

## Development of a conceptual model for Traffic Safety Culture

**Tor-Olav Nævestad<sup>a</sup>, Susanne Kaiser<sup>c</sup>, George Yannis<sup>d</sup>, Alexandra Laiou<sup>d</sup>, Dimitrios Nikolaou<sup>d</sup>, Jenny Blom<sup>a</sup>, Vibeke Milch<sup>a</sup>, Ingeborg Hesjevoll<sup>a</sup>, Hanna Wennberg<sup>b</sup>, Gunilla Björklund<sup>f</sup>, Henriette Wallen Warner<sup>f</sup>, Uta Meesmann<sup>g</sup>, Mathias De Roeck<sup>g</sup>, and Wouter Van den Berghe**

*a) Institute of Transport Economics*

*b) Lund University, Department of Technology and Society*

*c) Austrian Traffic safety Board (KFV)*

*d) National Technical University of Athens*

*e) Tilkon Research & Consulting*

*f) Swedish National Road and Transport Research Institute*

*g) Vias institute*

### Abstract

Every year, some 20,000 people die on roads in the EU and at least 100,000 are severely injured. Despite the progress over the last decades, these numbers are still unacceptably high and a key challenge for all European countries. Whilst progress can still be expected from improved infrastructure, (vehicle) technology and traffic laws and enforcement, many road safety experts believe that a change is needed in the beliefs, values, social norms of all stakeholders in road safety and among road users. These changes ask for a cultural change, which does not only apply to road user groups, but also – if not more – to people responsible for shaping the traffic system through their roles in organisations.

Leveraging a cultural change that may improve traffic culture across European countries requires, however, a well-developed understanding of the traffic safety culture concept; its key elements, relationships with road safety behaviours and safety outcomes, including a well-developed understanding of how it can be influenced. Such a well-developed understanding; summed up in a conceptual model - is lacking today. There has been an increasing number of studies on the traffic safety culture in recent years, but the concept is not well developed in the sense that there is an agreed understanding of how the concept should be defined and operationalised (Ward et al, 2019; Nævestad et al, 2019); and not the least how the concept should be utilized by policy makers.

The traffic safety culture concept is important, as it denotes shared ways of thinking and acting that are relevant to traffic safety. Previous research indicates that such shared ways of thinking and acting is related to individual road safety behaviour and thus accident involvement (Nævestad et al 2025). Safe System has become the state-of-the-art approach for road safety management, and it is recommended to countries worldwide (WHO & UN 2021, ITF 2022). Safe System policies need, however, to be coupled with a well-developed understanding of safety culture to ensure effective implementation. While Safe System refers to the formal aspects of road safety management (e.g. formal laws and policies), traffic safety culture refers to the informal aspects, (i.e. what road users actually do). Traffic safety culture is important, as there often is a discrepancy between formal policies; strategies, rules and regulations; and what people actually do. Thus, a proper understanding of traffic safety culture might address this implementation gap and provide new insights that may help improve road safety.

The aims of this study are therefore to:

- 1) Systematically map previous research on traffic safety culture, and
- 2) Based on the review, develop a conceptual model of traffic safety culture.

This study is part of the EU-project TRUST: “TSC a systematic transition towards shared responsibility for safe and sustainable mobility in the EU”. (Grant agreement ID: 101197992).

The study is based on a systematic literature review of all previous scientific papers focusing on traffic safety culture and organizational safety culture. The review is conducted according to PRISMA guidelines. The review is conducted as a scoping review, mapping and describing the research field, and previous studies are reviewed and described based on the following criteria:

- 1) Which TSC levels (community: national, regional, local, organisational) does the paper include?
- 2) Which transport mode is included
- 3) Which aspects of TSC are included in the paper? e.g. descriptive norms, freedom values, fatalistic beliefs, the sociocultural position of pedestrians etc.
- 4) How are the aspects measured? Which survey questions?
- 5) Is individual road safety behaviour measured? With which questions?
- 6) Are accidents (or other safety outcomes) measured?
- 7) What are the hypothesized relationships and mechanisms between TSC elements, behaviour and accidents, based on which theory?
- 8) What do the studies find regarding these relationships?
- 9) Does the study say anything about factors influencing different aspects of TSC (e.g. infrastructure, education, interaction, policies).
- 10) Does the study include other sustainability goals than Safety?

Based on the insights and data from the previous studies and expert group discussions, a new conceptual model for traffic safety culture is developed. When summarizing the studies to make the conceptual TRUST model for traffic safety culture, we take the model developed by Nævestad et al (2019), Nævestad et al (2021) and Nævestad (2021) as the point of departure. This model describes the key levels and dimensions that a conceptual model of traffic safety culture should include, at different levels: the community level (private road users) and organisational level (road users at work)

The model discerns between four analytical levels: 1) System, 2) Culture, 3) Behaviour and 4) Crashes/Outcomes. These four analytical levels are important, as they describe a causal relationship starting with factors influencing culture, to culture at different levels, which influence behaviour which in turn influence crashes and outcomes. Thus, this causal relationship explains why culture is assumed to be important; i.e. because it influences behaviour and outcomes, and because culture can be influenced in manners that in turn may influence outcomes.

