%	43.6%
Sweden	41.0%	55.1%	69.4%	49.3%	57.6%	55.7%
Switzerland	67.2%	78.4%	55.1%	70.4% (↑)	40.6%	68.3% (↑)
Thailand	26.1%	52.4%	58.5%	67.7%	53.9%	60.5%
Türkiye	50.0%	48.1%	35.3%	54.2%	76.5% (↑)	42.7%
United Kingdom	59.0%	62.5%	47.6%	51.7%	42.3%	64.9%
United States	73.0% (↑)	88.6% (↑)	40.4%	83.1% (↑)	46.6%	84.1% (↑)
Uzbekistan	35.3%	56.6%	32.4% (↓)	39.7%	42.8%	28.3%
Europe22	50.6%	61.1%	54.7%	47.9%	51.8%	45.5%
America8	64.3%	68.0%	46.9%	60.1%	54.5%	58.8%
AsiaOceania6*	36.4%	52.1%	52.3%	58.7%	59.8%	50.5%

Infrastructure types used and safety perceptions (%) - Cyclists

**Not including Armenia, Kyrgyzstan, Uzbekistan (different methodology), (↑) indicates the highest percentages while (↓) the lowest"*

Cyclists in all examined regions use streets and roads in urban areas with cycle lanes more frequently than roads without cycle lanes.

In Europe and Asia-Oceania, the highest perceived safety rates are associated with roads featuring cycle lanes, while in America, rural roads with cycle lanes record the highest safety perception rates.

For rural roads with cycle lanes, the highest use is recorded in Belgium (64.4%) and the highest safety perception in Uzbekistan (81.6%).

Regarding rural roads without cycle lanes, the highest usage is in Japan (51.7%). The highest safety perception is for the United States (67.1%).

For streets and roads in urban areas with cycle lanes, the highest use is observed in the Netherlands (83.1%) and for the respective streets without cycle lanes in Armenia (70.1%).

Country	Thoroughfares and high-speed roads within cities		Rural roads and roads connecting towns and villages		Other streets and roads in urban areas	
	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception
Armenia	29.5%	19.8% (↓)	23.7% (↓)	0.0% (↓)	70.7%	33.6%
Australia	67.5% (↑)	81.6% (↑)	38.2%	72.5% (↑)	41.0%	77.0% (↑)
Austria	58.7%	53.3%	79.8% (↑)	62.1%	56.1%	59.3%
Belgium	64.6%	65.0%	64.5%	52.0%	46.9%	47.2%
Bosnia and Herzegovina	17.9% (↓)	17.6% (↓)	36.0%	14.0% (↓)	61.7%	10.8% (↓)
Brazil	61.0%	35.2%	53.1%	39.9%	60.3%	37.1%
Canada	40.5%	49.8%	53.8%	62.5%	53.0%	67.3%
Chile	48.9%	49.8%	50.3%	40.1%	59.4%	38.8%
Colombia	57.9%	35.8%	58.1%	38.4%	63.1%	31.7%
Czech Republic	45.9%	38.6%	73.3%	38.2%	62.2%	40.2%
Denmark	37.3%	82.8% (↑)	60.6%	63.1%	70.4%	68.2%
Finland	47.8%	46.9%	56.0%	57.0%	57.6%	58.9%
France	55.5%	76.9%	47.9%	52.7%	56.5%	55.9%
Germany	72.5% (↑)	77.3%	54.6%	68.0%	22.8% (↓)	55.9%
Greece	44.8%	22.1%	40.8%	14.9%	73.3% (↑)	13.9% (↓)
Ireland	50.4%	54.6%	66.6%	50.5%	33.0% (↓)	57.5%
Israel	58.6%	42.5%	48.1%	39.3%	39.7% (↓)	48.1%
Italy	40.2%	36.3%	54.7%	34.4%	63.3%	34.3%
Japan	27.0%	23.4%	79.3% (↑)	35.3%	59.8%	28.3%
Kazakhstan	26.1%	29.7%	34.7% (↓)	28.7%	58.6%	28.9%
Kyrgyzstan	15.0% (↓)	50.2%	38.7%	20.4%	53.8%	14.0% (↓)
Latvia	36.2%	53.8%	52.5%	35.3%	63.8%	43.6%
Luxembourg	40.1%	29.3%	82.7% (↑)	33.0%	60.6%	30.4%
Mexico	45.3%	48.4%	53.8%	45.7%	71.4%	42.8%
Netherlands	51.9%	73.5%	54.6%	51.7%	47.8%	64.1%
Panama	48.4%	38.3%	56.2%	35.3%	59.1%	34.2%
Peru	49.6%	35.9%	52.6%	34.4%	61.3%	31.5%
Poland	26.9%	35.3%	62.9%	43.2%	60.7%	38.2%
Portugal	35.1%	52.4%	69.4%	33.6%	55.6%	21.7%
Serbia	20.1% (↓)	18.2% (↓)	39.8%	14.5% (↓)	78.0% (↑)	17.6%
Slovenia	43.6%	32.1%	62.4%	34.7%	64.2%	29.0%
Spain	41.4%	53.2%	61.2%	40.3%	64.0%	43.6%
Sweden	41.0%	55.1%	69.4%	49.3%	57.6%	55.7%
Switzerland	67.2%	78.4%	55.1%	70.4% (↑)	40.6%	68.3% (↑)
Thailand	26.1%	52.4%	58.5%	67.7%	53.9%	60.5%
Türkiye	50.0%	48.1%	35.3%	54.2%	76.5% (↑)	42.7%
United Kingdom	59.0%	62.5%	47.6%	51.7%	42.3%	64.9%
United States	73.0% (↑)	88.6% (↑)	40.4%	83.1% (↑)	46.6%	84.1% (↑)
Uzbekistan	35.3%	56.6%	32.4% (↓)	39.7%	42.8%	28.3%
Europe22	50.6%	61.1%	54.7%	47.9%	51.8%	45.5%
America8	64.3%	68.0%	46.9%	60.1%	54.5%	58.8%
AsiaOceania6*	36.4%	52.1%	52.3%	58.7%	59.8%	50.5%

