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A systematic review of traffic safety culture definitions

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INTRODUCTION AND OBJECTIVES

Introduction

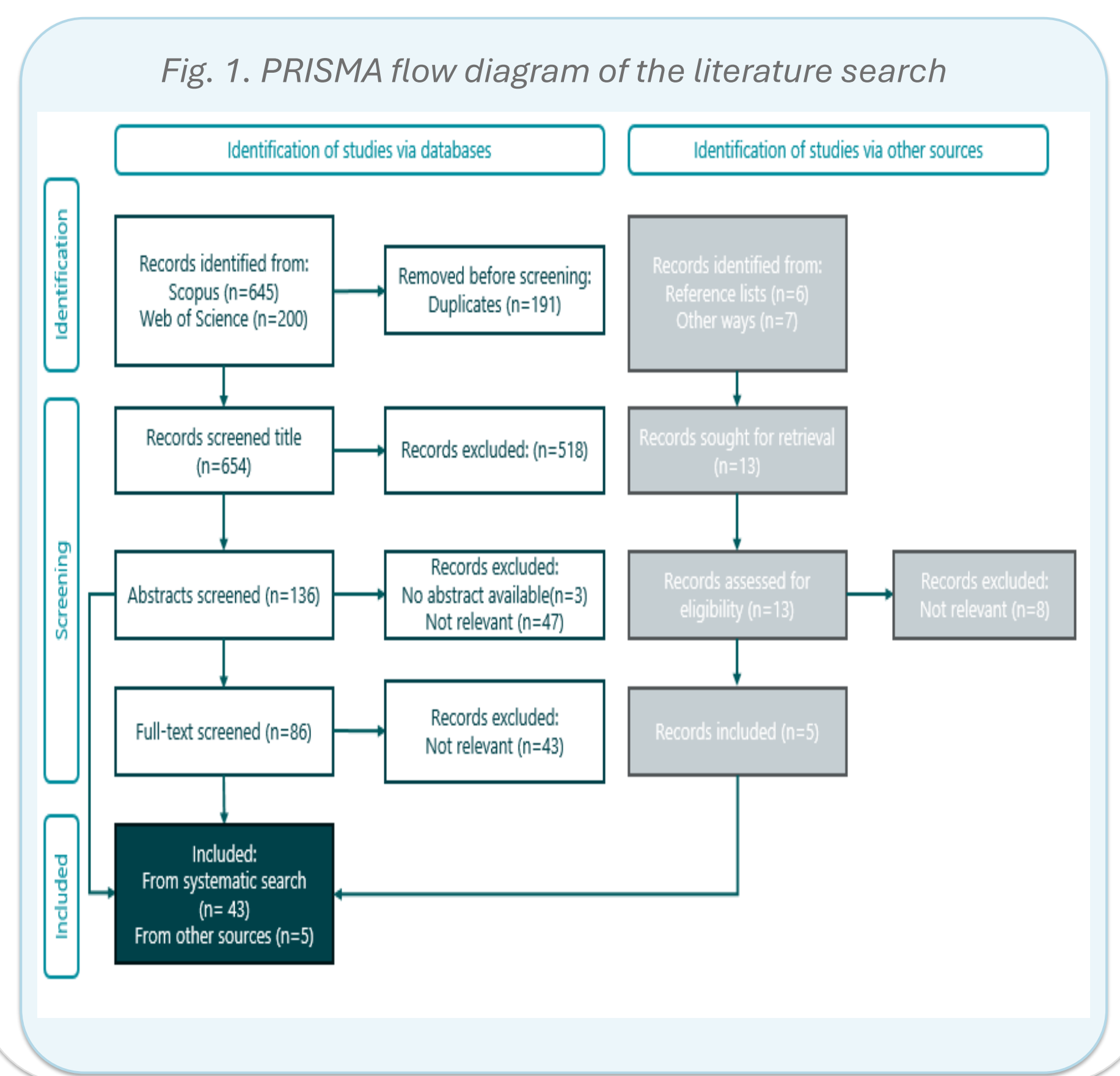
- Traditional road safety measures (driver behaviour, vehicle technology, infrastructure) have significantly reduced crashes – further progress requires complementary approaches.
- A safety culture perspective addresses cultural factors not targeted by traditional interventions; Traffic Safety Culture (TSC) is increasingly seen as a complementary lens for road safety research.
- Despite growing research since the 2010s, no consensus definition of TSC has emerged, creating conceptual ambiguity and methodological inconsistencies across studies.

Objectives

- Review existing definitions of Traffic Safety Culture (TSC) and Road Safety Culture (RSC).
- Identify recurring conceptual sub-dimensions across definitions.
- Examine how TSC has been operationalised in empirical research.

BACKGROUND AND LITERATURE

- Origins of safety culture research trace to the Chernobyl nuclear disaster (1986), where organisational deficiencies were identified as a contributing factor.
- Cultural explanations of driving behaviour appeared in the 1990s (Zaidel, 1992); explicit TSC frameworks emerged in the 2010s in the US, Australia, and Canada.
- Transferring safety culture from organisations to road users is challenging: private road users share little beyond mode and legal framework.
- Meaningful social units of TSC include families, peer groups, schools, communities, regions, and nations – where legislation, enforcement, education and infrastructure shape cultural patterns.
- Two closely related concepts: Traffic Safety Climate (perception-based, situational) and Traffic Culture (broader sociotechnical system).



