Project No. 101069500—AfroSAFE

AfroSAFE: Safe System for radical improvement of road safety in low- and middle-income African countries

HORIZON EUROPE—European Union's funding programme for research and innovation

Deliverable 5.2
Mapping of Road Safety Culture

Deliverable due date: 28.02.2024

Project start: 1.09.2022
Duration: 48 months

Lead contractor for this deliverable:

Institute of Transport Economics, Norway

Version 1.0 (2024.06.30)

Dissemination Level

PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Project funding

Horizon Europe
Grant Agreement 101069500

Revision and History Chart

Version	Date	Comment
1	2023-08-10	Template draft
2	2023-10-11	Revised template draft
3	2024-05-01	Revised template
4	2024-06-30	First official version

The present document is a draft; the approval from the EU Commission is pending.

Table of Contents

Summary vi
1 Introduction 1
1.1 Background 1
1.2 Aims 2
1.3 Study design 2
1.4 The AfroSAFE project 3
2 Theoretical approach previous research 4
2.1 Conceptual background 4
2.2 Previous research 6
2.3 Hypotheses 10
3 Methods 11
3.1 Explorative approach to national RSC 11
3.2 Interviews and focus groups 11
3.3 Fieldwork 12
3.4 Quantitative survey 12
4 Results 16
4.1 Description of the respondents 16
4.2 Accident involvement 20
4.3 Road safety violations 21
4.4 Fieldwork results 23
4.5 Elements of road safety culture 24
4.6 Factors influencing safety outcomes 29
4.7 Factors influencing elements of road safety culture 34
5 Discussion 41
5.1 Overarching objectives 41
5.2 Accident involvement and road safety violations 41
5.3 Where do we see the biggest differences between the RSCs of the European and African respondents? 41
5.4 Which elements of RSC are most important in explaining safety outcomes? 42
5.5 Why don’t we see bigger differences between road safety violations? 44
5.6 Summing up the main results 45
5.7 Which factors influence road safety culture? 45

5.8 Influencing elements of road safety culture 48
5.9 Do we need to change the society to change the road safety culture? 50
5.10 Methodological weaknesses and strengths 51
5.11 Issues for future research 53
6 Conclusions 56
7 Acknowledgements 57
8 References 58

Summary

Traffic fatality rate (per population) in Africa is the worst among all world regions, and is 4 times higher than in EU-countries. In recent years, the concept of safety culture has been applied to road safety, and it has been suggested that differences in national road safety culture (RSC) perhaps can contribute to explaining differences between road safety records and road safety behaviours between countries. The present study therefore provides a case comparison of road safety culture in three African countries (Tanzania, Ghana, Zambia) with three EU countries with record of excellence in traffic safety and practicing Safe Systems principles (Norway, Netherlands and Sweden). We compare RSC among car drivers and pedestrians across countries. The study is based on a quantitative survey with about 3800 respondents, as well as qualitative interviews and fieldwork.

The overarching objective of the study is to identify the elements of national RSC where we see the biggest differences between the African and the European countries, and the elements of RSC that are most strongly related to road safety outcomes (e.g. road safety violations and accident involvement). We want to examine to what extent we can use the concept of RSC to shed light on different road accident risk levels in the European and the African countries.

Our survey indicates that the accident involvement among the African respondents is three times higher than among the European respondents. We also find higher levels of road safety violations among car drivers in the African countries. Multivariate regression analyses indicate a relationship between accident involvement and road users' road safety violations.

We compare elements of national RSC among car drivers and pedestrians in European and African countries, to identify the elements where we see the biggest differences. The first element of national RSC is descriptive norms, which refer to individuals' perceptions of what driver in their country actually do. The link between RSC measured as descriptive norms and road safety violations is a subtle social pressure to act as others do. Results indicate that African respondents expect a somewhat higher level of road violations from drivers in their countries. It is, however, important to note that the differences between countries within the continent were considerable.

The second element of RSC that we focus on is fatalistic beliefs, which refer to a tendency for individuals to view life events as predetermined and inevitable. The link between RSC 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. This is where we saw the biggest difference between the road users in the African and the European countries. We have several questions measuring fatalistic beliefs, but two examples can be mentioned to illustrate. First, a total of 40% of the African respondents agreed with the statement: "I believe that some people die in road crashes as punishment for some bad deeds", while 5% of the Europeans agreed. Second, a total of 65% of the African respondents agreed in the statement: "I believe that spiritual intervention, such as prayers, can prevent road crashes", while 4% of the Europeans agreed.

The third element of RSC that we focus on is values and attitudes related to freedom to take risk in traffic, and paternalistic attitudes. The link between RSC measured as attitudes focusing on freedom to take risks in traffic and road safety violations is that individuals have a right to take risks, that "risk taking" is not dangerous for "capable" individuals, and that the state should refrain from interfering. Although we found differences across national contexts, we did not see big differences between the African and European respondents in general on this issue.

Multivariate analyses examining factors influencing road safety violations, indicate that all these RSC elements influence road safety violations. Thus, we see a relationship between elements of RSC, road safety violations and accident involvement, indicating the importance of RSC for road

safety in both the African and the European countries. However, the RSC element which was particularly different was fatalistic beliefs.

We also discuss the factors influencing the different elements of national RSC. Descriptive norms are created in interaction, influenced by factors like road infrastructure, enforcement, training, composition of road users, economy, degree of urban planning, the existence of a well-functioning public transport system etc. Fatalistic beliefs, on the other hand, are influenced by integrated and deep-seated part of religious views and related to religion. Finally, attitudes focusing on freedom to take risk and paternalism are part of ideological and political views. Thus, we see that national RSC are influenced by several different spheres of society, and that it often is intertwined with underlying social, economic and religious structures.

We also discuss how to influence elements of RSC to improve road safety in the African and the European context. To influence descriptive norms, we might need to influence factors shaping interaction, e.g. road infrastructure, enforcement, training, composition of road users, economy, the degree of urban planning, the existence of a well-functioning public transport system etc. Influencing fatalistic beliefs is likely to be a task for priests, imams and religious representatives in African countries. Fatalistic beliefs are in a way a competing approach to Safe system, as it assumes that humans cannot prevent road accidents, as they are caused by the will of God. According to fatalistic beliefs, road users' risk taking will not make a difference for the will of God; nor will Safe System policies. Thus, fatalistic beliefs may impede both road safety policies and road users' safety behaviours. Priests, imams, and other religious representatives in the African countries need to nuance and counter such views in the future. It seems that the Safe system also needs to expand to the religious sector in the African countries to be effective. Finally, we suggest that influencing attitudes focusing on freedom to take risk in traffic is an issue for politicians and political parties.

Based on our survey results, we discuss whether our comparisons of road safety violations and descriptive norms indicate smaller differences between the African and European countries than we would expect, given the large differences in road fatalities per capital in the African and European countries. Our qualitative fieldwork data indicate that there are some aspects of RSC that we have been unable to measure quantitatively in our survey, e.g. a culture focusing on road users' ambition to "get ahead in traffic at almost any cost". Few markings and less physical separation than in Europe, including congestion, creates a more chaotic, hectic, and unregulated traffic environment in the African countries than in the European countries, with a lot of conflicts and near misses in traffic, and ultimately also accidents. In addition, we often observed risk behaviour that is unthinkable in a northern European context (e.g. people sitting on truckloads in traffic, families on motorcycles). These are types of behaviour and culture different from what is typically captured in European DBQ studies, which to a considerable extent presupposes a more well developed and well-regulated road infrastructure and road system than what we see in the African countries. This indicates important areas for future research

Clearly, we cannot use this study to determine the importance of RSC when it comes to explaining the different road accident risk levels in the European and the African countries. Our study indicates, however, that the element of national RSC where we see the biggest differences between the African and the European countries is related to fatalistic beliefs about road safety. Additionally, we see that these beliefs are related to road safety violations, which in turn are related to car drivers' and pedestrians' accident involvement. Thus, influencing fatalistic beliefs regarding road safety are likely to improve road safety in the African countries.

1 Introduction

1.1 Background

According to WHO estimates, 1.19 million deaths occur in traffic each year (WHO, 2023). The low- and middle-income countries are the main location of traffic safety problems globally, standing for 93% of traffic fatalities, a share which is completely out of proportion, if accounted for their populations and vehicle fleets (Academic Expert Group, 2020). Traffic fatality rate (per population) in Africa is the worst among all world regions and is 3 times as much as in Europe (4 times in comparison to EU-countries). There has been a constant growth in African traffic fatalities and the number is expected to increase by another 68% over the next decade if nothing is done.

Comparing road safety violations between the European and the African context, WHO (2016) states that although few African countries collect road safety behaviour indicators, existing data indicate that road safety violations differ substantially, with a very high risk tolerance among road users in some African countries. This means e.g. very low seat belt use (e.g. as low as 18%) and low helmet use for drivers (e.g. as low as 15%) and a high share of road traffic deaths attributable to alcohol impairment (e.g. as much as 60%) (WHO, 2016).

In recent years, the concept of safety culture has been applied to road safety, and it has been suggested that differences in national road safety culture (RSC) can contribute to explaining differences between road safety records and road safety behaviours between countries (Ward et al, 2019; Nævestad et al, 2019). Nævestad (2021) define road safety culture as shared norms, beliefs, assumptions providing frames of reference that guides individuals' interpretations of actions, hazards, and their identities, and which motivate and legitimize behaviours that have an impact on safety, and which are created through interaction within groups.