Infrastructure types used and safety perceptions (%) - Pedestrians

In all examined regions, streets and roads in urban areas with sidewalks have the highest use rates and the highest safety perception rates in Europe and Asia-Oceania.

For rural roads with sidewalks, the highest use is observed in Japan (64.7%) and the highest safety perception in Germany (82.1%).

Regarding rural roads without sidewalks, the highest use is seen in Japan (45.3%), while the highest safety perception in the United States (68.1%).

For streets and roads in urban areas with sidewalks, the highest use is found in Serbia (96.1%) and for the respective streets without sidewalks in Slovenia (58.6%).

*Not including Armenia, Kyrgyzstan, Uzbekistan (different methodology),
(↑) indicates the highest percentages while (↓) the lowest"

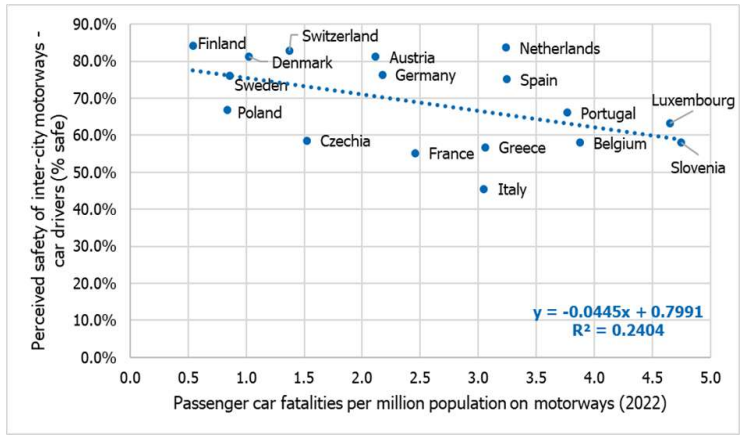
Country	Rural roads and roads connecting towns and villages with sidewalks		Rural roads and roads connecting towns and villages without sidewalks		Streets and roads in urban areas with sidewalks		Streets and roads in urban areas without sidewalks	
	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception	Use of Infrastructure	Safety Perception
Armenia	9.9% (↓)	47.9%	7.7% (↓)	32.7%	93.3% (↑)	67.2%	24.8%	46.5%
Australia	28.8%	75.2%	17.2%	51.2% (↑)	84.1%	78.9%	31.3%	50.3% (↑)
Austria	55.8%	66.4%	23.6%	24.4%	87.9%	80.8%	39.1%	37.3%
Belgium	53.5%	52.6%	40.9% (↑)	30.7%	77.2% (↓)	58.5%	49.9%	34.9%
Bosnia and Herzegovina	19.5%	14.9% (↓)	13.5%	8.9% (↓)	86.1%	33.3% (↓)	28.3%	9.5% (↓)
Brazil	28.3%	39.8%	17.9%	32.6%	86.3%	42.4%	43.0%	18.3%
Canada	32.0%	76.7%	26.6%	44.6%	85.7%	78.7%	41.1%	44.0%
Chile	35.9%	45.8%	18.4%	27.3%	88.0%	54.1%	34.3%	25.2%
Colombia	30.9%	45.5%	22.8%	27.6%	92.8%	42.3% (↓)	36.6%	18.4%
Czech Republic	53.4%	70.3%	36.2%	17.4%	91.6%	76.1%	46.9%	28.9%
Denmark	25.1%	75.2%	23.8%	42.5%	89.8%	85.7% (↑)	39.2%	47.5%