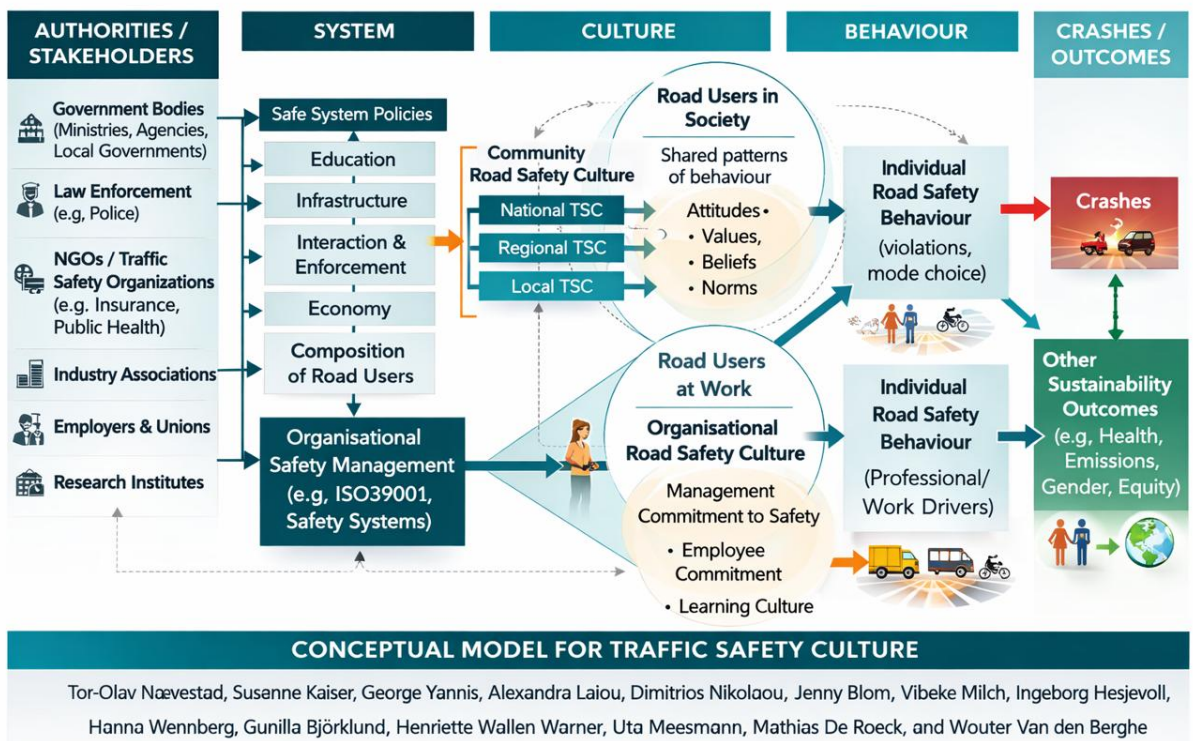


Figure 1 Model for traffic safety culture, used as point of departure, based on Nævestad et al (2019), Nævestad et al (2021) and Nævestad (2021). Image generated by Chat GPT 5.2.

Safety culture is created in interaction in groups and shared among members of groups. The model separates between traffic safety culture among three key groups: 1) private road users in society, 2) road users at work and 3) road safety stakeholders (NGOs, insurance companies, unions etc.) and people working in road safety authorities. The first denotes e.g. the national, regional, local level, which are influenced by system factors like road safety policies, infrastructure, education, composition of road users etc.

The organisational level is special as this is a more established research field than for drivers at the community level. Drivers who are at work are often part of organisations with a management, and for these the more established framework for analysing organisational safety culture can be used. In this context, the most important aspects of culture are employees perceived management commitment to safety and employee perceptions of safety management system (Nævestad 2021). As the organisational context is more well-defined and because of the employer relationship, the possibility to influence drivers at work (influencing their freedom to take risk) is far greater than for private drivers.