There are, however, few studies of national road safety culture, and there is a need to develop and test conceptualizations and mechanisms, explaining the relationship between RSC, road safety violations and accident involvement. Nævestad et al (2019) find, in a comparison between RSC in Greece and Norway, among private and professional drivers, that the Greek RSC was characterized by more aggression and violations than the Norwegian RSC. They also find that the different national RSCs are related to professional and private drivers' road safety violations, which in turn are related to accident involvement. Thus, they suggest that the different RSCs perhaps may shed light on the different accident records in the two countries (20 road deaths per million inhabitants in 2017 in Norway and 69 in Greece). Nævestad et al (2019) suggest that national RSC is influenced by several underlying factors like interaction between road users, infrastructure, education, enforcement, economy the composition of road users etc.

These factors are clearly different when we compare African and European countries, although it is important to stress that there are also large differences i between countries in Africa and Europe. However, experiences on the ground, on roads in European and African countries, indicate generally different types of infrastructure, different types of road users and higher risk tolerance in the African context, as indicated by the WHO (2016) study. Thus, the two continental contexts seem suitable for a comparison of RSC. As the field of national RSC research needs empirical studies that can serve as a backdrop for development of conceptual models and testing of these, a comparison of the African and European context seems warranted.

In the present study, we therefore compare road safety culture in three European countries (Norway, Sweden, Netherlands) which have had the best safety records in the world for several years, with three African countries (Ghana, Tanzania, Zambia), with poorer road safety records. Comparing WHO (2024) estimated numbers of road fatalities per million capita in 2021, the numbers in Norway, Sweden and the Netherlands were 15, 21 and 34 killed per million inhabitants, while the numbers in

Ghana, Zambia and Tanzania were 259, 171 and 158 killed per million inhabitants.[1] Thus, the fatal road accident rate per capita is on average 8.4 times higher in the three African countries than in the three European countries. Additionally, the three European countries are pioneers in the field of Vision Zero and Safe system implementation in road transport. This European policy context is likely to be related to national road safety culture, e.g. higher acceptance for paternalistic measures and less focus on individual freedom to take risk (Elvebakk, 2015).

In the present study, we examine whether and how these differences also reflect differences in RSC in the European and African countries. We also examine the relationship between national RSC and road safety violations.

1.2 Aims

The present deliverable provides a comparison of road safety culture in three African countries (Tanzania, Ghana, Zambia) with three EU countries with record of excellence in traffic safety and practicing Safe Systems principles (Netherlands, Norway and Sweden).

The overarching objective of the study is to identify the elements of national RSC where we see the largest differences between the African and the European countries, and the elements of RSC that are most strongly related to road safety outcomes (e.g. road safety violations and accident involvement. We want to examine to what extent we can use the concept of RSC to shed light on different road accident risk levels in the European and the African countries.

In this study the aim is to compare three European countries with another three African countries when it comes to:

1) Accident involvement among car drivers and pedestrians.
2) Road safety violations among car drivers and pedestrians.
3) Elements of national RSC among car drivers and pedestrians (to identify the elements where we see the biggest differences).
4) Factors influencing safety outcomes (accidents, road safety violations) focusing especially on different elements of national RSC (to identify the elements that are most strongly related to behaviours).
5) Factors influencing the different elements of national RSC.
6) How to influence elements of RSC to improve road safety in the African and the European context.

1.3 Study design

We focus on three different elements of national RSC in the study. The first element of national RSC is descriptive norms, which refer to individuals' perceptions of what other people actually do (Cialdini et al 1990). The second element of RSC that we focus on is fatalistic beliefs, which refer to a tendency for individuals to view life events as predetermined and inevitable (Esparza et al., 2015; Boua et al 2024). The third element of RSC that we focus on is values and attitudes related to freedom to take risk in traffic, and paternalistic attitudes (Elvebakk, 2015).

We compare RSC elements among car drivers and pedestrians in the six countries, thus comparing RSC across transport modes. We focus on pedestrians, as vulnerable road users (VRUs) are the largest but most underprivileged road user group in Africa, disproportionally impacted by traffic accidents with fatalities share of 44% (WHO, 2018). The different levels of Safe system implementation suggest differences in RSC related to vulnerable road users in northern European countries and in

[1] The numbers are based on estimates from WHO (2024). The estimates from WHO are different from the official numbers of fatal accidents reported by national authorities, especially in the African countries. In Tanzania, the WHO estimated number of road fatalities is seven times higher than the official number reported by national authorities.

African countries. The studied European countries are Safe system pioneers, which involves a pedestrian friendly infrastructure, with a high degree of physical separation between vulnerable road users and cars. Previous studies indicate that high traffic volumes, insufficient pedestrian road infrastructure and lacking respect shown by drivers to pedestrians contribute to high risk perception among pedestrians in LMIC (Aceves-Gonzalez et al, 2020).

The study provides a good point of departure to examine national RSC, by comparing different groups of road users within and across countries. The study provides an opportunity to examine whether:

1) Different elements of RSC (e.g. descriptive norms, attitudes) are shared among different modes of transport (pedestrians, car drivers, drivers) within each country, but different across countries, and whether

2) Elements of RSC are relatively similar within the European and the African countries.

If so, we can discuss the importance of influencing factors that are similar in the African and the European contexts, e.g. related to different levels of Safe System implementation (e.g. infrastructure). Moreover, it is also important to note that we study two different groups of road users, ranging on a scale from formally "untrained" road users (pedestrians), to road users who have been trained for a period (car drivers). What these actors share, however, is their experience in traffic. Thus, if these different actors attribute the same level of road safety violations to car drivers in their country, it is an indication of shared national patterns of expectations (i.e. a national RSC).

1.4 The AfroSAFE project

The present study is part of the EU-funded AfroSAFE project (Grant agreement ID: 101069500). The primary objective of the AfroSAFE project is to make a significant progress in propagation of the Safe System modus operandi within the road safety work context in African countries. This is reached by exposing the local practitioners and decision makers to the state-of-the-art knowledge and practices within road safety management based on Safe System principles, as well as supporting them by sharing necessary knowledge, tools and methods for road safety improvement—adjusted to the African conditions and in tight cooperation with the local actors. The present deliverable is part of Work Package (WP5) in the AfroSAFE project, and the objectives of WP5 are to**:**

- Review current procedures, practices and methodologies of national road safety work concerning road users in the African participating countries and compare them to EU countries, which have applied a Safe System approach to road safety.
- Map Road Safety Culture (RSC) in the African participating countries and benchmark it against selected European countries (e.g., Sweden, Norway, the Netherlands) which have applied the Safe System approach.
- Carry out relevant pilot studies to introduce the mind-set of the Safe System approach, focusing on vulnerable road users, enforcement, transport companies and driver education

2 Theoretical approach previous research

2.1 Conceptual background[1]

2.1.1 Organisational safety culture

Since its first use in the wake of the Chernobyl accident in 1986, the organisational safety culture concept has become an established part of safety research. Although it has especially been applied in high-risk settings like the nuclear industry and in aviation, the relationship between organizational safety culture/climate and safety outcomes is robustely documented in studies reporting experiences across organizations, industries and countries (Zohar 2010). The crucial importance of safety culture is also documented in a range of accident investigations. Additionally, high quality studies of safety culture interventions, with pre- and post-measurements, test and control groups, have indicated up to 60% decrease in accidents in the road sector (Gregersen et al. 1996).

Organizational safety culture can be defined as "safety relevant aspects of culture in organizations" (Antonsen, 2009, Hale, 2000, Nævestad, 2010). Safety culture provides frames of reference that guides individuals' interpretations of actions, hazards, and their identities, and which motivates and legitimizes behaviours that have an impact on safety, and that such shared frames of reference are created through interaction within groups (Nævestad 2021).

It should also be mentioned that several scholars on culture in organisations discern between different levels of culture. Schein (2004) discerns between three different levels. Culture at the deepest level refers to underlying assumptions (beliefs, perceptions, thoughts and feelings) influencing what we pay attention to, what things mean, how we react emotionally, and how we act. Organisational culture at the middle level refers to the espoused beliefs and values, e.g. explicit strategies, goals and philosophies, while organizational culture at the most superficial level refers to artifacts, e.g. visible organisational structure and processes.

Quantitative studies of organisational safety culture are often referred to as studies of safety climate, which can be conceived of as «snapshots», or manifestations of safety culture (Cox & Flin 1998). The concepts of culture and climate are, however, often used interchangeably. Based on Schein's depiction of different layers of culture, we may state that safety climate only gives access to the most superficial levels of safety culture; perceptions of managers' and colleagues' commitment to safety, perceptions of incident reporting, perceptions of procedures, safety training etc.

The qualitative studies involve research interviews and/or time-consuming field works, where researchers interact with people over long periods of time to learn how they see the world, how they think etc. Qualitative studies of safety culture focus on how it guides individuals' interpretations of actions, hazards and their identities, and motivates and legitimizes behaviours that have an impact on safety (Antonsen 2009, Nævestad, 2010a; 2010b). These studies may give us access to the «deeper» levels of safety culture; the more implicit and taken for granted basic assumptions and «tacit knowledge» (cf. Schein 2004; Haukelid 2008).

2.1.2 Studies of road safety culture among professional road users

As drivers at work are members of organizations, they have been subjected to organizational safety culture/climate studies, which have documented a relationship between culture/climate and safety outcomes (e.g., behaviours, near misses, accidents) (Davey et al 2006; Wills et al 2005; Huang et al 2013; Öz et al 2013). In a European context, about 40% of fatal accidents in Norway involve drivers at work (Nævestad et al 2015). Most of these are members of organizations, and thus susceptible to organizational safety culture measures.