Finland	40.4%	75.7%	30.4%	35.3%	88.8%	80.1%	48.0%	47.2%
France	31.1%	60.3%	17.1%	30.5%	87.1%	64.8%	34.7%	22.8%
Germany	46.6%	82.1% (↑)	18.0%	29.0%	91.0%	85.0% (↑)	23.0% (↓)	33.0%
Greece	18.0%	32.1% (↓)	13.9%	15.4%	92.4%	38.4% (↓)	56.4%	8.6% (↓)
Ireland	41.7%	50.5%	36.4% (↑)	18.6%	80.0%	74.0%	30.4%	24.2%
Israel	18.3%	40.3%	11.4%	20.0%	92.9%	70.7%	24.5%	24.1%
Italy	29.9%	51.4%	18.7%	22.0%	90.3%	59.2%	44.7%	18.3%
Japan	64.7% (↑)	47.3%	45.3% (↑)	19.9%	68.1% (↓)	53.4%	38.4%	15.4%
Kazakhstan	28.0%	48.0%	19.1%	32.0%	83.4%	63.8%	36.3%	27.1%
Kyrgyzstan	2.5% (↓)	44.7%	6.7% (↓)	13.7% (↓)	90.8%	70.4%	32.7%	33.7%
Latvia	29.4%	60.3%	35.2%	18.4%	93.5% (↑)	74.2%	57.0% (↑)	25.7%
Luxembourg	36.8%	54.6%	17.3%	17.0%	91.4%	68.1%	31.2%	19.5%
Mexico	30.8%	43.9%	19.0%	27.6%	84.5%	50.2%	44.7%	28.4%
Netherlands	34.7%	75.8%	28.5%	42.1%	87.0%	86.3% (↑)	48.1%	50.2%
Panama	48.5%	40.4%	27.7%	17.4%	81.0%	44.0%	41.5%	17.8%
Peru	32.7%	47.7%	24.1%	27.4%	91.5%	50.3%	39.0%	21.6%
Poland	30.8%	53.4%	23.9%	27.8%	91.1%	75.8%	44.7%	28.5%
Portugal	36.5%	45.7%	21.8%	19.4%	89.0%	57.0%	45.3%	22.0%
Serbia	16.3%	34.3% (↓)	15.1%	11.0% (↓)	96.1% (↑)	50.4%	57.1% (↑)	14.3% (↓)
Slovenia	57.0% (↑)	55.7%	32.5%	21.0%	87.2%	68.6%	58.6% (↑)	22.7%
Spain	31.4%	57.8%	21.8%	34.3%	92.5%	74.0%	35.9%	35.0%
Sweden	36.0%	73.1%	28.9%	29.8%	86.2%	79.9%	43.6%	42.2%
Switzerland	56.9% (↑)	79.5% (↑)	26.8%	36.5%	88.5%	84.9%	35.7%	43.8%
Thailand	39.7%	71.9%	28.3%	47.3% (↑)	67.8% (↓)	67.3%	18.3% (↓)	41.6%
Türkiye	40.9%	51.2%	25.7%	38.6%	87.5%	56.5%	49.3%	27.6%
United Kingdom	46.5%	64.4%	29.2%	30.2%	84.6%	73.3%	25.4%	36.4%
United States	40.1%	78.6% (↑)	25.6%	68.1% (↑)	80.3%	80.8%	23.5% (↓)	56.9% (↑)
Uzbekistan	9.1% (↓)	54.7%	6.2% (↓)	33.1%	82.9%	82.1%	31.0%	65.0% (↑)
Europe22	37.7%	64.7%	22.8%	28.7%	88.9%	71.9%	36.5%	29.4%
America8	34.2%	60.8%	22.1%	47.9%	84.3%	60.6%	34.7%	32.6%
AsiaOceania6*	47.2%	53.6%	32.1%	30.3%	75.8%	60.4%	36.1%	25.6%

