



This document is part of a series of 20 thematic reports on road safety. The purpose is to give road safety practitioners and the general public an overview of the most important research questions and results on the topic in question. The level of detail is intermediate, with more detailed papers or reports suggested for further reading. Each report has a 1-page summary.

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Summary

Despite considerable advances in road safety, EU countries still experience approximately 20,000 fatalities and over 100,000 serious injuries on the roads each year. This ongoing high toll has led experts to advocate for growing a positive "Traffic Safety Culture" (TSC), a framework complementary to the Safe System approach. TSC encompasses shared values, norms, and attitudes that impact behaviours across the road system, influencing not only individual road users but also key stakeholders such as public authorities, private companies, NGOs, vehicle manufacturers, and infrastructure designers.

Safety culture, a concept proven effective in high-risk sectors like aviation and nuclear energy, aims to establish collective beliefs that promote safer behaviours. However, unlike these sectors, road safety involves both private and professional drivers operating within less monitored environments. These limitations in terms of transferability made TSC a loose term, which still awaits an agreed upon definition. A frequently used definition suggests TSC "as the shared belief system of a group of people, which influences road user behaviors and stakeholder actions that impact traffic safety." (Ward et al. 2019b, p. 8). Beliefs are informed by (societal and group) values, and impact attitudes, norms and perceptions regarding the execution of behaviours known to increase crash risk (e.g. speeding or distraction).

An important way to leverage TSC as a concept to improve road safety is through organisations and companies, particularly as up to 40% of road fatalities are work-related and standards on safety management systems such as ISO 39001 are not mandatory. A positive safety culture in organisations – led by management commitment – influences drivers' motivation and adherence to safety practices.

Preventive efforts to tackle risk behaviours ideally focus on long-term behavioural change. Some existing intervention approaches are already in line with the idea of strengthening TSC, in particular some few well-founded awareness campaigns and traffic safety and mobility education in schools as well as consistent enforcement of traffic laws. However, all lines of road safety action are suitable to adopt a TSC perspective and living up to the Safe System thinking would mean prioritising change through system stakeholders and decision makers within their roles in organisations.

To further support a shift towards safer traffic behaviours and decisions, systematic monitoring and evaluation of TSC-based interventions are essential as well as making an effort to better understand the interaction between TSC constituents and how to change them.

1. What is the problem?

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. There are even signs that the trend of decreasing road fatalities is stagnating, and most European countries face great challenges with relatively large numbers of seriously injured pedestrians and cyclists. Whilst progress can still be expected from improved infrastructure, (vehicle) technology and traffic laws and enforcement, road safety experts argue that a change in the values, beliefs and social norms is needed. This asks for a cultural change, which applies to road users (non-professional and professional), but also to stakeholders responsible for shaping the traffic system through their roles in organisations such as in public authorities, private companies, NGOs, vehicle manufacturers, infrastructure designers, (traffic) police and educators. All ecosystems of the road transport sectors are concerned.

Traffic Safety Culture (TSC) is an umbrella term which broadly refers to a complex interaction between cultural and social factors affecting behaviour. Leveraging a culture change approach to improve road safety requires deep understanding of how traffic safety culture and its different components contribute to risk behaviours and safety outcomes. There is promising evidence pointing to the effectiveness of culture-based interventions (see upcoming sections). At the same time, TSC remains a diffuse concept and there is a lot of confusion about the term (Hopkins, 2018). It has been used in many different contexts and in many ways. To exploit its potential for road safety improvements, it is important to be precise with terminology and transparent about the use of TSC and its constituting factors (such as shared beliefs, attitudes or norms) as well as high quality evaluation of culture-based road safety interventions for further understanding. On this assumption, TSC can be a useful concept to describe, explain and change safety-relevant behaviours of groups of road users and road safety stakeholders.

2. Concept and definition

The concept of Traffic Safety Culture (TSC) is ingrained in the aviation, railway and maritime sectors as well as in other high-risk industries (e.g., nuclear sector, oil and gas industry). However, the road safety community is catching up and increasingly convinced to adopt the vision of a positive safety culture for road transport. The main difference between safety in road transport and the other transport modalities is that the former - aviation, rail, maritime sectors - deal with the behaviour of people within legal organisations, which is influenced by the organisation's culture. People in these sectors are part of organisations, with formal safety management systems and a management aiming to systematically foster a positive safety culture. This is created through formal training, rules and procedures, management setting examples etc. Professional drivers might also be part of such systems, as they are employed by organisations, which might have safety management systems with formal rules, procedures, training.