For drives who are not at work, the situation is different, as we cannot take the work organisation context as point of departure. Safety culture is generally (re)created through interaction processes in groups, and, to explain the existence of traffic safety culture at different levels (e.g., national, communities, peer group), we may hypothesize that this interaction is influenced by factors located at different analytical levels. At the more general level, we may hypothesize that national road safety culture is created through processes involving drivers in the same country. Several factors that could influence a traffic safety culture are national (e.g., traffic rules, the police enforcing the rules, and infrastructure). Based on these factors, we may expect the existence of different national traffic safety cultures, resonating with the fact that the fatality risk varies with a factor of up to 10 between EU countries). Nævestad et al (2019) measures national traffic safety culture as descriptive norms, hypothesizing that the mechanisms between national traffic safety culture and road safety behavior are drivers' perception of what is "normal" and expected from drivers within their country, generating a subtle social pressure to behave in certain ways. It also seems well founded to hypothesize the existence of traffic safety culture at the regional and the local community level, as road user interaction to a large extent occurs between a given number of actors within relatively geographical limited areas (Luria et al., 2014). Some studies

also apply the traffic safety culture perspective to peer groups, which can be defined as a group of people sharing some key characteristics, often a combination of age, sex, and/or crucial interests. It is evident that road users are part of several cultural units influencing road user behaviours.

At the system level, we have the factors influencing culture. Our conceptual model is unique, as it also includes a third group, which is road safety stakeholders and people working in road safety authorities. People working in authorities and stakeholders are important, as they might influence the system level factors in Figure 1, which in turn influence the other actors in the system. This can be done e.g. through development of new rules and legislation, new training, new information, changes in road and infrastructure etc. At the same time, people in authorities and stakeholders are also influenced by the system level factors.

Our conceptual model is also unique, as it is based on an updated systematic literature review based on all existing literature in the field, summing up the state of the art. Based on the results of all available research, it points to the most important theoretical mechanisms and theoretical approaches, which explain the relationship between the four analytical levels described above: 1) System, 2) Culture, 3) Behaviour and 4) Crashes/Outcomes.

The conceptual model is also unique, as it is based on and further develops the TRUST definition of traffic safety culture (Nævestad et al 2026), which provides the first triangulated, expert-informed, theoretically grounded unified definition of traffic safety culture applicable across actors in the transport system.

Traffic safety culture encompasses shared values, beliefs, attitudes, norms, and patterns of behaviours that shape how traffic safety is understood and enacted within a meaningfully defined group of actors in the transport system. This meaningfully defined group of actors can refer to road users, organizations, authorities, or other actors within the transport system.

The main difference to our conceptual model and previous works is that previous works have not summed up the totality of elements that make up traffic safety culture in society, including the three groups we focus on and the four analytical levels. The model provides a total overview of how the level of Safe System implementation and traffic safety culture level in a society interacts, through focusing on the four analytical levels in the model. By focusing on three groups, four levels and theoretical mechanisms between the four levels, it provides conceptual clarity in a new research field, which has been somewhat fragmented. The model also provides an approach and a tool for defining the traffic safety maturity level of a society, indicating how it starts with system level factors and spreads to the rest of society, through analytical levels and mechanisms which may end in accidents and other safety outcomes. The model can be applied in practice by authorities and stakeholders, as it indicates steps to influence traffic safety culture in society, increasing the overall traffic safety culture maturity level, by highlighting key influencing factors. For researchers, it provides a comprehensive set of hypotheses based on previous research that can be tested and refined, including ideas for interventions.

**Keywords:** Traffic safety culture, traffic safety, European countries

## References

- Nævestad, T.-O., A. Laiou, R.O. Phillips, T. Bjørnskau, G. Yannis (2019) Safety Culture among Private and Professional Drivers in Norway and Greece: Examining the Influence of National Road Safety Culture, *Safety* 2019, 5(2), 20; Special Issue: Social Safety and Security
- Nævestad, T.-O. I. S. Hesjevoll, R. Elvik (2021) How can regulatory authorities improve safety in organizations by influencing safety culture? A conceptual model of the relationships and a discussion of implications, *Accident Analysis & Prevention*, Volume 159,
- Nævestad, Tor-Olav, (2021) Safety culture. In: Vickerman, Roger (eds.) *International Encyclopedia of Transportation* vol 2. pp. 554-559. United Kingdom: Elsevier Ltd.



# Better Road Safety Data for Better Safety Performance

📅 15-17 April 2026 📍 Athens, Greece

International  
Transport Forum



National  
Technical  
University  
of Athens

Nævestad, T.-O., Meesmann, U., Wallén Warner, H., Kaiser, S., Milch, V.; De Roeck, M., Schachner, M., Nikolaou, D., Björklund, G., Laiou, A., Storesund Hesjevoll, I., Forward, S., Wennberg, H., Aigner-Breuss, E., Eichhorn, A. (2026). Traffic Safety culture: Framework; influencing factors; traffic safety impact. Deliverable 2.1 of the EC Horizon Europe project TRUST.

Ward, N. J., Otto, J., & Finley, K. (2019). Ten principles of traffic safety culture. In *Traffic Safety Culture: Definition, Foundation, and Application*. Emerald Publishing Limited