[1] This outline is based on Nævestad's (2021) encyclopedia article about road safety culture.

Studies of organizational safety climate among professional (or work-related) drivers or driver at work in road transport often combine organizational safety climate questionnaires combined with questionnaires measuring safety outcomes like self-reported driving behaviours (e.g. the Driving Behaviour Questionnaire) and self-reported accidents (cf. Davey et al 2006; Öz et al 2013). Apart from also focusing on management commitment to safety, like most of the studies of safety climate independent of sector do, the studies of safety climate in road transport organisations also measure safety climate aspects like e.g. the supervisor's role, (adequacy of) fleet safety rules, communication and support, work pressure, driver training, colleagues' influence, competence etc. The studies also often include questions on perceived time pressure, and other work-related factors related to efficiency, e.g. commission pay, bonus and reward systems. The studies generally find that positive organisational safety culture/climate scores are related to lower incidences of road safety violations (Davey et al, 2006; Öz et al, 2013). Previous studies have also found relationships between time pressure, stress, and road safety violations (Davey et al, 2006; Öz et al, 2013). Davey et al. (2006) suggest that higher perceived levels of work/pressure stress are related to mistakes for professional drivers, while Öz et al. (2013) find that higher perceived levels of work/pressure stress are related to errors and violations.

2.1.3 Road safety culture among non-professional road users

It seems even more important to employ the safety culture perspective to non-professional road users, as these include high risk groups, like those who are too young or too old to be employed by work organisations, and which also includes road users who are in the traffic in high-risk contexts, e.g. in weekends, at evening/nights, with friends. Employing the safety culture concept to these groups, involves however shifting the focus to other social units than organisations, e.g. nations, communities, peer-groups, families (Nævestad and Bjørnskau, 2012). There are several challenges related to this, as some these sociocultural units may be less well defined than e.g. work organisations (Nævestad and Bjørnskau, 2012).

Although scholars seem to agree that safety culture also is important for non-professional road users, there are still no definitions of road safety culture that are commonly accepted by road safety researchers. In 2014, Edwards et al noted that a compendium following from a workshop about road safety culture, arranged by the American Automobile Association (AAA, 2007), comprised the bulk of literature on road safety culture. The few definitions given in this compendium focus on e.g. the "beliefs, norms and values and things people use that guide their social interactions in everyday life" (Moeckli & Lee, 2007), "implicit shared values and beliefs", "common practices, expectations and informal rules that drivers learn by observation from others in their communities" (Lonero, 2007). There seems, however, to be agreement that road safety culture among non-professional road users can be viewed as a different application of the same foundational concept as organisational safety culture (Edwards et al, 2014). This means e.g. drawing on the understanding and definition of Schein (2004) and other conceptualisations of organisational safety culture. Thus, we may e.g. define safety culture among non-professional road users as e.g. shared norms, beliefs, assumptions providing frames of reference that guides individuals' interpretations of actions, hazards, and their identities, and which motivates and legitimizes behaviours that have an impact on safety, and which are created through interaction within groups. This definition can be applied to the national level, the community level, to smaller peer groups and families (Nævestad, 2021).

Safety culture is generally (re)created through interaction processes in groups, and based on the discussion above, we may hypothesize that this interaction is influenced by factors located at different analytical levels (Nævestad and Bjørnskau 2012). At the more general level, we may hypothesize that national road safety culture is created through processes involving road user in the same country. Several factors that could influence road safety culture are national (e.g., traffic rules, the police enforcing the rules, infrastructure, education, interaction among road users). For these reasons, we could expect the existence of different national road safety cultures. Moreover, studies comparing road safety in countries find considerable variations between national road safety records (these even

vary with a factor of up to ten between EU-countries), and between self-reported road safety violations, measured by means of the DBQ (Warner et al, 2011). In accordance with this, studies find national differences between national road safety cultures (Nævestad et al, 2019).

2.2 Previous research

2.2.1 Road safety violations and culture in African and European countries

There are few studies linking cultural factors with road safety, and even fewer studies comparing road safety culture across African and European countries. And there are as far as we know, no studies comparing RSC among both car drivers and pedestrians in European and African countries. There are, however, a few recent examples of studies of road safety violations and/or RSC in African countries, which compare with European data.

Safer Africa. There is one study examining road safety culture in African countries, which has been conducted in the Safer Africa project (Cestac et al, 2019). The study is labelled a pilot study, and it is based on qualitative interviews and results from a small quantitative survey sample (n=209) from a total of 11 African countries. Only one country, Burkina Faso (n=126), produced enough responses to the questionnaire to be analysed. The qualitative part of the study is based on in-depth interviews with local road safety experts (from Burkina Faso, Cameroon, Ghana, Kenya and Tunisia). Although this study does not systematically compare road safety culture in African and European countries, results in the African countries are discussed in light of comparable results from a recent French sample. The study also provides a thorough discussion of the RSC concept and previous research.

Results from Cestac et al (2019) show that the main issues in the investigated countries are: the safety of vulnerable road users, respect of the law by road users, bribery, and awareness about road risks. In the analysis of the survey data, cultural values and religious beliefs were found to influence risk perception and risk taking. Religious affiliation was a strong differentiator of relation to risks, and Cestac et al (2019) recommend that public policies will need to be adapted and developed accordingly. In particular, they highly recommend increasing education efforts and to fit them to the local cultures.

Cestac et al (2019) discusses the interaction between the driving environment and the RSC, indicating that RSC constitutes an "X-factor", that may explain differences that cannot be attributed to traditional variables known to influence road safety:

> Countries' differences in road safety performances are often explained by differences in driving environment. Several factors such as mobility habits, vehicle fleet, roads network, public transportation network, traffic laws, or level of education and enforcement constitute this driving environment. If it seems obvious that these factors indeed have an impact on road safety, still some countries, or states, with comparable driving environments have very different traffic fatalities patterns. These remaining differences could be related to cultural specificities. (Cestac et al 2019: 6).

The sample in Cestac et al (2019) is, however, too small to study this systematically in the included countries.

ESRA2 survey. The ESRA project (E-Survey of Road users' Attitudes) is a joint initiative of research organisations and road safety institutes across 60 countries aiming at collecting comparable (inter)national data on road users' opinions, attitudes and behaviour with respect to road traffic risks. The themes covered are among others: self-declared behaviour, attitudes and opinions on unsafe traffic behaviour, enforcement experiences and support for policy measures. The ESRA survey addresses different road safety topics (e.g. driving under the influence of alcohol, drugs and medicines, speeding, distraction) and targets all types of road users. This survey originates from

Europe, but it has also been expanded to include other countries, e.g. African countries (Torfs et al, 2021).

The ESRA2 survey comparing Africa and Europe (Torfs et al, 2021), is based on the second edition of the global ESRA2 survey, which was conducted between 2018-2020. ESRA2 collected data from about 45 000 road users in 48 countries, of which 12 countries on the African continent: Benin, Ivory Coast, Cameroon, Egypt, Ghana, Kenya, Morocco, Nigeria, Tunisia, Uganda, South Africa, Zambia. More than 7500 road users were surveyed in these countries in total. The ESRA 2 survey is unique, as comprehensive survey safety data are rarely available from African countries (UNECA, 2015). In the following, we present the main results from the ESRA2 survey, as outlined in Torfs et al (2021):

When it comes to **exposure**, the top 3 of most used transport modes during the last 12 months in the participating African countries are (1) pedestrian (94%), (2) car passenger (87%) and (3) taking a taxi (86%). A share of 67% answered car as a driver The lower prevalence of car driving in the majority of African countries is related to the fact that car ownership is not as widespread as in Europe.

The self-reported prevalence of **speeding** of African car drivers generally is lower than in Europe. An opposite pattern is found for motorcyclists: African motorcyclists report more often than the European riders to have exceeded speed limits outside built-up areas (42% vs. 20%).

Driving under the influence (DUI) of alcohol and drugs. The findings showed that numbers of drink driving in Africa are similar to those in Europe. However, they find that twice as many African respondents reported that their friends would drive after drinking alcohol compared to European respondents (13% vs. 7%).

Seatbelt and use of protective equipment. Almost three out of four African respondents reported that they did not wear a seatbelt as a passenger on the back seat, even though the African respondents indicate that they do not find such a behaviour acceptable (only 9% of the car drivers finds it acceptable). Almost half of the African motorcyclists did not use a helmet in the past 30 days.

Distracted driving. About half of car drivers reported having made a hand-held phone call while driving in the past 30 days, and about one third of the motorcyclists used their mobile phone while riding in the past 30 days.

(Torfs et al, 2021)

Driver Behaviour Questionnaire (DBQ) studies. Road safety violations are generally measured by means of the Manchester driver behaviour questionnaire (DBQ). The DBQ originally distinguished between three types of aberrant behaviours, based on Reason et al. (1990): lapses, errors, and violations. Lapses typically involve problems with attention and memory. Errors typically involve observation failures and misjudgements. Violations involve deliberate deviations from safe driving practices (cf. Lajunen et al, 2003). There are several cross-cultural studies of safety behaviours using DBQ items among private drivers (e.g., Özkan et al, 2006; Warner et al, 2010).