The road sector is however, also comprised by private drivers, who are not on the road as employees. In road traffic, private road users meet professional drivers and drivers at work. Although all of them are also subject to rules - traffic laws - the possibilities for seamless monitoring are much more limited but also not necessarily desirable for societies. Although, the safety culture concept stems from domains where the level of safety is established through organisational structures, scholars suggested to apply it also to private road users and their respective social units as equivalents to organisations such as nations, communities, peer groups or families (Nævestad, 2021).

The Safe System Approach recognises that humans are flawed, and the traffic system design should anticipate, prevent and forgive behavioural errors. The responsibility for safety is shared between "those who design, build, manage and use roads and vehicles to prevent crashes resulting in serious injury or death and to provide effective post-crash care" (ITF, 2022, p. 12). TSC can be seen as a complementary or related concept to a Safe System (Ward et al., 2019a), also emphasizing the shared responsibility for safety. However, TSC addresses the different stakeholders who are representing the six defined pillars in a Safe System, reflected also in the definition proposed by Ward et al. (2019b), who suggest:

Traffic Safety Culture "as the shared belief system of a group of people, which influences road user behaviors and stakeholder actions that impact traffic safety." (p. 8)

This is applicable to both road user behaviours as well as stakeholders who act within their roles in organizations, as public servants, in companies or other organisations. The belief system of stakeholders can be expressed through policies, resource allocation and prioritization, safety management systems or the establishment and tracking of road safety programmes (Ward et al., 2019c). Many more definitions of TSC have been proposed, some more comprehensive, some more focused (cf., Girasek, 2012; National Academies of Sciences, Engineering, and Medicine, 2024).

It is important to note that culture is a group characteristic, not one of an individual (Hopkins, 2018), meaning that an individual is always part of various sets of subcultures (comprised by e.g., family, peers, workplace, municipality, region, country). The individual can therefore show contradicting behaviour, depending on the social identity of a respective group. A strong bond with a certain group, results in more conformity with the particular group beliefs (Ward et al., 2019c).

3. Organisational safety culture

The concept of organisational safety culture in transport companies is much closer to safety culture, as it was originally conceived and applied to organisations and its members in hazardous industries (Nævestad et al., 2018a). While general occupational safety has increasingly improved by means of legislation and proposed standards¹, the requirements for work driving safety worldwide leave room for improvement (Wishart et al., 2019). ETSC (2017) estimates that up to 40% of fatalities on the road are work-related, including professional drivers moving people or goods, but also commuters. This calls for attention to improve road safety standards within transport companies but also for example through authorities in their role as employers or procurers. While there is the standard ISO 39001:2012 for public and private organisations, documenting requirements for a road traffic safety management system, it is, however, not mandatory. This contrasts the situation in aviation, rail and the maritime sector.

Due to the decade-long tradition of applying safety culture approaches in high-risk industries, the link between organisational culture and safety outcomes is well established (Nævestad, 2021). Hinging upon the effect of cultural norms on behaviour, safety policies and practices establish what kind of behaviour is expected of drivers at work. (Newnam & Muir, 2019). It is even assumed that organisational culture has a stronger influence on behaviour than national culture (Hopkins,

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¹ Safety and health legislation | Safety and health at work EU-OSHA

2018). Research suggests that a strong organisational safety culture and extensive policies and practices are associated with safer driving (cf. Newnam et al., 2004; Nævestad et al., 2018a). Research, however, has limited its focus mainly on heavy goods vehicle and bus drivers (Nævestad et al., 2018a).

Nævestad et al. (2018a) identified a widespread understanding of organisational safety culture "as shared and safety relevant ways of thinking or acting that are (re)created through the joint negotiation of people in social settings" (p. 29). Hopkins (2018) suggests safety culture as a set of collective practices of an organisation ("the way we do things around here", p. 39) and traces its emergence to either structures of an organisation or leadership. Senior managers' commitment to safety seems to play a key role in creating a strong safety culture within an organisation (Nævestad et al., 2018b) and influences the safety motivation of drivers at work (Nævestad et al., 2018b).