Advanced Analysis

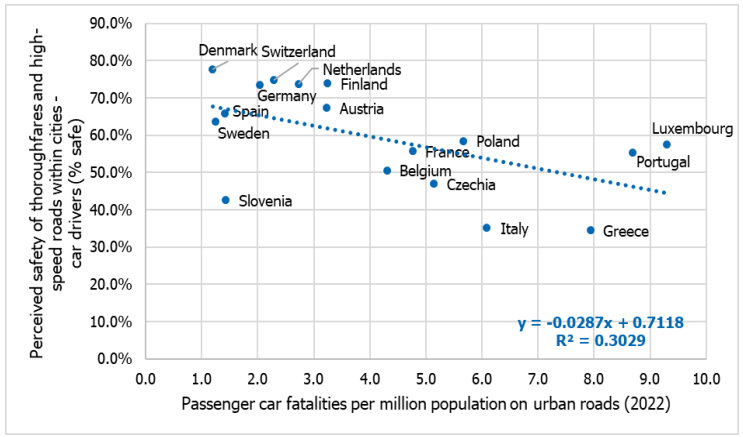
Relationship between safety perception and fatalities – Car drivers

- The road safety performance of the country is reflected at the safety feeling of respondents. As passenger car fatalities increase, the safety perception is reduced.

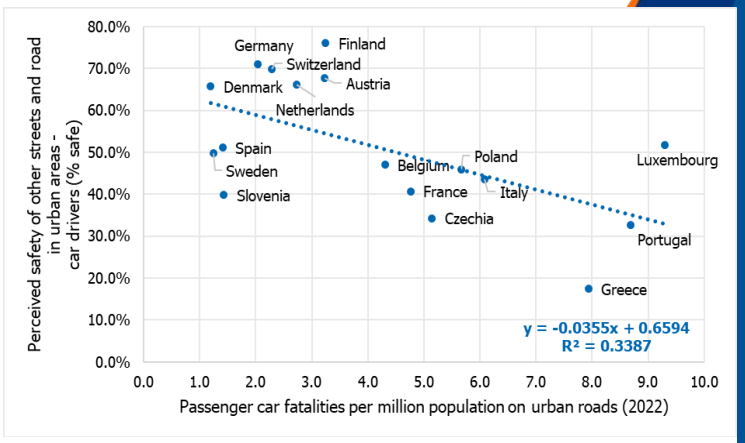
- The highest coefficient of determination (R^2) is recorded for the dependent variable of the perceived safety of other streets and roads in urban areas (R^2=0.34), while the lowest is for the safety perception of intercity motorways (R^2= 0.24).



Linear relationship between car drivers' perceived safety of inter-city motorways and passenger car fatalities per million population on motorways (2022)



Linear relationship between car drivers' perceived safety of thoroughfares and high-speed roads within cities and passenger car fatalities per million population on urban roads (2022)

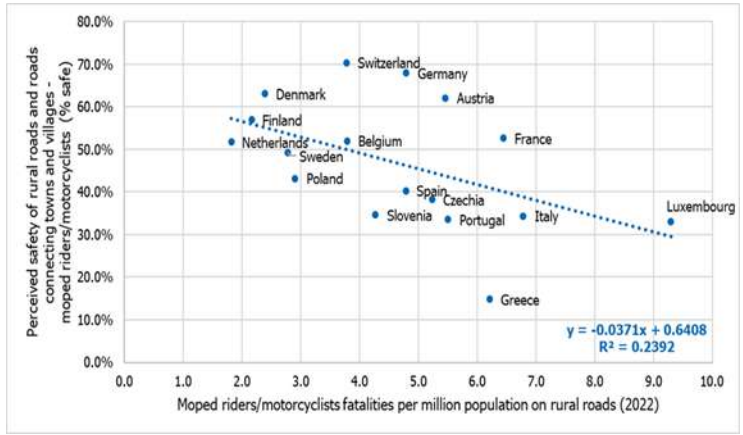


Linear relationship between car drivers' perceived safety of other streets and roads in urban areas and passenger car fatalities per million population on urban roads (2022)

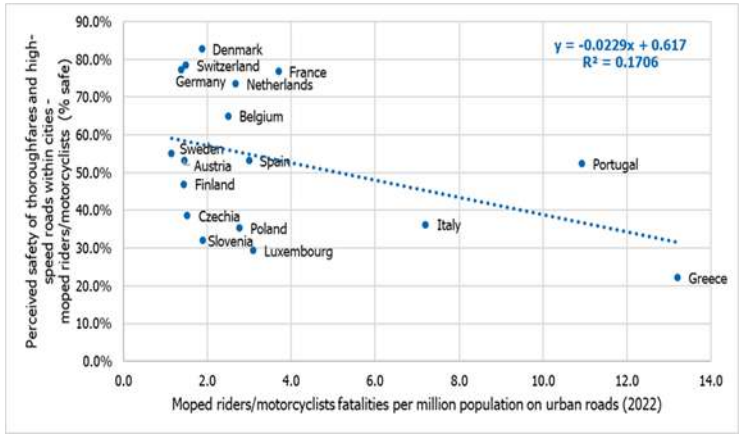
Relationship between safety perception and fatalities – PTW riders

- Countries with fewer recorded fatalities for 2022 report higher percentages of perceived safety for thoroughfares and high-speed roads within cities and urban roads → the majority of the countries are gathered in the upper left part of the figures.