Although few studies systematically compare DBQ items across African and European countries, some studies of DBQ items in African countries compare with previous results from European countries. Dotse and Rowe (2021) states that little is known about how well models of driver crash risks from the developed world apply to drivers in African low- and middle-income countries, and that the applicability of the DBQ to Africa is currently unknown. They analyse the DBQ in a sample of 453 Ghanaian drivers. They find that both violations and errors were independently correlated with self-reported crash involvement and that violations correlated with self-reported traffic citations. Moreover, they conclude that both violations and errors were higher in Ghana than typically reported in the UK (Dotse and Rowe, 2021).

Pedestrian Behaviour Questionnaire (PBQ) studies. There are, to our knowledge, few (or no) studies comparing pedestrian RSC across national contexts, but there are several studies of pedestrian behaviour across countries using pedestrian behaviour (PBQ) scales (e.g. McIlroy et al, 2020). McIlroy et al (2020) aim to validate the short version of a Pedestrian Behaviour Questionnaire across

six culturally and economically distinct countries; Bangladesh, China, Kenya, Thailand, the UK, and Vietnam. The questionnaire comprised 20 items that asked respondents to rate the extent to which they perform certain types of pedestrian behaviours, with each behaviour belonging to one of five categories identified in previous literature; violations, errors, lapses, aggressive behaviours, and positive behaviours. The sample consisted of 3423 respondents across the six countries. After analyses, only the violations, lapses, and aggressions sub-scales were retained (those with acceptable reliability and factor loadings). Analyses suggest that a three-factor model with 12 items showed the best fit to the data.

McIlroy et al (2020) examined the relationship between pedestrian behaviours and pedestrian accident involvement and found that pedestrians that had never been involved in an accident scored significantly lower on 'Aggressions' than those that had been involved in one ($p < .001$) or more than one ($p < .001$). It was also found that those that had never been involved in an accident scored significantly lower on 'Lapses' than those that had been involved in one accident ($p = .008$). The items measuring aggressive behaviours in the PBQ were: "I get angry with another road user (pedestrian, driver, cyclist, etc.), and I yell at them", "I cross very slowly to annoy a driver", "I get angry with another road user (pedestrian, driver, cyclist, etc.), and I make a hand gesture", "I have gotten angry with a driver and hit their vehicle". Comparing results for aggressions, respondents in both Vietnam and Thailand scored significantly lower than all other countries, and respondents in the UK, China, Kenya, and Bangladesh also did not differ significantly from each other.

2.2.2 Factors influencing road safety violations

2.2.2.1 Demographic variables

Previous research has found that demographic variables (e.g. age, gender, nationality) influence the road safety behaviour of both car drivers and pedestrians. Cestac et al (2019) refers to such variables as "universal influencing variables", compared to RSC, which is assumed to vary across countries.

Research on private drivers finds that older drivers and females are more inclined to be involved in lapses, while errors do not seem to be related to any specific demographic groups (Parker et al, 1998). The reason for older drivers and females being involved in more lapses is most likely due to lack of driving experience. Moreover, violations (which seem to be the behaviour most strongly related to accidents) seem to be more prevalent among young drivers and male drivers (Parker et al, 1998). Previous research on private drivers has also established a relationship between drivers' level of education and driving behaviours. In a study using the DBQ in a Czech population of drivers, Sucha et al. (2014) report, for instance, lower levels of what they term dangerous violations and dangerous errors with increasing levels of education. Finally, McIlroy et al (2020) also find that demographic variables influence pedestrian behaviours: males reported more risky behaviours than females, and younger respondents reported per more risky behaviours than older respondents.

2.2.2.2 Elements of road safety culture.

The mentioned studies of national differences between DBQ items (Özkan et al, 2006; Warner et al 2011) often hypothesize that the results indicate differences in national culture. These studies do not, however, directly measure RSC or specify the (cultural) mechanisms generating these different national behaviours. According to Ward et al (2010), research on road safety culture often seems to lack an explanation of the theoretical link between safety culture and safety behaviours. In the present study, we explore the significance of three elements of national RSC, with different assumed influences on road safety behaviour.

The first element of national RSC is **descriptive norms**, which refer to individuals' perceptions of what other people actually do (Cialdini et al, 1990). Descriptive norms may influence behaviour by providing information about what is normal behaviour in traffic in their country, thereby creating a "mild social pressure" to do as the others do (Cialdini et al 1990; Nævestad et al 2019). Operationalizing RSC partly as descriptive norms, we may refer to the mechanism mediating between

safety culture (shared norms and expectations) and safety behaviours as “subtle social pressures” (Cialdini et al, 1990; Nævestad et al, 2019). In line with this, Cestac et al (2019) mention several studies focusing on how social norms are transmitted through observation of and communication with other drivers on the road, referring to this as of "informal rules" of acceptable and expected behaviours (e.g., Cialdini & Trost, 1998; Björklund, 2005). They also mention a Swedish study, where most drivers agreed that it was safer to drive at the same speed as other drivers, even if they were speeding, rather than to strictly comply with the legal speed limit (cf. Åberg, Larsen, Glad, & Beilinsson 1997). It is also important to note that descriptive norms can also influence behaviour through the false consensus bias, in which individuals overestimate the prevalence of risky behaviour among their peers in order to justify their own behaviour (Berkowitz, 2005).

The second element of RSC that we focus on is **fatalistic beliefs** (cf. Boua et al, 2024). Fatalistic beliefs refer to a tendency for individuals to view life events as predetermined and inevitable (Esparza et al, 2015). People who hold fatalistic beliefs tend to believe that they do not have control over events, as these events are controlled by external factors (Kouabenan 1998). A review of available literature on the relationship between fatalistic beliefs and road safety behaviour, conclude that fatalistic beliefs are related to less safe behaviours (Boua et al 2024). Mcllroy et al (2020) cite a wide range of studies from African countries reporting a relatively high level of fatalistic beliefs among road users, and which indicate relationships between fatalistic beliefs and unsafe road behaviours. Summing up relevant research, Boua et al (2024) mention several studies examining the relationship between fatalistic beliefs and risk taking in traffic. Omari and Baron-Epel (2013) found that drivers with high levels of fatalism were less likely to make their children wear a seatbelt than those with low levels of fatalism. In addition, studies have found that road users with high levels of fatalistic beliefs were involved in less safe road behaviours compared to those with low fatalistic beliefs (Ngueutsa and Kouabenan, 2017; Teye-Kwadjo, 2019). Similar results were reported by Şimşekoğlu et al. (2013). In a recent study, McIlroy et al (2020) found that pedestrians who reported strong fatalistic beliefs tended to report less safe behaviours and more unsafe road safety attitudes.

The third element of RSC that we focus on is **values and attitudes related to freedom to take risk** in traffic and paternalism. Previous research indicates a relationship between the scope of road safety policies in countries and cultural values related to the freedom to take risks and paternalism (Elvebakk 2015). In a comparison of drivers in Norway, Israel and Greece, Nævestad et al (2022) found that the Greek drivers valued freedom to take risk in traffic higher than drivers from Norway and Israel, and that attitudes measuring this value influenced road safety violations, which in turn influenced accident involvement. Values and attitudes legitimize and motivate road user behaviours and the norms prescribing behaviours (Gehlert et al, 2014, Kaçan et al, 2019). As the three European countries studied are early implementers of Safe system and Vision zero, with a high road safety level, we might expect lower focus on values and attitudes related to freedom to take risk (i.e. the opposite of paternalism) in these countries (cf. Nævestad et al 2022).

We assume that the attitudes that we measure can be linked to some underlying values. Schwartz (1992) defines six key aspects of values: 1) Values are beliefs, 2) Values refer to desirable goals, 3) Values transcend specific actions and situations, 4) Values serve as standard or criteria, 5) Values are ordered by importance, 6) The relative importance of the set of relevant values guides action. Attitudes are closely related to values, but the former are more context specific (Seymer, 2013). Several studies have been devoted to comparing cultural values in different countries. Kaçan et al. (2019) study the relationship between Schwartz (1992) general values, safety climate and road user behaviour in five countries. Hofstede (2001) is another example of a widely used approach to comparing values across countries.

Several studies indicate that values and attitudes comprise an important element of RSC, and that they influence road safety behaviours (Gehlert et al 2014, Kaçan et al, 2019). The relationships between these concepts are outlined in different theories. According to the expectancy value model, the attitude towards a behaviour is influenced by beliefs about its consequences, which is weighed by the subjective value of the consequences (Fishbein & Ajzen, 1975). The Theory of Planned Behaviour

(TPB) describes in turn how attitudes form into behavioural intentions and behaviour. TPB predicts that our behaviour is the result of our intention to carry out the behaviour, and that our intention to carry out a particular behaviour is influenced by our attitudes towards the behaviour, subjective norms and our perceived control over our behaviour (Ajzen, 1991). Perceived behavioural control is key in studies of the influence of fatalistic beliefs on road safety behaviours, as fatalistic beliefs involve little or no perceived control over safety outcomes, as this is predestined by a greater force.

2.2.3 Factors influencing accident involvement

Demographic variables. Nationality is a crucial demographic variable influencing the accident risk of drivers (DaCoTa 2012; European Commission, 2016; Nævestad et al 2017). Moreover, age is also an important variable influencing accident risk for both private drivers' accident involvement (Salminen 2000; Bjørnskau 2015). Salminen (2000) find that older drivers (50–65 years) at work and unmarried drivers have a higher risk, while Charbotel, Martin, and Chiron (2010) find that younger drivers at work (25–34) years have a higher risk. Sex is also an important factor influencing accident risk: male drivers have a higher risk of being involved in accidents with passenger cars than female drivers (Bjørnskau 2015).