A road safety management system for organisations such as outlined by ISO 39001:2012 includes the systematic observation and the monitoring of crashes and incidents but also to develop a system and culture to learn from these incidents and implement targeted measures to avoid crashes and incidents as part of this learning culture. This means e.g. a system for identifying risk factors and addressing them by a.o. issuing safety procedures, driver training and appointing safety personnel. However, safety goals and overall company goals can represent conflicting interests and pose a challenge especially for small transport companies. These have fewer means when it comes to competence, time and resources. A management strategy developed to facilitate strengthening organizational safety culture regardless of available resources is the "Safety ladder for safety management in goods transportation", developed by Nævestad et al. (2018b). It suggests prioritization of measures yielding the greatest impact, in this order:

- Safety commitment of managers and employees (lowest level of the Safety Ladder)
- 2. Follow-up of drivers' speed, driving style and seat belt use
- 3. Focus on work-related factors' influence on traffic safety (e.g. organization of transport)
- 4. Safety management system (e.g. ISO 39001) (highest level of the Safety Ladder)

A world-wide initiative promoting road safety through the impact that organisations and companies have is FIA's Road Safety Index². It helps organisations to assess and monitor their safety footprint alongside their value chain as well as setting goals for improvement, which is also called for in the UN resolution A/RES/74/299³ and the Stockholm declaration⁴. The concept hinges upon an organisation's long-term commitment to improving road safety.

As already mentioned, prioritising road safety can be impeded by competing corporate goals and requires willingness to change. Some organisations are more ready to change than others depending on various factors. The model of "change readiness", developed by Otto et al. (2022) refers to the capacity to instigate and support the desired change. It can help identifying areas where attention should be focussed to move forward in growing a positive safety culture. The readiness to change is influenced by:

- 1) Cultural readiness: the perceptions that the change aligns with the organisational culture
- 2) Commitment readiness: the perceptions that the organisation is committed to the change (leadership and staff)
- 3) Capacity readiness: the perceptions that the organisation has the resources required for the change.

4. Road users' safety culture

Despite the lack of a commonly agreed definition of TSC, there are constituents used in various approaches to measure TSC, such as (selection):

- Attitudes (e.g., towards safety relevant behaviours or road safety measures)
- Norms (e.g., perception of how others behave or of what is acceptable behaviour in traffic)
- Perceived behavioural control and habits (e.g., regarding compliance with speed limits)
- Values (e.g., societal values like freedom or individualism) influencing our belief system, which in turn affects attitudes, norms and behavioural control beliefs (Ward et al., 2019c).

These socio-cognitive constructs facilitate operationalizing aspects of road users' safety culture and, when measured, aid the explanation of certain behaviours (Meesmann et al., 2022) which are linked to

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² FIA ROAD SAFETY INDEX | Federation Internationale de l'Automobile

³ https://digitallibrary.un.org/record/3879711/files/A RES 74 299-EN.pdf

⁴ <u>Stockholm Declaration - RoadSafetySweden</u>

increased crash risk. Comprehensive data on those components and analyses on the interrelations can provide an important insight for targeted road safety interventions and measures.

However, explaining differences in the behaviours of different road user groups and of different subcultures requires to account for many additional influencing factors, such as traffic laws and enforcement, historical emergence of a traffic system, the educational system, driver licensing, economic development or road infrastructure. Since many of those factors are regulated on the national level, countries as analytical units to understand cultural differences in road user behaviour is considered useful – despite the limitations of focusing merely on the national level (e.g., the disregard of subcultures, or regulatory differences on a regional level).

Standing in the tradition of the SARTRE survey (Antov et al., 2012), the ESRA initiative (E-Survey of Road Users' Attitudes) systematically collects data on TSC-related constructs such as road users' attitudes, (perceived) norms and perceived behavioural control, among other indicators, on a three-year basis (Meesmann & Wardenier, 2024). ESRA links those socio-cognitive constructs to self-reported behaviour (Meesmann et al., 2024), collected for a series of road user behaviours which are known to be associated with crash risk or severity of crash outcomes, e.g., speeding, distraction, driving under the influence or use of protective systems (cf. ERSO Thematic Reports⁵).

