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Towards a Traffic Sustainability Culture: Integrating Safety and Sustainability in Line with the Stockholm Declaration

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Abstract

Traditionally, road safety policymaking is seen as part of transport, safety and security as well as public health policy, but increasingly, it is also considered a part of sustainability and vice versa. A turning point was the Stockholm Declaration, where road safety is seen as a prerequisite for public health and the reduction of the climate footprint by increasing the share of safe walking and cycling and promoting active mobility of children and young people. The expert recommendations that are the basis for the Stockholm Declaration refer to a sustainable goal integration approach, shortly referred to as "Integrated Approach" (STA 2019). An Integrated Approach can be seen as the next maturity level for an advanced safe system implementation and Traffic Safety Culture. In spite of this, there are very few studies of traffic culture which are in accordance with the Integrated approach. We therefore develop such a model.

The aims of the study are to:

1) Conduct a literature review to examine previous research on traffic sustainability culture, which includes both safety and other sustainability development goals (SDGs), in line with the Integrated goal approach of the 2020 Stockholm declaration, and
2) Develop a conceptual model of traffic sustainability culture which includes both traffic safety and other sustainability goals, in line with the Integrated Goal Approach.

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The model is important, as policy silos are a major barrier in transport planning. Traffic safety, climate change mitigation, public health, and social equity are often addressed independently. A conceptual model helps integrate these goals into a coherent framework, promoting synergies (e.g., promoting walking and cycling enhances safety, health, and emissions goals) and awareness of potential conflicts.

The study is based on a systematic literature review, reported according to PRISMA guidelines. The study examines the integration of traffic safety with broader SDGs (e.g., health, climate, equity, gender equality), focusing on a broader concept of traffic sustainability culture, encompassing SDG aspects. The study examines the alignment (or misalignment) of safety with sustainability goals in previous studies of mobility and traffic safety, defining traffic sustainability culture as shared ways of thinking and acting related to safety and sustainability in transport.

The point of departure for our model is the preliminary version of a traffic safety culture model (Figure 1), which distinguishes four analytically connected levels: System, Culture, Behaviour and Outcomes; forming a causal chain from policy structures to sustainability outcomes. System-level factors influence culture, culture shapes behaviour, and behaviour affects safety and broader SDG-related results. This structure clarifies how policy interventions may indirectly influence outcomes through cultural and behavioural mechanisms.