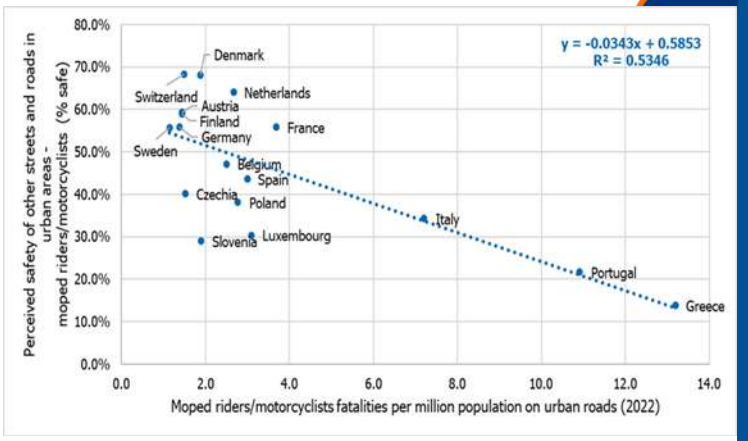
- The highest coefficient of determination (R^2) is recorded for the dependent variable of the perceived safety of other streets and roads in urban areas (R^2=0.53), while the lowest for the safety perception of thoroughfares and high-speed roads within cities (R^2= 0.17).



Linear relationship between moped riders and motorcyclists' perceived safety of rural roads and roads connecting towns and villages and moped riders and motorcyclists' fatalities per million population on rural roads (2022)



Linear relationship between moped riders and motorcyclists' perceived safety of thoroughfares and high-speed roads within cities and moped riders and motorcyclists' fatalities per million population on urban roads (2022)

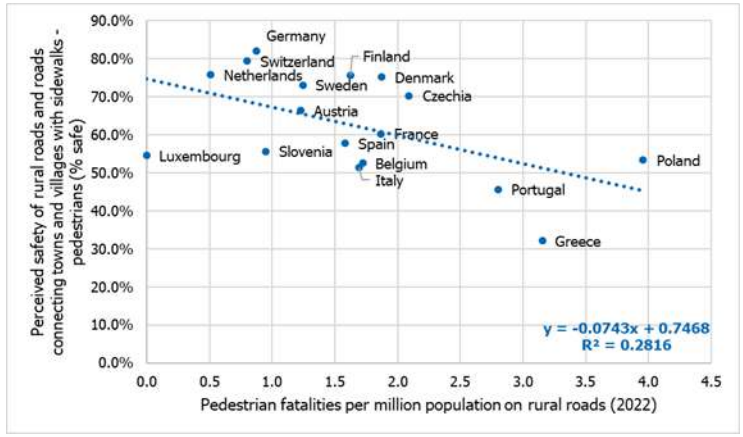


Linear relationship between moped riders and motorcyclists' perceived safety of other streets and roads in urban areas and moped riders and motorcyclists' fatalities per million population on urban roads (2022)

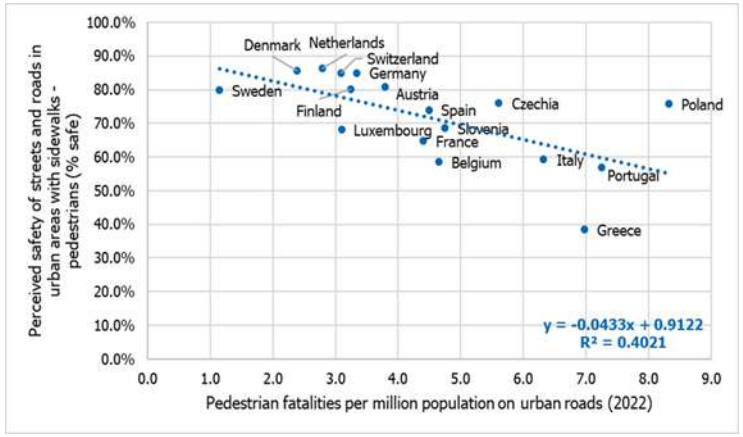
Relationship between safety perception and fatalities – Pedestrians

- As the fatalities of pedestrians increase, the safety perception of using the examined road types is reduced.