Driver behaviours. In a meta study of 174 studies using the DBQ's and measures of self-reported accidents, De Winter and Dodou (2010) found especially violations, but also errors, were related to accidents. Moreover, in their study of safety behaviours among private drivers in Finland, Sweden, Turkey, and Greece, Warner et al (2011) found that five of the DBQ items predicted drivers self-reported accident involvement (for the last three years) in an analysis where all the countries were taken together.

Exposure. The number of kilometres driven each year is an important risk factor influencing the risk of being involved in an accident. (Elvik et al 2009).

2.3 Hypotheses

We have the following hypotheses, based on the previous research outlined above:

1) **Road safety violations.** We expect higher levels of road violations among the road users in the African sample than in the European sample (*Hypothesis 1*). This applies both to car drivers and pedestrians. This indicates different patterns of road safety violations within the African countries, compared with the European countries.
2) **Descriptive norms.** We expect that the level of violations that car drivers and pedestrians expect from car drivers in their country is higher in the African countries than in the European countries. This means an RSC with more violations among car drivers in the African countries.
3) **Fatalistic beliefs.** We expect a higher level of fatalistic beliefs among road user in the African countries than in the European countries.
4) **Freedom values and attitudes.** We expect a higher level of freedom values and attitudes among road users in the African countries than in the European countries.
5) **National RSC.** We expect that the descriptive norms, paternalistic beliefs and freedom values/attitudes that car drivers and pedestrians report in their country is similar for drivers and pedestrians within countries, indicating shared RSC within countries.
6) **Influence of national RSC on behaviour.** We expect that there is a relationship between RSC measured as descriptive norms, fatalistic beliefs and freedom values/attitudes on the road safety violations of drivers and pedestrians.

3 Methods

3.1 Explorative approach to national RSC

The present study provides an explorative approach to understanding national RSC, as it has as an overarching objective to identify the elements of national RSC where we see the biggest differences between the African and the European countries, and the elements of RSC that are most strongly related to road safety violations. The approach is explorative, as there are few other studies of national RSC in general. This includes studies examining national RSC between European and African countries. National RSC is comprised of several different elements, which may be important for road safety in different ways. This field of research is not well developed, and there is therefore a need for studies testing the relevance of different elements, conceptualisations and mechanisms between RSC and road safety violations, like the present study. Different elements and ways of measuring RSC may be important in comparisons across different national contexts. Thus, before more studies are conducted, there is a need for open, explorative examinations, aiming to identify the conceptual and methodological lenses that captures the most important differences between national RSC across the European and African contexts.

The study takes further insights from a project (SafeCulture) on road safety culture in private and professional transport in the road and maritime sector in Norway and Greece, which was conducted by the Institute of Transport Economics and the National Technical University of Athens in the period 2015-2018. Results from the SafeCulture project are reported in several papers, e.g. Nævestad et al (2019), which focuses on professional and private drivers in Norway and Greece. Questions measuring national RSC from the SafeCulture project were used in a study comparing bus drivers in Norway and Ghana, together with questions measuring organisational safety culture and safety management (Safety Ladder for safety management) from other projects reported in e.g. Nævestad et al (2020). The study comparing bus drivers in Norway and Ghana is based on survey data (n=285 and 281), interview data (n=11 and 19) and fieldwork and provides a pilot for our present comparison of road safety culture in the European and African contexts.

The survey questions in the present study develops further some of the conceptual models and understandings of national RSC which were developed in the SafeCulture project, e.g. the understanding of national RSC as descriptive norms and attitudes related to freedom to take risk. We have adapted this framework to our comparison across European and African countries, aiming to identify the conceptual and methodological lenses that captures most important differences between national RSC across the European and African contexts. We have used several methods and approaches in this process of adaption. **First,** European researchers have conducted field works in the African countries, while African researchers have conducted field works in the European countries. **Second,** individual interviews and focus group interviews have been conducted with road users and stakeholders in the African countries. **Third,** literature has been reviewed, describing the road safety violations, attitudes, beliefs etc. in African countries, in addition to literature about road safety and road safety policies in African countries in general. **Fourth,** a pilot study of national RSC among bus drivers was conducted in Norway and Ghana in 2023. The pilot study is based on qualitative interviews, survey data and field works. Results from this study was presented at three African transport research conferences, and discussed with participants. The results from the present study was also presented at an African transport conference, and discussed with African researchers and stakeholders. These processes have provided an important conceptual development process which has led to the present study.

3.2 Interviews and focus groups

Individual interviews and focus group interviews with 46 stakeholders were conducted in three African countries: Ghana, Tanzania and Zambia. The main purpose of the interviews and focus

groups was to get information about and discuss the relevance of items measuring road safety violations and items measuring road safety culture, including to get insights into the most relevant road safety challenges and behaviours, beliefs and norms that might be important in these contexts. Other issues that were discussed were factors influencing road safety culture, e.g. road user interaction, enforcement, the composition of road users (e.g. vulnerable road users, motorcyclist), economy, urban planning. We had a relatively open interview guide, which includes questions about the most important types of accidents, typical scenarios involved in these accidents (e.g. who, where and when), typical risky road user behaviours in different settings, relevant road safety measures to address the most prevalent accident types and road safety challenges. In addition to asking about this, we also showed lists of relevant items that we planned to use to measure road safety violations and national RSC to compare this across European and African countries. We asked about the relevance of the items, and whether interviewees had suggestions to more items to be added, based on their views on risky road user behaviours that are prevalent in their (African) country.

The focus group interviews were conducted as part of focus group interviews about road safety management in the three African countries. Interviews were conducted digitally via Microsoft Teams between November 2022 and April 2023, with interview durations ranging from 40 minutes to 2,5 hours (for group interviews). We employed a strategic sampling method, where the interviewees were selected based on criteria relevant to the research questions. We focused on assembling a sample that represented various roles in traffic safety work, including e.g. people working in authorities, NGOs and people working as researchers. We conducted thematic analyses of the interviews, systematically recurring themes in the interviewees' descriptions of specific topics. (Braun & Clarke, 2006).

3.3 Fieldwork

The main author visited Zambia in 2022, and Tanzania in 2023 and 2024 and Ghana in 2023. He stayed for 6-7 days each time and spent a lot of time in traffic as passenger in cars and as a pedestrian. Provisional field work notes were made (as well as photographs and videos), focusing on e.g. the: 1) composition of road users, 2) interaction between road users (e.g. the level of cooperation or conflict), 3) the quality of road and road infrastructure, 4) facilitation of the road system for vulnerable road users and 5) car drivers respect for and consideration of vulnerable road users and motorcyclists, 6) general risk taking behaviours (e.g. speeding, seat belt use, helmet use) and 7) the situation of children in traffic. The focus on the field notes were on comparing the situation in the African countries with the situation in the European countries (i.e. Norway, Sweden, Netherlands). A second Norwegian researcher has also been to Ghana and Tanzania to observe, and discuss results from the fieldwork. The purpose of the fieldwork was that the Norwegian authors should experience traffic in the African countries, to get a deeper understanding of the background of the data in the survey. In addition, African researchers have been to Norway and Sweden, using the same field work note scheme as the Norwegian researchers used in the African countries. Thus, comparisons of observations were made.

3.4 Quantitative survey

3.4.1 Recruitment of respondents

The survey data was mainly collected in the first half of 2024. The survey data aims to include representative samples of private car drivers and pedestrians in the capitals/largest cities of the participating countries. Capitals were chosen in all the participating countries, except Tanzania, where we choose the largest city (Dar es Salaam), which was the capital until 1996. The survey data in the three African countries was collected through personal interviews in Lusaka, Accra and Dar es Salaam. Accessing respondents through web surveys was not feasible in these countries, as only a few people have e-mails and internet access, presumably people in favourable economic positions and/or high levels of education. To obtain representative samples of pedestrians and car drivers, teams of interviewers therefore went out in traffic to recruit respondents to participate in personal survey

interviews. In some cases, respondents who were in a hurry were given the link to the survey, so they could answer the survey in their home. To maintain representativity, interviewwers ensured to recruit respondents in different areas of the cities and at different times. We assumed that this would make them avoid recruiting only particular segments of road users. The Norwegian respondents were recruited from a representative sample of respondents from the Capital Oslo, who have agreed to participate in surveys from the Institute of Transport Economics. The Swedish and Dutch respondents were recruited from representative samples of respondents from Stockholm and Amsterdam, using representative panels of respondents from the company Norstat. Norstat is a leading European data collector for market research, which offer access to over 4 million respondents across 19 countries. Surveys were collected using the official languages in all countries, e.g. English in Ghana and Zambia, Swahili in Tanzania, Dutch, Swedish and Norwegian. Professional translators were used, and translations were tested and validated by native speakers, who are traffic researchers. In an attempt to increase response rates, Norwegian respondents were informed that they could participate in a draw for a present card of 3000 NOK (260 Euro), if they wanted to. The Norstat respondents in Sweden and Netherlands are in panels, where they get points for participating in surveys.