4.1 TSC and road safety outcomes

Much effort has been made to study TSC in transport companies (i.e. organisational culture) and to a lesser extent regarding non-professional road users. Although the impact of TSC-based prevention approaches on crash outcomes for non-professional road users is not easily quantifiable, there is growing evidence that targeting specific socio-cognitive constructs (e.g., attitudes, beliefs) of road user groups are linked with safety-relevant behaviours known to influence crash risk. Three examples:

- A recent analysis of ESRA3 data on distraction suggests that attitudes towards mobile phone use while driving a car predicts self-reported mobile phone use on a national level (Meesmann et al., 2024).
- In a study conducted in Norway and Greece as contrasting cases, Nævestad et al. (2019) argue that the influence of national TSC on road users' behaviour is mediated through descriptive norms, which refer to individuals' perceptions of what they believe

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⁵ Thematic reports - European Commission

- drivers in their country do. The link between TSC measured as descriptive norms and road safety violations is a subtle social pressure to act as others do.
- In a recent study of TSC among car drivers and pedestrians in three European and three African countries, Nævestad et al. (2024) find that the main difference related to TSC is a higher incidence of fatalistic beliefs among the African respondents. Fatalistic beliefs refer to a tendency for individuals to view life events as predetermined and inevitable. The link between TSC measured as fatalistic beliefs and road safety violations is that if your fate is predestined, what you do (i.e. risk taking) will not make a difference. In accordance with other studies, the authors of the study therefore find a relationship between fatalistic beliefs and unsafe road behaviours.

Examples like these demonstrate the value of TSC-based indicators, such as the ones operationalized by ESRA for many European countries and worldwide. They facilitate explaining differences in safety-relevant behaviours between countries as well as within countries, and benchmarking aspects of road users' TSC for continuous evaluation. Section 5 of this report provides an overview of selected TSC-relevant constructs from ESRA3 for 22 EU and EFTA countries – as a proxy for TSC in Europe. For further expansion of knowledge about the specific mechanisms of culture influencing road safety, high quality evaluation studies with pre- and post-measurements are indispensable.

5. Measuring road user's TSC

This section provides some concrete examples of how certain constituents of Traffic Safety Culture (TSC) were operationalised by the ESRA initiative on a country level. TSC constituents exemplified here concern car drivers' perceived norms (see also section 4) regarding speeding and phone use while driving.

ESRA is an international initiative of road safety institutes, research centres, public services, and private sponsors. It collects comparable data on road safety and mobility indicators, also on aspects of TSC and behaviour of private road users⁶. The latest edition – ESRA3 – provides road data from 39 countries worldwide, 19 of which are EU and EFTA countries (Meesmann & Wardenier, 2024). ESRA data are collected by means of online panel surveys, providing a representative sample of

⁶ Please note: As explained in the previous section, individuals are part of various sub-cultures. Although, data was collected for private road users, they may also be subject to their employer's culture.

the national adult population in each country. Data displayed below were collected in 2023. EU and EFTA countries included are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and Switzerland. ESRA's Europe22 means furthermore include Bosnia and Herzegovina, Serbia and the UK (Vias Institute, 2024).

The TSC sub-dimensions (constituents) regarding road users' norms were operationalized by the following item formulation queried on a five-point rating or Likert scale (examples):

- Personal norm/acceptability: "How acceptable do you, personally, feel it is for a car driver to talk on a hand-held phone while driving."
- **Social norm/acceptability**: "Where you live, how acceptable would most other people say it is for a car driver to talk on a hand-held phone while driving."

The percentage values presented below refer to the share of people who responded with the highest or second-highest score of agreement.

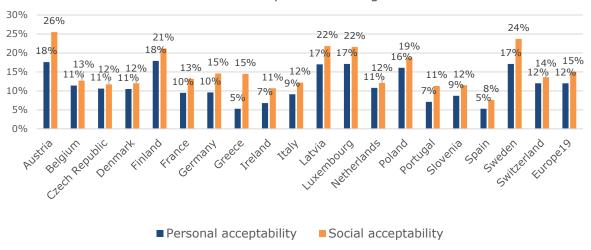
5.1 Car drivers' norms regarding speeding

Car drivers' personal norms (what they personally consider acceptable and unacceptable behaviour in traffic) and social norms (what they think people around them consider acceptable and unacceptable behaviour) regarding speeding outside built-up areas are presented in Figure 1 for 19 European countries. On average driving faster than the speed limit outside of built-up areas is accepted by 12% of car drivers. Consistently, respondents' perception of other car drivers' acceptance of this speeding behaviour is higher than what they indicated for themselves. The discrepancy is particularly pronounced in Greece, Portugal, Germany and Austria, with the latter showing the highest projected and self-reported levels of accepting driving too fast outside built-up areas (motorways/expressways excluded).

Figure 1. Percentage of car drivers personally accepting driving faster than the speed limit outside built-up areas (except motorways/ expressways) and perceived social acceptability of same behaviour.