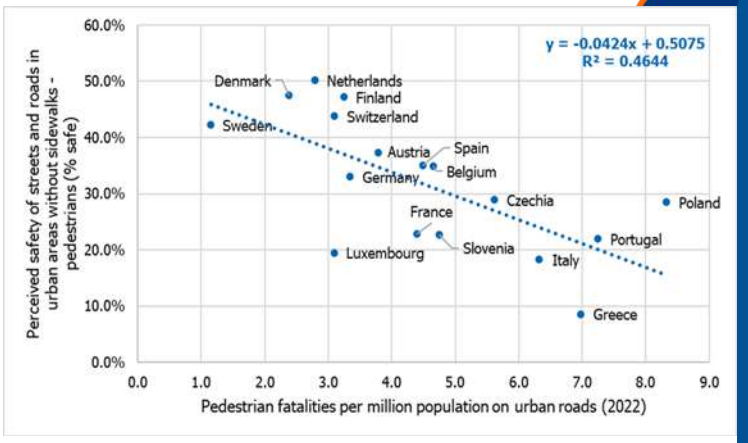
- Regarding the coefficient of determination (R^2), the highest value is recorded for the dependent variable of the perceived safety of streets and roads in urban areas without sidewalks (R^2=0.46), while the lowest for the safety perception of rural roads and roads connecting towns and villages with sidewalks (R^2= 0.28).



Linear relationship between pedestrians' perceived safety of rural roads and roads connecting towns and villages with sidewalks and pedestrians' fatalities per million population on rural roads (2022)



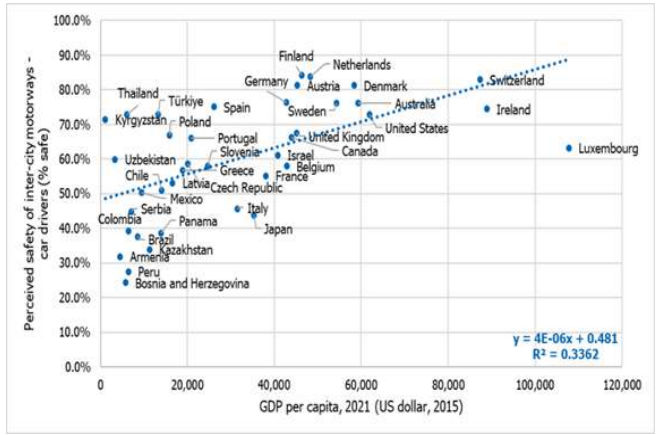
Linear relationship between pedestrians' perceived safety of streets and roads in urban areas with sidewalks and pedestrians' fatalities per million population on urban roads (2022)



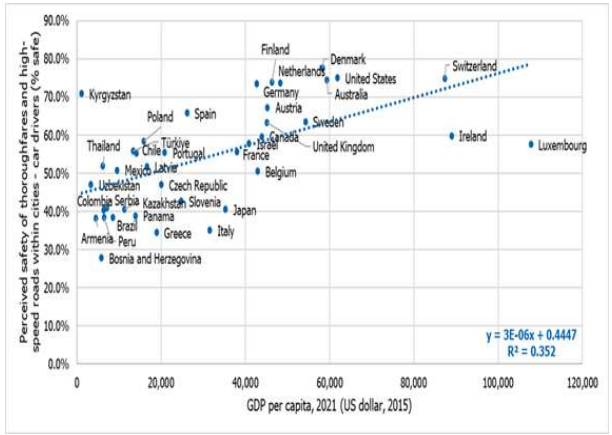
Linear relationship between pedestrians' perceived safety of streets and roads in urban areas without sidewalks and pedestrians' fatalities per million population on urban roads (2022)

Relationship between safety perception and GDP - Car drivers

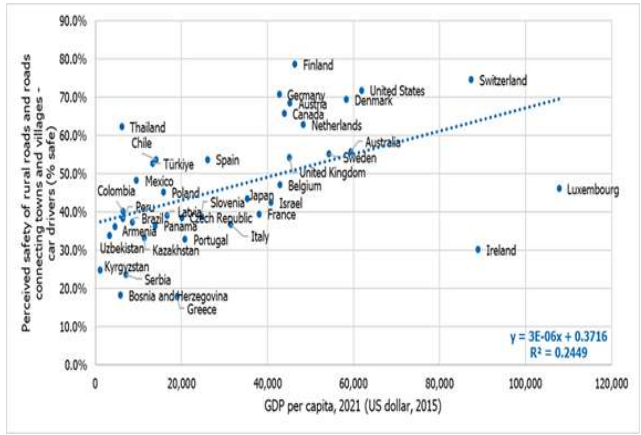
- Gross Domestic Product (GDP) is closely related to road infrastructure and the safety perception associated with its use.
- Evident linear relationship between GDP per capita and perceived safety rates (as the GDP per capita increases, the perceived safety of the use of these types of infrastructure also increases).
- The highest coefficient of determination (R^2) is recorded for the dependent variable of the perceived safety of thoroughfares and high-speed roads within cities (R^2=0.35), while the lowest for the safety perception of intercity motorways (R^2= 0.24).