Respondents in the survey were filtered in two steps. First, the present study only includes results for respondents who are of the same nationality as their country. The reason is that we focus on questions related to national road safety culture. Previous studies have indicated that respondents who are immigrants in their country might rate different factors higher than domestic respondents, e.g. due to deference to authority and their immigrant status (Guldenmund et al 2013). Results for the immigrant respondents will be presented in other publications, also including these. Second, we have filtered out 353 respondents who answered the survey in a shorter time than 2,5 minutes. The speed of respondents' survey response time is an established measure of survey response quality (Huang et al 2012; Zhang and Conrad 2014). There are no established threshold limits for excluding too fast respondents, but one criterion is that speeding involves answering the survey faster than it is possible to read the questions (e.g. 300 milliseconds per word) (Zhang and Conrad 2014). We assess that reading all the 50 questions in the survey fast takes about three minutes. Thus, our threshold value is somewhat below that. The reason is that survey speeding does not apply to all sections in surveys. It should ideally be measured for several sections within surveys. We have not had the possibility to do that. With a threshold time criterion of 2,5 minutes for survey responses, we acknowledge that speeding does not necessarily apply to all questions in the survey.

3.4.2 Survey Themes

Sum score indexes*:* We have made several sum score indexes, based on the questions in the surveys. When making these sum score indexes, we have taken three considerations. First, we have assessed the importance and relationship between questions based on previous research, indicating that the questions measure the same underlying phenomenon. Second, we have conducted exploratory factor analyses based on the data from all the countries taken together, examining whether questions load on the same factor, or different factors. Third, we have also conducted analyses of internal consistency, including Cronbach Alpha estimate with: "scale if item deleted" analyses, to identify questions that seem less important, and whose removal might increase the internal consistence of the sum score index.

Demographic variables. All respondents were asked questions about age, gender, nationality. Car drivers and pedestrians were also asked about education. Car drivers were also asked questions about experience as a driver, kilometres driven with private vehicle in the last two years, car type, where they usually drive etc. For pedestrians we asked how often they walk as a means of transport to reach destinations (e.g. from their home to work, to the shop etc), for how many minutes they usually walk on a typical day where they walk as a means of transport, what types of roads that they usually walk.

Car drivers: The present study includes 12 questions on road safety violations for car drivers. Some of these were taken from the DBQ and based on the results of previous research (Warner et al, 2011;

Nævestad et al 2019). Behaviour questions were also tested in an African context in the study of bus drivers in Norway and Ghana (Nævestad et al 2024). We also included behaviour questions based on our focus group interviews with African stakeholders. These were e.g. about not stopping for pedestrians and one about overtaking vehicles, although the driver does not have a clear view of oncoming traffic. Factor analyses of the 12 items and private car drivers from all the six countries indicated two factors: one with 10 items about different types of violations and risk taking, with the factors related to aggressive violations and lacking seat belt use with the highest factor loadings, e.g. "Become angered by another driver and give chase with the intention of giving him/her a piece of your mind", "Become angered by a certain type of driver and indicate your hostility by whatever means you can". The second factor in the factor analysis was the two items about speeding. We made a sum score index based on the first ten items (Cronbach Alpha: .831).

Pedestrians. The survey includes four questions about aggressive pedestrian behaviours: "For every ten trips you walk on streets/roads, approximately how often do you behave like this?:

- I get angry with another road user (pedestrian, driver etc.), and I yell at them
- I get angry with another road user (pedestrian, driver etc.), and I make a hand gesture
- I get angry with a driver and hit their vehicle
- I cross very slowly to annoy a driver

The four questions were combined into a sum score index (Cronbach's Alpha: .720). PBQ items are based on McIlroy et al (2020). The survey also included two questions about positive pedestrian behaviours (thanking drivers who let pedestrians pass), but we do not use these, as we generally do not trust results from the items that were reversed.

The DBQ and the PBQ answer alternatives have been changed from relative to absolute alternatives (e.g. Question: "For every ten trips, how often do you …?", Alternative answers: 1) "Never", 2) "Once or twice", 3) "Three or four times", 4) "Five or six times", 5)"Seven or eight times", 6) "More than eight times but not always", 7) "Always"). Answer alternatives were changed, as previous research indicates that different demographic groups tend to interpret questions and formulations differently (i.e. what does "often" mean?) (Bjørnskau and Sagberg, 2005). Given that e.g. "often" and "very often" may have different meanings among respondents across countries and parts of the world, we use absolute answer alternatives on these questions.

National RSC measured as descriptive norms. We measure national RSC as descriptive norms (Cialdini et al 1990), reflecting drivers' perceptions of what other drivers in our country do. The survey includes 5 questions on expectations to other road users that were common among respondents in both the survey to car drivers and pedestrians. We chose these five questions, as: 1) These questions were common both in the car driver sample and the pedestrian sample, and 2) These questions showed different scores in the pilot study of Ghanaian and Norwegian bus drivers (Nævestad et al 2024). One question measuring descriptive norms that was common in both the pedestrian and car driver sample was not included in the index, as we did not observe significant differences between Ghanaian and Norwegian bus drivers on it in the pilot study. This measured over speeding on residential roads. The five questions were combined into a sum score index (Cronbach's Alpha: .798). Five answer alternatives ranged between 1 (none-very few) and 5 (almost all/all).

National RSC measured as fatalistic beliefs. The second element of RSC that we focus on is fatalistic beliefs related to road safety. The survey includes six statements about fatalistic beliefs:

- I believe that some people die in road crashes as punishment for some bad deeds
- I believe that spiritual intervention, such as prayers, can prevent road crashes
- I pray before embarking on a journey
- I believe that road crashes are the will of God
- Human beings cannot do anything to prevent people from dying in traffic

- People cannot prevent their own death (e.g. in road crashes), they die when it is their time to die

These questions are based on and build further on questions from a study presented by Emanuel Kofi Adanu, in the 2023 ICTCT AfroSAFE conference in Winneba in June 2023. The five questions were combined into a sum score index (Cronbach's Alpha: .828). Five answer alternatives ranged between 1 (Totally disagree) and 5 (Totally agree).

National RSC measured as attitudes related to freedom to take risk in traffic. The survey included two questions measuring attitudes related to individual freedom to take risk in traffic:

- Drivers should be able to do whatever they want in traffic, as long as they do not expose others to risk
- A skilled driver can take more risks than others

The two questions were combined into a sum score index (Cronbach's Alpha: .539). We keep this index, in spite of the low internal consistency, as we have used this index in previous studies (e.g. Nævestad et al 2022), and as it only consists of two items (where Cornbach Alpha measurements may be seen as less relevant). Five answer alternatives ranged between 1 (Totally disagree) and 5 (Totally agree).

Safety outcomes. We report results for one question on car drivers' accident involvement while driving in the last two years, with four answer alternatives: 1) no, 2) yes involving property damage, 3) yes, involving personal injuries, 4) yes, involving fatal injuries. Questions have been combined into two values: 1) No, 2) Yes. This means that accident involvement is defined as at least accident with property damage. We also report results for one question on pedestrians' accident involvement while walking in the last two years: "During the last two years, have you been involved in an accident involving a vehicle (e.g. car, motorcycle) while walking on streets/roads?" Answer alternatives were: 1) No, 2) Yes, but I was not physically injured, 3) Yes, I was physically injured, but I did not seek medical help, 4) Yes, I was physically injured and visited doctor/hospital. Alternatives were combined into two categories: 1) No, 2) Yes.

3.4.3 Multivariate analyses

Seven multivariate regression analyses were conducted. Two of factors influencing accident involvement, two of factors influencing road safety violations and three of factors influencing RSC. Examining the factors influencing whether car drivers and pedestrians have been involved in a traffic accident in the last two years, we employ binary logistic regression analyses. Independent variables are included in successive steps, with the most basic ones added first, followed by the other independent variables. We use logistic regression analysis, as the dependent variable in these two analyses is dichotomous (accident: yes/no). In the five other analyses, we use linear regression analysis, as the dependent variables are continuous. The dependent variables in these analyses are car drivers' and pedestrians' road safety violations and the three elements of RSC.

4 Results

4.1 Description of the respondents

4.1.1 Sex, age and education

A total of 4124 respondents participated in the study. A total of 1910 of the respondents are car drivers, while 1862 of the respondents are pedestrians (cf. Table 4.1).

Table 4.1 Car drivers and respondents in the study

	Male	Female	Total
Car Europe	49%	51%	1121
Car Africa	71%	29%	789
Pedestrian Europe	48%	52%	1109
Pedestrian Africa	61%	39%	753
Total	56%	44%	3772

Table 4.2 shows the distribution of car drivers within each country, while Table 4.3 shows the distribution of pedestrians in each country.

Table 4.2: Distribution of car drivers within each country

Group	Male	Female	Total
Car Norway	53%	47%	544
Car Sweden	46%	54%	293
Car Netherlands	43%	57%	284
Car Ghana	68%	32%	282
Car Tanzania	81%	19%	216
Car Zambia	67%	33%	291
Total	58%	42%	1910

Table 4.3 shows that the share of females is lower among the car drivers in the African countries, especially in Tanzania. Table 4.3 shows that the share of females is more similar among the pedestrians, but lower in Tanzania than in the other countries.

Table 4.3 Distribution of pedestrians within each country

Group	Male	Female	Total
Pedestrian Norway	49%	51%	544
Pedestrian Sweden	44%	56%	285
Pedestrian Netherlands	51%	49%	280
Pedestrian Ghana	62%	38%	258
Pedestrian Tanzania	70%	30%	250
Pedestrian Zambia	52%	48%	245
Total	53%	47%	1862

Table 4.4 shows the distribution of the respondents in different age groups.

Table 4.4 The distribution of the respondents in different age groups.