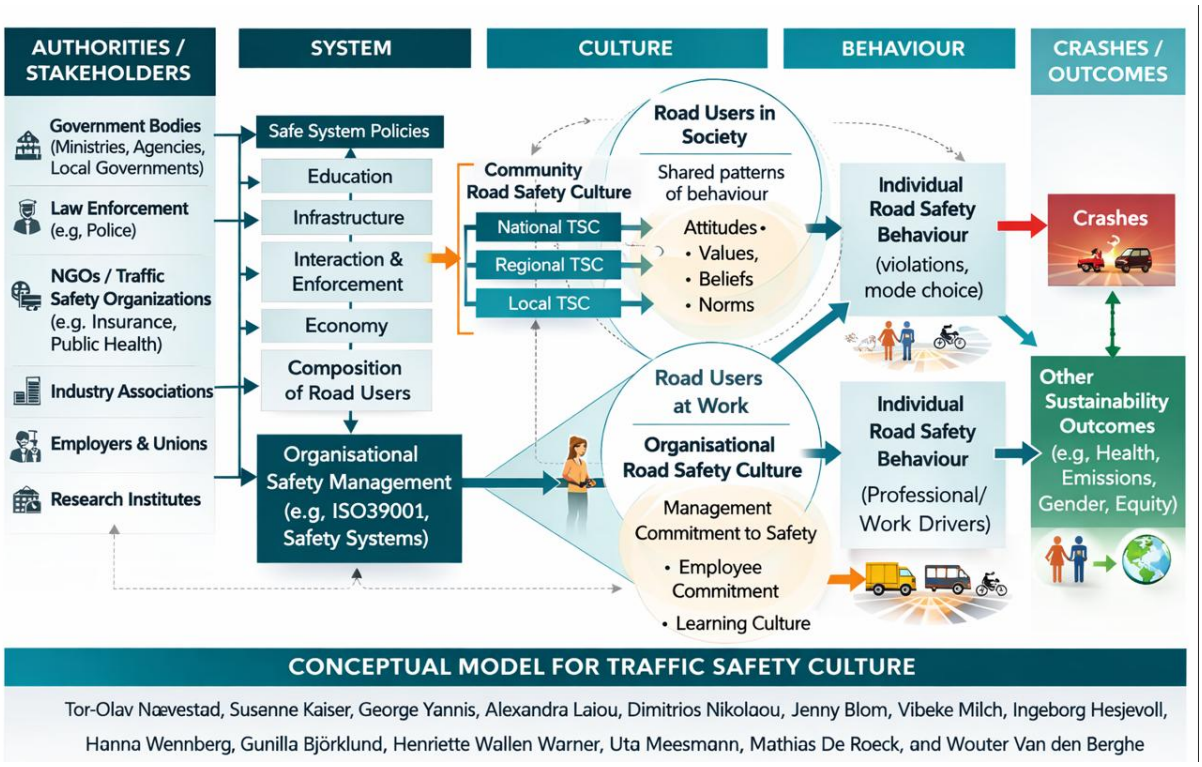

Figure 1 Model for traffic safety culture, used as point of departure, based on Nævestad et al (2019), Nævestad et al (2021) and Nævestad (2021). Image generated by Chat GPT 5.2.

The model separates between culture among three key groups: 1) private road users in society, 2) road users at work and 3) People working in road authorities and road safety and sustainability stakeholders (NGOs, insurance companies, unions etc.). Private road users in society denote e.g. the national, regional, local level, which are influenced by system factors like road safety policies, infrastructure, education, composition of road users etc.

At the system level, we have the factors influencing culture. People working in authorities and stakeholders (far left column) 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 roads and infrastructure etc.

When reviewing the studies identified in our systematic PRISMA literature review, we focus on the following questions:

1) Which SDGs do the studies focus on (e.g. traffic safety, gender equality, work environment, public health, liveable cities etc)?
2) What doe the studies find about the relationships between SDGs?
    a. Synergies? -what are the mechanisms in the synergies?
    b. Conflicts? -what are the mechanisms in the conflicts?
3) To what extent do the studies examine the relationships between the four analytical levels in the model? What information and results do they include about each level, related to SDGs, synergies and conflicts?
4) What do they find about the relationships between the levels, and which analytical mechanisms can explain it? To what extent do they include the full causal chain in the model?

In this abstract, we report preliminary findings from the review. The review is conducted from the perspective of the traffic safety SDG, focusing on traffic safety culture and traffic culture. Starting from about 2000 paper titles, the search identified relatively few studies, which includes several SDGs. Most of the studies focus on active mobility and (cultural) factors influencing mode choice, while some focus on drivers at work.

The review identifies both synergies and tensions between road safety and other SDGs across all four analytical levels of the model. At the system level, policy integration links road safety with public health (SDG 3), climate action (SDG 13), sustainable cities (SDG 11), gender equality (SDG 5), and decent work (SDG 8.8). At the culture and behaviour levels, active mobility is associated with combined safety, health, and climate benefits, partly explained by mechanisms such as safety-in-numbers and norm adaptation. However, the studies also highlight trade-offs. Increased exposure of vulnerable road users without adequate infrastructure may increase injuries. Car-oriented status norms and gender barriers may constrain modal shift. Furthermore, embedding safety within broader sustainability agendas may dilute accountability if governance structures are not clearly coordinated. Table 1 summarises the identified synergies, conflicts, and underlying mechanisms across the four analytical levels.

Analytical Level	Synergies (SDG reinforcement)	Mechanisms Behind Synergies	Conflicts / Tensions (SDG Trade-offs)	Mechanisms Behind Conflicts
1. System Level	Integration of road safety with public health (SDG 3), climate action (SDG 13), and sustainable cities (SDG 11). School-based interventions (e.g., Heart Zones) combining safety and active mobility. Embedding road safety within workplace and sustainability governance structures (SDG 8.8).	Infrastructure and system redesign. Cross-sectoral policy integration. Institutional anchoring and strengthened implementation capacity.	Road safety may shift from being treated as an absolute ethical commitment (Vision Zero) to one priority among several within sustainability agendas. Increased exposure of vulnerable road users without adequate system adaptation. Dilution of responsibility in multi-SDG governance contexts.	Insufficiently coordinated governance. Accountability dilution in integrated policy frameworks. Infrastructure failing to adapt to mobility transitions.
2. Culture Level	Development of norms supporting active mobility. Increased respect for vulnerable road users. Norm shifts toward safe and sustainable mobility.	Cultural adaptation and norm change. "Safety-in-numbers" effects through increased visibility and acceptance of active transport.	Car-oriented status norms. Gender norms limiting active transport participation (SDG 5). Social and climatic barriers, particularly in LMICs.	Deeply embedded cultural expectations. Social status associated with car use. Resistance to behavioural change.
3. Behaviour Level	Increased walking and cycling contributing simultaneously to improved health, reduced emissions, and potentially lower per-capita crash risk (safety-in-numbers). Changes in parental travel behaviour in school zones.	Behavioural adaptation through increased exposure. Modal shift toward active transport.	Increased injuries (e.g., single bicycle crashes) during early transition phases toward active mobility if infrastructure is inadequate.	Increased exposure without corresponding system adaptation. Misalignment between infrastructure, culture, and behavioural change.
4. Outcome Level	Simultaneous improvements in road safety (SDG 3.6), public health (SDG 3), climate mitigation (SDG 13), and sustainable urban development (SDG 11).	Combined effects of system, cultural, and behavioural changes.	Potential weakening of safety outcomes if sustainability measures are not accompanied by adequate safety measures. Empirical links between behavioural change and broader sustainability outcomes (e.g., climate, equity) are often assumed rather than demonstrated.	Assumed rather than empirically established causal chains. Uneven progress across SDGs.