Source: Vias institute (2024)

Personal and social acceptability of driving faster than the speed limit outside built-up areas among car drivers



Harkin et al. (2024) analysed the ESRA data (worldwide) regarding factors related to self-reported speeding behaviour. Results of logistic regressions suggest that car drivers are more likely to report that they speed themselves, when they think of speeding as acceptable (personal and social norm), when they feel the need to drive fast to avoid losing time (attitude) and when they trust themselves when driving significantly faster than the speed limit (perceived behavioural control).

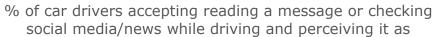
5.2 Car drivers' norms regarding phone use

The second selected example presented here of measured aspects of TSC within ESRA is car drivers' norms and perceived behavioural control⁷ with regard to driver distraction, more precisely to reading text messages or social media posts (Figure 2) and talking on a hand-held phone while driving (Figure 3). For both distracting behaviours, the discrepancy between what personally is acceptable, and the projected acceptance of others is more pronounced than for speeding.

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⁷ Values for attitudes towards phone use while driving are currently not published.

Figure 2. Percentage of car drivers personally accepting reading a message or checking social media/news while driving and perceived social acceptability of same behaviour. Source: Vias institute (2024)



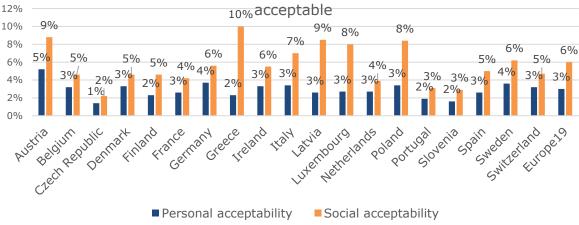
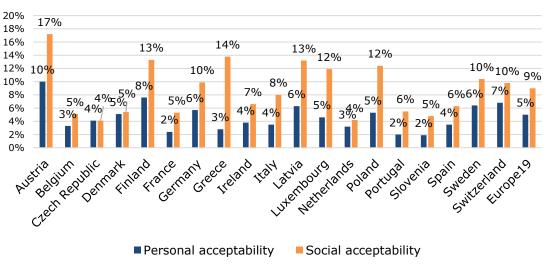


Figure 3. Percentage of car drivers personally accepting talking on a hand-held phone while driving and perceived social acceptability of same behaviour. Source: Vias institute (2024)

% of car drivers accepting talking on a hand-held phone while driving and perceiving it as acceptable



In an in-depth analysis of the ESRA data worldwide by Areal et al. (2024) suggest that among attitudes, norms and perceived behavioural control, the latter is the strongest predictor of self-reported use of talking on a hand-held mobile phone while driving. Meesmann et al. (2024) come to the same conclusion.

6. TSC approaches in education and awareness raising

As mentioned in the introduction, strengthening safe road user behaviour requires a change in values, beliefs and social norms. This cultural change applies not only to road user groups but also to all stakeholders involved in road safety (e.g., public authorities, infrastructure designers). Therefore, preventive efforts aimed at changing traffic safety culture should address these various actors and levels.

This chapter focuses on how to influence safety-relevant behaviours of road user groups (non-professional) using a TSC approach in education and awareness raising as examples. According to Lewis et al. (2019a) "road safety advertisement is a robust tool that can reinforce other countermeasures (e.g. enforcement) as well as transform community values and expectations" (p. 292). Campaigns therefore contribute to social, and behaviour change and thereby TSC.

To influence road safety-related behaviour, it is essential to understand the reasons for non-compliance, in order to address them and guide behaviour in the right direction or achieve a behavioural change. Therefore, a key element of incorporating TSC into prevention is understanding how TSC and its various components contribute to risky behaviours: "Road safety interventions should build on sound assessment (e.g. by surveys), which cultural factors (beliefs: behavioural, normative, control; attitudes) contribute in what strength to the current frequencies of a specific aberrant behaviour, what the intended behaviour – and the underlying attitudes and beliefs – is, and which are likely candidates to be addressed by interventions" (Machata et al., 2018, p. 12). Findings from the ESRA initiative, where those aspects of TSC were operationalized, could be used for a deeper understanding of risky behaviour of specific road user groups and planning targeted preventive activities (see Section 5). Based on this approach culture-related interventions could modify perceived norms, educate about risks and protection and improve safety-related skills (Machata et al., 2018).