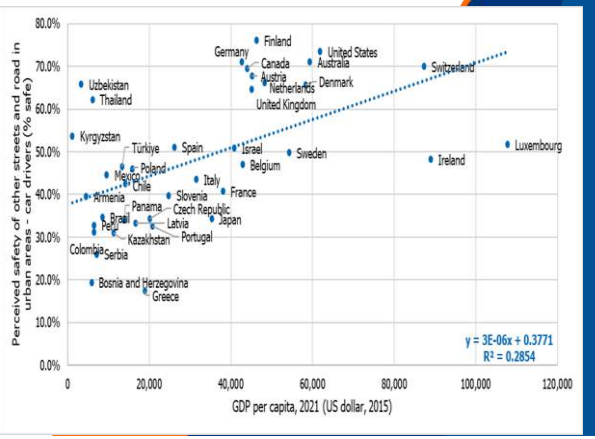
Linear relationship between car drivers' perceived safety of inter-city motorways and Gross Domestic Product per capita (2021)



Linear relationship between car drivers' perceived safety of thoroughfares and high-speed roads within cities and Gross Domestic Product per capita (2021)



Linear relationship between car drivers' perceived safety of rural roads and roads connecting towns and villages and Gross Domestic Product per capita (2021)



Linear relationship between car drivers' perceived safety of other streets and roads in urban areas and Gross Domestic Product per capita (2021)

Key results and recommendations

Key results – Infrastructure use

- Car drivers predominantly use rural roads, with Europe showing the highest usage rates.
- Thoroughfares and high-speed roads within cities are heavily utilized across all regions.
- In urban areas, other streets and roads are most frequently used, particularly in Asia-Oceania.
- Moped riders and motorcyclists demonstrate varying preferences for infrastructure, with high usage rates on thoroughfares within cities in America and Europe.
- Cyclists show a strong preference for urban roads with cycle lanes, particularly in Europe.
- Pedestrians also exhibit clear preferences, with the highest usage on urban streets and roads equipped with sidewalks.

Key results – Safety perception

- Perceptions of safety varied significantly across different types of infrastructure and user groups.
- Rural roads and roads connecting towns and villages are perceived as moderately safe across all regions.
- Car drivers generally perceive inter-city motorways as relatively safe, particularly in Europe, while thoroughfares within cities are perceived with slightly lower confidence in Asia-Oceania.
- Moped riders and motorcyclists perceive thoroughfares within cities as safer in America, compared to Asia-Oceania, , while cyclists express higher safety perceptions on urban roads with cycle lanes, particularly in Europe.
- Pedestrians consistently feel safest on urban streets and roads with sidewalks across all regions.

Key recommendations (1/2)

- The low safety perception rates for the use of several road types by road users impose targeted measures to improve road infrastructure.

- Intercity-Motorways:
  - ✓ Ensure regular maintenance and upkeep of inter-city motorways to reduce road crashes caused by poor road conditions.
  - ✓ Implement advanced warning systems for hazards, weather conditions, and traffic congestion to improve driver awareness and response.