Group	<26 yrs	26-35 yrs	36-45 yrs	46-55 yrs	>55 yrs	Total
Car Africa	11%	34%	30%	18%	7%	789
Car Europe	7%	21%	17%	21%	33%	1121
Pedestrian Africa	31%	38%	19%	9%	3%	753
Pedestrian Europe	8%	21%	18%	22%	32%	1109
Total	13%	27%	20%	18%	21%	3772

Table 4.4 shows that the European respondents are generally older than the African respondents. When we look at the car drivers, we see that there are three times more respondents in the age group over 55 years old in the European sample, and more respondents between 26 and 45 years old in the African sample. When we look at the pedestrians, we see that there are ten times more respondents in the age group over 55 years old in the European sample, and three times more respondents under 26 years old in the African sample.

Table 4.5 shows the highest level education of the respondents in the different groups. Respondents were asked: "What is your highest education?"[1]

Table 4.5 What is the highest level education of the respondents in the different groups.

	Primary school	High school	University 3-4 yrs	University 5 yrs	Total
Car Africa	7%	25%	23%	45%	789
Car Europe	1%	22%	37%	40%	1121
Pedestrian Africa	12%	36%	19%	32%	753
Pedestrian Europe	2%	23%	36%	39%	1109
Total	5%	26%	30%	39%	3772

Table 4.6 show relatively similar levels of education among the different groups, although there are higher shares of respondents in the lowest education level among the African pedestrians. Moreover, the education level among the pedestrians in Europe is higher than for the African pedestrians.

4.1.1.1 Car drivers

In table 4.6 we show the distribution of car driver experience in the African and the European car driver sample. Car drivers were asked: "For how long have you been driving a car?"

Table 4.6 Distribution of car driver experience in the African and the European car driver sample.

	0-5 years	6-10 years	11-15 years	16-20 years	> 20 years	Total
Car Europe	9%	11%	13%	9%	58%	1121
Car Africa	30%	35%	20%	10%	6%	789
Total	18%	21%	16%	9%	37%	1910

In accordance with the age differences, we see a far lower share in the group with the highest level of car driver experience: there is approximately a ten times higher share of drivers with over 20 years experience in the European sample of car drivers.

We also asked car drives how often they drive a car as a driver (Table 4.7). Respondents who answered "never" were filtered out of the survey.

Table 4.7 Frequency of car driving among drivers in the European and the African sample

Group	Every day	5-6 days a week	3-4 days a week	1-2 days a week	A few days each month	Less frequently	Total
Car Europe	18%	13%	17%	21%	18%	13%	789
Car Africa	49%	22%	15%	8%	4%	2%	1120
Total	31%	17%	16%	16%	12%	8%	1909

Table 4.7 show that the African car drivers drive more often than the European drivers.

Car drivers were also asked what type of car they usually drive (cf. Table 4.8).

[1] The answer alternatives were slightly different in the European and the African samples for education, due to a perceived need for national adaptation. Answer alternative 3 in the African sample was "Professional school / Technological university". The fourth alternative in the African sample was "University (tertiary)". Thus, the category university is not fully comparable across national contexts.

Table 4.8 Types of car that the European and African car drivers usually drive

Group	Passenger car	Station wagon	Van/box van	Pick-up	SUV	Other	Total
Car Europe	68%	11%	3%	0%	13%	4%	789
Car Africa	16%	8%	13%	22%	36%	5%	1121
Total	46%	10%	7%	9%	23%	5%	1910

Table 4.8 shows that there are less passenger cars and more pick-ups and SUVs in the African sample. We also asked car drivers where they usually drive. The first answer alternative was: Rural roads: (9% European, 6% African). The second was: Urban roads: (35% Europe, 46% African). The third was both types: (56% Europe and 48% African).

4.1.1.2 Pedestrians

Table 4.9 shows how often the pedestrian respondents walk to reach destinations, e.g. from home to work, from home to the shop, from home to the bus etc., using walking as a means of transport.

Table 4.9 Frequency of walking as a means of transport among African and European pedestrians

	Several times a day	Every day	5-6 days a week	3-4 days a week	1-2 days a week	A few days a month	Less frequently	Total
European	24%	39%	11%	13%	10%	3%	1%	753
African	40%	26%	9%	11%	7%	5%	2%	1109
Total	627	578	190	218	149	75	25	1862

Table 4.9 shows that among both African and European respondents, about 65% use walking as a means of transport to reach destinations each day. European respondents have a higher share who report that they walk several times a day. However, we also asked respondents how long they usually walk on a typical day where they walk to reach destinations. The African respondents walk twice as many minutes on average on a typical day where they walk (96 minutes versus 45 minutes). It should be noted that the African respondents were recruited when they walked on the street, while the European were recruited through e-mails. Thus, there might be a self-selection bias for the European respondents, which could indicate that they to a greater extent perceive themselves as pedestrians (and often use walking as a means of transport). Results for the different countries are summed up in Figure 4.1.

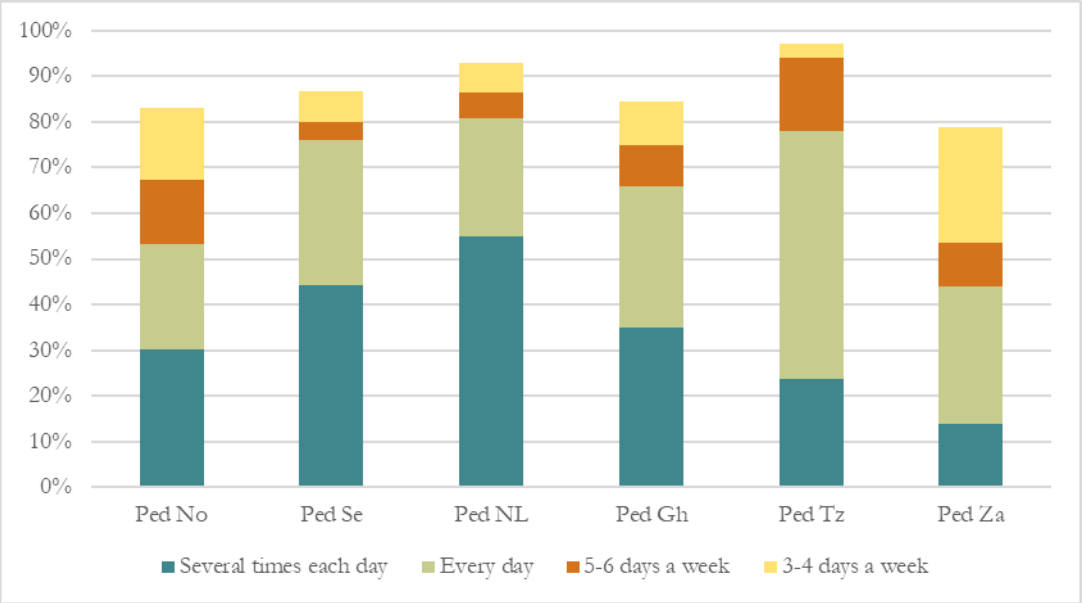

Figure 4.1 Frequency of walking as a means of transport among African and European pedestrians in different countries.

Figure 4.1 shows that especially the Netherlands have a high share of respondents who walk several times each day.

Figure 4.2 shows where respondents usually walk.

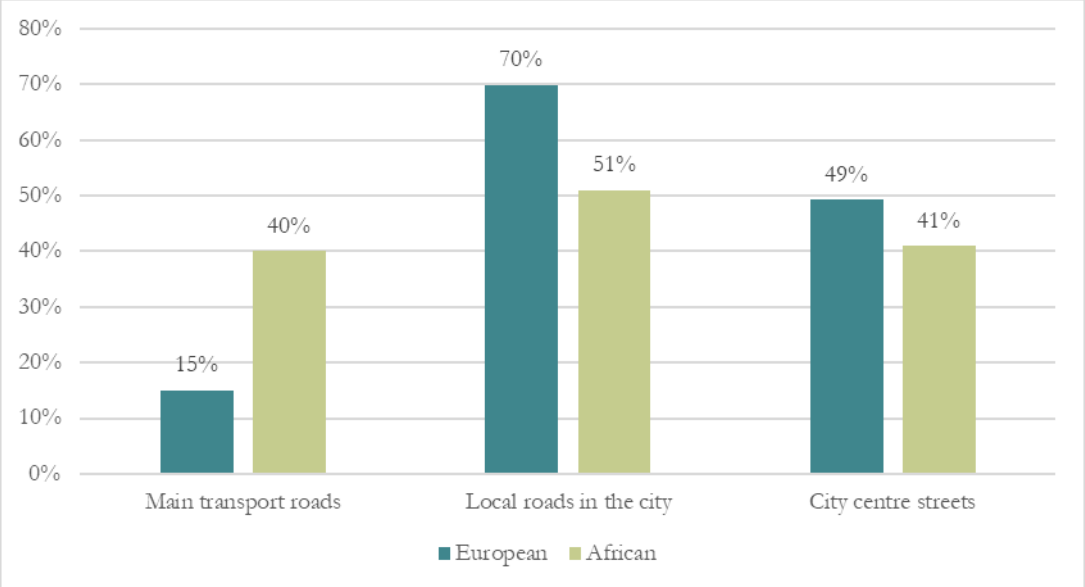

Figure 4.2 Where pedestrians from European (n=1109) and African countries (n=753) usually walk.

Figure 4.2 shows that African respondents walk more on the main transport roads (indicating that they use walking as the main means of transport for longer trips), while the European walk more on local roads. This difference is also reflected in the length of the walking trips for the African respondents.