Overall, only a small number of studies clearly model the causal relationships across all four levels: from system factors influencing culture, culture shaping behaviour, and behaviour affecting safety and sustainability

outcomes. Most focus on one or two levels, implying rather than fully analysing the dynamic relationships between them. This indicates a need for future studies examining all the important levels in the causal chain in the model. More such studies may facilitate deeper understanding of how policies can effectively promote SDG integration through the causal mechanisms outlined in the model.

The review adopts traffic safety (SDG 3.6) as the analytical entry point for examining SDG interactions. Accordingly, the literature search focuses on traffic safety culture. This perspective allows us to analyse how road safety both influences and is influenced by other SDGs across the four analytical levels (System, Culture, Behaviour, Outcomes). The findings indicate that SDG interactions are multidirectional and complex, with some goals reinforcing traffic safety and others potentially constraining it.

Our study indicates that synergies and conflicts between SDGs must be examined at each level in the model. For instance, although SDG integration is assumed at the system level, or the policy level, our study indicates that there may be conflicts between shared and informal norms at the traffic culture level.

Against this background, the need for systematic trade-off awareness becomes central. The main policy implication of our study concerns the need for increased trade-off awareness at the policy level. This entails, first, recognising synergies between SDGs, which should motivate the implementation of policies that advance multiple goals simultaneously. Second, it entails the explicit recognition that policy actions designed to achieve one objective may unintentionally undermine others, and that such tensions must be identified, assessed, and actively managed. In other words, trade-off awareness means identifying areas of alignment without assuming that all desirable objectives automatically reinforce one another, and systematically examining where conflicts may arise.

In conceptual terms, trade-off awareness entails the systematic identification and assessment of potentially competing policy objectives, such as mobility efficiency, traffic safety, and climate mitigation. It requires anticipating unintended consequences, evaluating short- and long-term effects, and considering distributional implications, including who benefits from, and who bears the costs of, particular policy choices. Furthermore, it implies a commitment to transparency in decision-making, especially where compromises between legitimate objectives are unavoidable.

In the context of road safety and sustainability, such tensions are evident in several common policy domains. For example, increasing speed limits may improve traffic flow and reduce travel times, but it is likely to increase crash severity and greenhouse gas emissions. Similarly, expanding road infrastructure may temporarily alleviate congestion, yet induce additional traffic demand, thereby undermining long-term climate and land-use objectives. Even policies widely regarded as environmentally progressive, such as promoting electric vehicles, may reduce tailpipe emissions while reinforcing car dependency and weakening incentives for active mobility and modal shift.

Trade-off awareness is particularly important within integrated policy frameworks such as the SDGs, where targets are inherently interlinked. Progress towards one target may reinforce another (synergy), but it may also undermine it (trade-off). Consequently, trade-off awareness constitutes a prerequisite for policy coherence. It helps ensure that decision-makers do not address one societal challenge while exacerbating another, that mitigation measures are designed where conflicts cannot be avoided, and that policy priorities are determined through informed and transparent deliberation.

Our study contributes to strengthening trade-off awareness by systematically mapping synergies and conflicts across the four analytical levels of the traffic sustainability culture model (System, Culture, Behaviour, Outcomes). This structured approach clarifies how SDG interactions operate through policy structures, cultural norms, behavioural practices, and resulting outcomes (cf. Table 1). While the Stockholm Declaration promotes an integrated approach, our findings indicate that policy integration alone does not guarantee alignment. Deliberate and explicit trade-off awareness is required to prevent road safety from being diluted within broader sustainability agendas and to ensure coherent progress across interlinked SDGs.

Keywords: Traffic safety culture, sustainability, Stockholm declaration