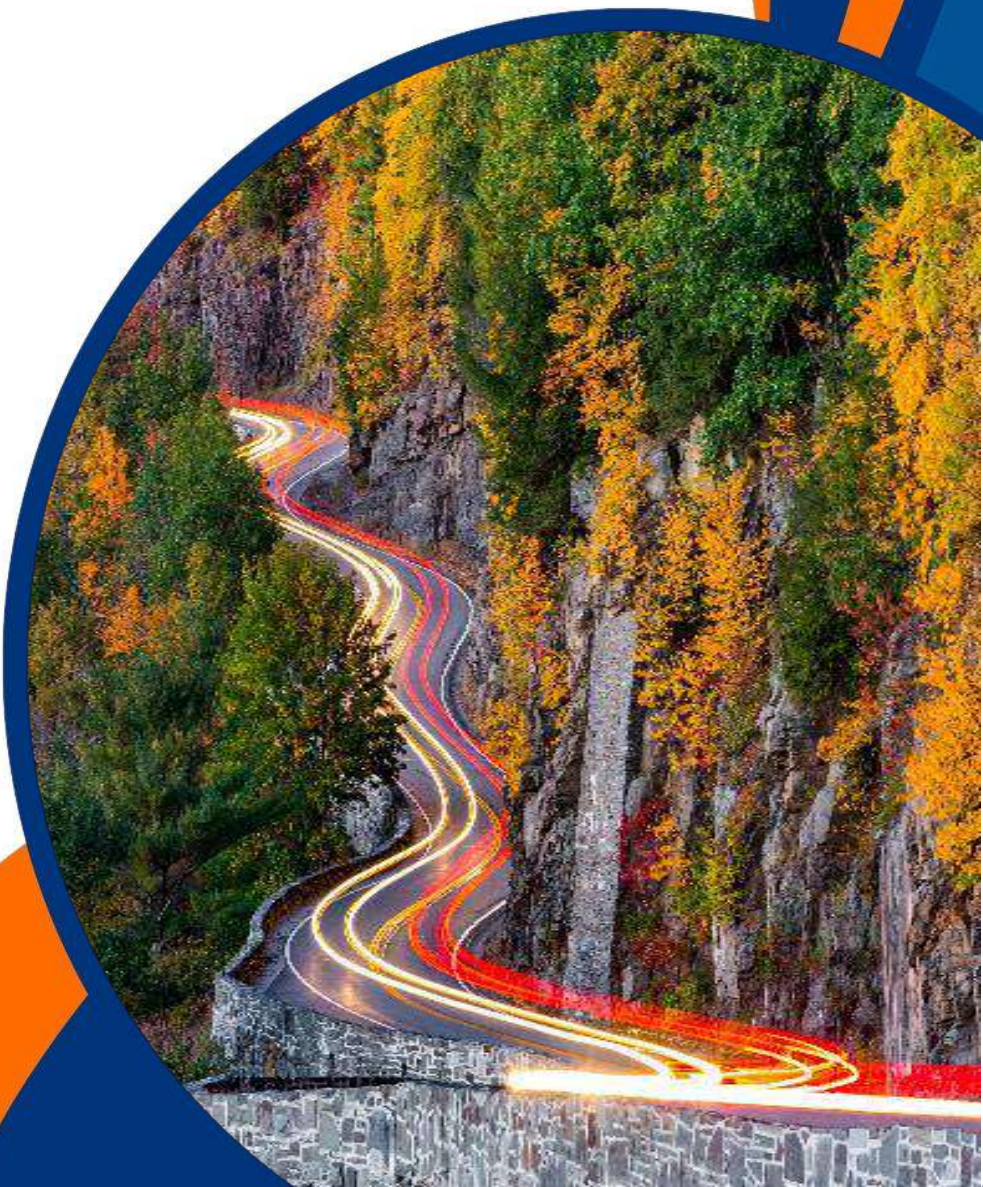
- Thoroughfares and High-Speed Roads within Cities:
  - ✓ Install speed cameras, enforce speed limits, and design road layouts that discourage speeding.
  - ✓ Improve street lighting and signage to increase visibility, especially at night or in adverse weather conditions.

- Rural Roads and Roads Connecting Towns and Villages:
  - ✓ Develop and upgrade roads to accommodate safer speeds and separate vulnerable road users from motorized traffic where feasible.
  - ✓ Increase awareness campaigns on rural road safety and encourage defensive driving techniques.

Key recommendations (2/2)

- **Other Streets and Roads in Urban Areas:**
  - ✓ Designate lanes for cyclists to reduce conflicts with motor vehicles and improve overall safety perceptions.
  - ✓ Build and maintain sidewalks with adequate space and accessibility features to ensure pedestrian safety.

- **Additional Recommendations:**
  - ✓ Foster collaboration between transportation authorities, urban planners, and safety agencies to implement comprehensive safety measures.
  - ✓ Utilize data analytics and crash statistics to identify high-risk areas and prioritize safety interventions accordingly.
  - ✓ Regularly evaluate the effectiveness of implemented safety measures and adjust strategies as necessary based on evolving road usage patterns and safety perceptions.
  - ✓ Integrate technologies like adaptive traffic signals, surveillance cameras, and mobile apps to provide real-time traffic updates and safety alerts. These advancements enhance situational awareness, optimize traffic flow, and improve overall road safety for all users.



Infrastructure use & safety feeling of different road user types globally results from the ESRA 3 project

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40th Meeting of the International Road Traffic Safety Analysis and Data (IRTAD) Group

OECD Headquarters , 1-2 October 2025

International Transport Forum