METHODOLOGY AND DATA

Search strategy

- Databases: Scopus and Web of Science.
- Search string: (traffic OR road OR pedestrian OR cyclist OR bike OR car OR lorry OR moped OR motorcycle OR truck OR road user* OR bus OR taxi OR cab OR highway) AND safety AND (climate OR culture).
- Filters: titles & keywords; English language; articles and review articles only.
- Additional records identified from reference lists and other sources.

Selection process (PRISMA)

- 654 records identified through systematic database search.
- Duplicates removed (automatic + manual verification for spelling inconsistencies in author names).
- Title screening, abstract screening, and full-text screening conducted sequentially.
- Records assessed for relevance to TSC, Road Safety Culture (RSC), Traffic Culture (TC), or Traffic Safety Climate.
- Final sample: 48 papers included (43 from databases + 5 from reference lists / other sources).**

Data extraction & analysis

- From included papers, 25 explicit TSC / RSC definitions were extracted, along with the social unit of application stated by each author.
- Each definition decomposed into sub-constructs through inductive content analysis.
- 13 recurring sub-constructs identified and mapped across definitions (see Table 1).
- Operationalisation approaches catalogued: quantitative surveys, mixed methods, grounded theory, social media sentiment analysis, and crash data analysis.

Sample characteristics

- Publication period: 1992-2024 (most studies post-2010).
- Geographic spread: North America, Europe, Asia, Australia.

RESULTS AND DISCUSSION

Definitions of TSC

- 25 definitions extracted; 12 from two research groups, reflecting ongoing conceptual refinement.
- 3 definitions overly broad without measurement guidance.
- Most definitions conceptualise TSC through 1-5 sub-dimensions, primarily cognitive but also behavioural and motivational.

RESULTS AND DISCUSSION (continued)

Recurring sub-constructs

- 13 sub-constructs identified across definitions: beliefs, values, attitudes, norms, behaviour, risk perception, assumptions, knowledge/skills, perceived control, motivation, intention, commitment, meaning.
- Beliefs (n=13), attitudes (n=10), values (n=10), norms (n=9) are most frequently included.**
- Disagreement on relationships: some authors treat constructs as TSC components; others as outcomes / reflections of an underlying cultural system.

Table 1. Sub-constructs of TSC / RSC definitions

Author(s) of definition	Year	Construct	Beliefs	Values	Attitudes	Norms	Behaviour	Percept. (or risk)	Assumptions	Knowledge-Skills	Perceived control	Motivation	Intention	Commitment	Meaning	Social unit of application
Chen et al.	2012	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"that people share"
Edwards et al.	2014	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"shared by members of a community"
Lajunen et al.	2017	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"road users"
McDonald & Arthur	2014	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"shared within a meaningful defined group"
Mishra & Mehra	2022	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"a group of people"
Myers et al.	2014	n.a.	•	•	•	•	•	•	•	•	•	•	•	•	•	n.a.
Nevestad	2021	TSC/RSC of non-prof. road users	•	•	•	•	•	•	•	•	•	•	•	•	•	"among non-professional road users"
Nevestad & Bjornskau	2012	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"shared by members of particular groups"
Nevestad et al.	2019a	RSC	•	•	•	•	•	•	•	•	•	•	•	•	•	n.a.
Nevestad et al.	2019b	RSC	•	•	•	•	•	•	•	•	•	•	•	•	•	n.a.
Nevestad et al.	2022	RSC	•	•	•	•	•	•	•	•	•	•	•	•	•	n.a.
National Academies	2018	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"shared among groups of road users and stakeholders"
Otto et al.	2016	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"shared among groups of road users and stakeholders"
Pietrek	2023	SC (at individ. level)	•	•	•	•	•	•	•	•	•	•	•	•	•	"individual employees of transport companies"
Stringer	2018	Community TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	n.a.
Sucha et al.	2016	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"shared by the given society"
US DOT	2011	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	n.a.
Ward & Özkan	2014	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"of subgroups within society"
Ward et al.	2010	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"people"
Ward et al.	2014	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"drivers"
Ward et al.	2019a	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"of a group of people"
Ward et al.	2019b	TSC	•	•	•	•	•	•	•	•	•	•	•	•	•	"of a group"

CONCLUSIONS

Conceptual gaps

- TSC remains theoretically fragmented; multiple definitions, varying operationalisation – limited agreement on how constructs relate or should be measured.
- Greater conceptual clarity and methodological standardisation are essential for cross-study comparison and policy use.

Implications for road safety

- Communication campaigns: target shared norms, beliefs and expectations within peer groups, families, schools and communities.
- Diagnostic tools: cognitive, behavioural and motivational sub-dimensions provide a structured basis for tailored interventions.
- Policy: integrate TSC indicators into national road safety strategies and monitoring frameworks alongside engineering, enforcement and education.
- Measurement: develop standardised TSC tools embedded in road safety observatories for ongoing evaluation and benchmarking.

The TRUST project (<https://trafficsafetyculture.eu/>) is advancing a coherent TSC definition and methodology.



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