Another important consideration when applying the TSC concept in the development of interventions is that culture is a group characteristic (see Section 2). "Culture is a characteristic of a group, not an individual, and talk of culture must always specify the relevant group." (Hopkins, 2018, p. 37). Individuals can belong to multiple sociocultural groups, each with their own set of social norms (e.g. families, peer groups).

When designing interventions, it is essential to consider the various groups with which individuals identify and participate in relation to road traffic (family, friends, peers, school, workplace, community, region, nation). Additionally, the specific group within which risky behaviour occurs should be clearly identified.

A systematic evaluation is another crucial component of TSC-based interventions. On one hand, it helps assess whether the intended effects have been achieved and identifies which components of the socio-cognitive construct have the greatest impact. On the other hand, it provides further insight into safety-relevant behaviours, which can serve as a basis for future interventions.

When considering which types of interventions are suitable for strengthening road safety culture and addressing different road user groups, awareness-raising campaigns are one example. Campaigns aim to influence road users' attitudes, norms, and ultimately motivate safe behaviours (Nævestad, 2021). Additionally, education plays a crucial role in shaping beliefs and values from an early age. One of the objectives of traffic safety and mobility education is "strengthening and/or changing attitudes and intrinsic motivations towards risk awareness, personal safety and the safety of other road users to contribute towards a safety-minded culture" (ETSC, 2023, p. 2).

Both types of interventions have a long-standing tradition in road safety. Research on road safety impacts and the improvement of preventive activities of this kind of interventions is widely available. Within the CAST (Campaigns and Awareness-Raising Strategies in Traffic Safety) project (Delhomme et al., 2009) manuals with detailed instructions on how to develop and evaluate targeted, theory-based campaigns to enhance their effectiveness were created (Delhomme et al., 2009; Boulanger et al., 2009). Further insights in theoretically guided message design and evaluation from a TSC perspective are given by Lewis et al. (2019b). An increased application of these guidelines for designing road safety campaigns could contribute to changing towards a positive TSC.

A guide on how to develop and evaluate activities and programmes for traffic safety and mobility education can be found in the LEARN!⁸ Manual (ETSC, 2021). Additional examples of specific traffic safety and mobility education initiatives are also provided.

⁸ The LEARN! project (Leveraging Education to Advance Road safety Now!) by the European Transport Safety Council (ETSC), Fundación MAPFRE and the Flemish Foundation for Traffic Knowledge (VSV), aims to improve the quality of traffic safety and mobility education in Europe by providing information, tools and resources to education experts as well as policy recommendations to decision makers.

The existing manuals and tools for developing and evaluating highquality road safety campaigns and education also highlight important aspects discussed within the TSC approach, including:

- In-depth analysis of the problem and its possible solutions using theories to explain and change safety-relevant behaviours
- Identification of specific target groups
- Conducting an evaluation of the developed intervention, including pre- and post-measurements based on a theoretical model.

For creating interventions based on TSC these tools are a starting point and other cultural aspects can be included. It is beneficial to embed campaigns into a bundle of measures pulling in the same direction (e.g., enforcement). This can support the messages of campaigns and increase acceptance of supporting measures (Lewis et al., 2019a). Enforcement as an example can be more effective when accompanied by campaigns, where risks of an illegal behaviour and the purpose of traffic law enforcement are explained (Turner et al. 2021; European Commission, 2024). This reinforcing role of campaigns from a TSC perspective is further described in Lewis et al. (2019a). Additionally, the ERSO thematic report *traffic law enforcement* gives detailed insights to enforcement measures (European Commission, 2024).

Subsequently, a successful example of a campaign is presented in which cultural factors influencing norms and safety-relevant behaviours were addressed through tailored design.

The MOST campaign aimed at reducing the prevalence of driving after drinking among 21 to 34-year-olds. A baseline survey revealed that the target group believed the average person their age in Montanan drove after drinking. One explanation for this perception is that individuals often overestimate the prevalence of risky behaviour within their social group to justify their own undesirable behaviour (Nævestad, 2021). The campaign's message was based on the survey's findings, aiming to influence the perceived social norm through its slogan "MOST Montana Young Adults [4 out of 5] Don't Drink and Drive". The evaluation study's results indicated that the campaign effectively reduced in the target group the perceptions regarding the frequency of impaired driving among their peers. This shift in perceptions correlated with a change in reported behaviour (Linkenbach & Perkins, 2005).

To further support a shift towards safer traffic behaviours and decision making, systematic monitoring and evaluation of TSC-based interventions are essential as well as making an effort to better understand the interaction between TSC constituents and strategies for change.

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