We also ask respondents questions about why they walk (cf. Figure 4.3):

- Walking is one of my main means of transportation
- I walk because I have no other choice
- I walk for the pleasure of it
- Public transport is one of my main means of transportation

- Private car is one of my main means of transportation

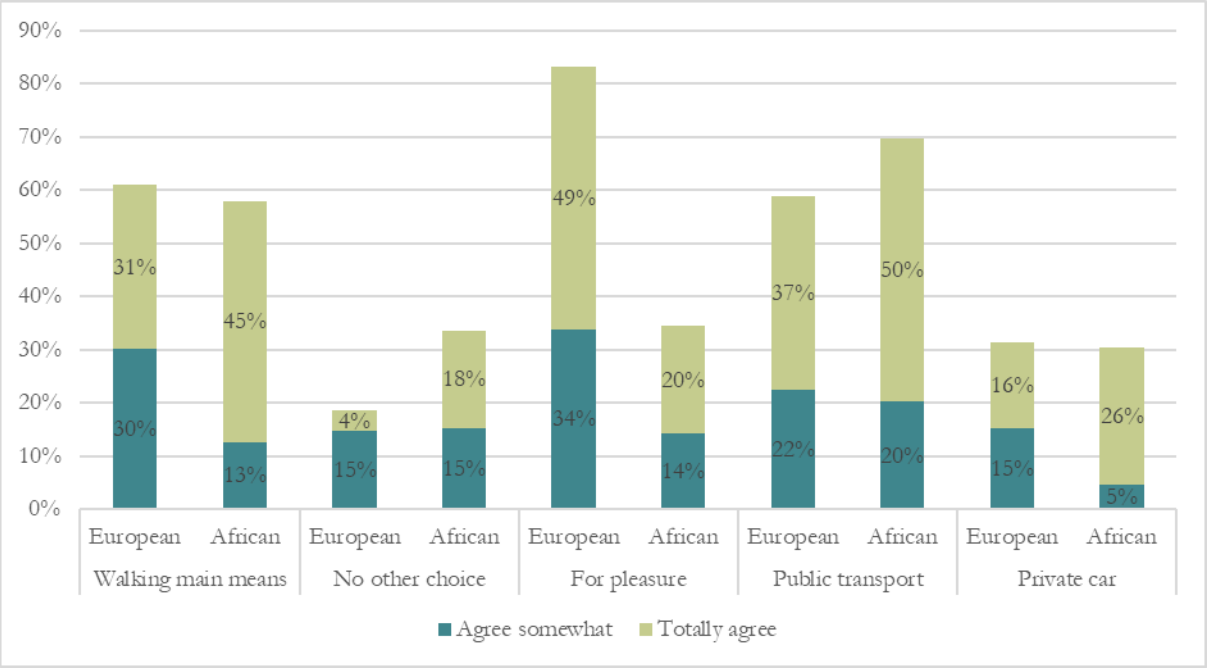

Figure 4.3 Questions about why the pedestrians in the European (n=1109) and African countries (n=753) walk.

Figure 4.4 shows that the share who has walking as their main mode of transport is approximately the same in the two groups. There is, however, a higher share of pedestrians in the African countries who answer that "I walk because I have no other choice". There are over four times as many who totally agree with the statement in the African sample. The pedestrians in the European countries have twice as large a share of respondents who answer that "I walk for the pleasure of it" There is a slightly higher share of respondents who has public transport as their main means of transportation in the African sample, and about the same shares who have private car as their main means of transportation in the two groups.

4.2 Accident involvement

Th first aim of the study is to compare accident involvement among car drivers and pedestrians in the three studied European countries and the three African countries.

4.2.1 Accident involvement among car drivers

Respondents were asked: “During the last two years, have you been involved in a road crash while driving a car?” Answer alternatives were: 1) No, 2) Yes, a crash with material damage only, 3) Yes, a crash with injury to people, 4) Yes, a crash with fatal injury to people. Answer alternatives were combined into 1) No and 2) Yes. Thus, accident involvement involves at least property damage accident. A share of 28% of the African car drivers report that they have been involved in a car accident in the last two years, while 9% of the European car drivers report the same. Table 4.10 shows accident involvement in the last two years among the car drivers in each country.

Table 4.10 Accident involvement in the last two years among the car drivers in each country

Group	No	Yes	Total
Car Za	62%	38%	291
Car Tz	85%	15%	216
Car Gh	74%	26%	282
Car NL	90%	10%	284
Car Se	86%	14%	293
Car No	94%	6%	544

Total	83%	17%	1910

The table shows that the share of car drivers in Zambia involved in accidents is six times higher than thar of car drivers in Norway.

4.2.2 Accident involvement among the pedestrians

Pedestrian respondents were asked: "During the last two years, have you been involved in an accident involving a vehicle (e.g. car, motorcycle) while walking on streets/roads?" and "During the last two years, have you been involved in an accident not involving any vehicle (e.g. tripping, falling) while walking on streets/roads?" Answer alternatives were: 1) No, 2) Yes, but I was not physically injured, 3) Yes, I was physically injured, but I did not seek medical help, 4) Yes, I was physically injured and visited doctor/hospital. Figure 4.5 shows accident involvement for pedestrians in the European and African countries, in the last two years among the car drivers in each country, with and without vehicles involved.

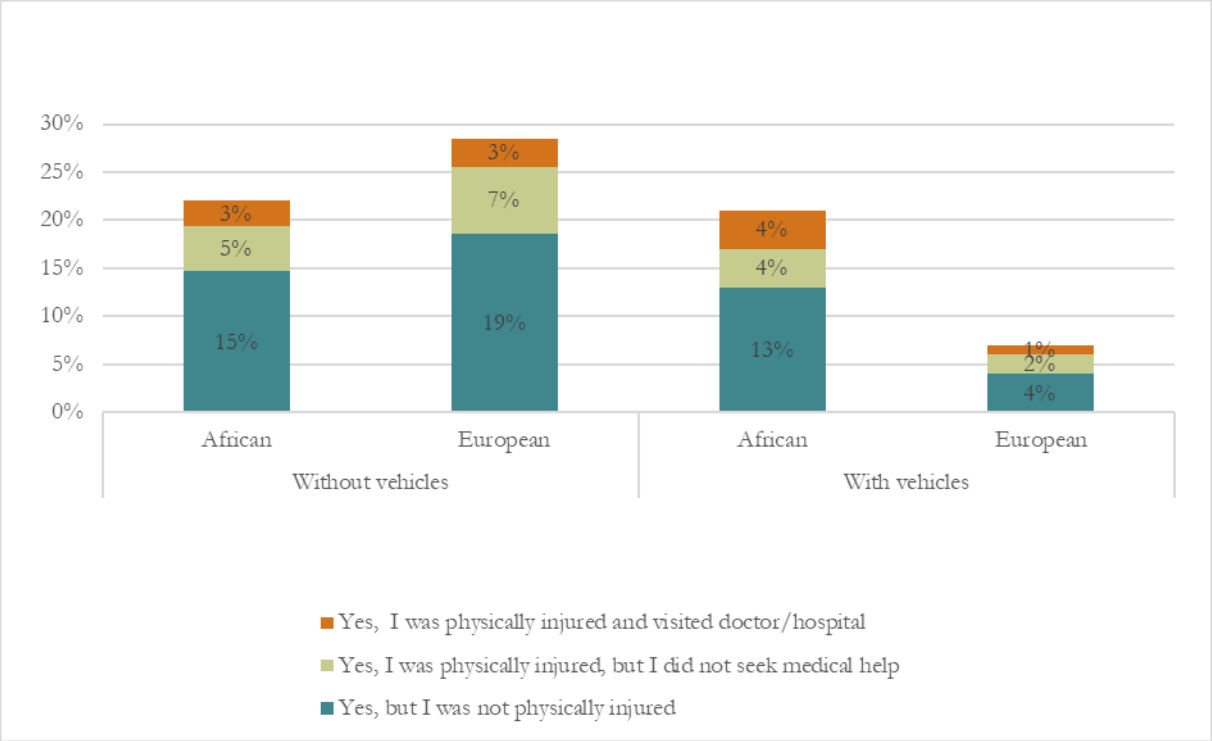

Figure 4.4 Accident involvement for pedestrians in the European (n=1125) and African (n=898) countries, in the last two years, with and without vehicles involved.

The figure shows a higher share of accidents among European pedestrians without vehicles involved, especially without physical injuries. The situation is different when it comes to accidents which involves vehicles; here the share is higher among the African pedestrians. The share of respondents who was physically injured, but did not seek medical help is three times higher in the African sample.

4.3 Road safety violations

4.3.1 Car drivers

The study includes 10 questions (Cronbach's Alpha: .831|) about road safety violations for car drivers. The questions are based on the DBQ and interviews with African stakeholders.

- Become angered by a certain type of driver and indicate your hostility by whatever means you can
- Sound your horn to indicate your annoyance to another road user

- Pull out of a junction so far that the driver with right of way has to stop and let you out
- Drive when you suspect you might be over the legal blood alcohol limit
- Drive without using a seat belt
- Race away from traffic lights so you can get in front of the driver next to you
- Become angered by another driver and give chase with the intention of giving him/her a piece of your mind
- Overtake a slow driver on the inappropriate side
- Don't stop for pedestrians at pedestrian crossings
- Overtake a vehicle when you do not have a clear view of the oncoming traffic (e.g. before bends, hill tops)

Figure 4.5 shows mean scores on the index measuring car drivers' road safety violations in the different countries, sorted according to the scores. The higher the scores on the index, the higher the level of violations is.

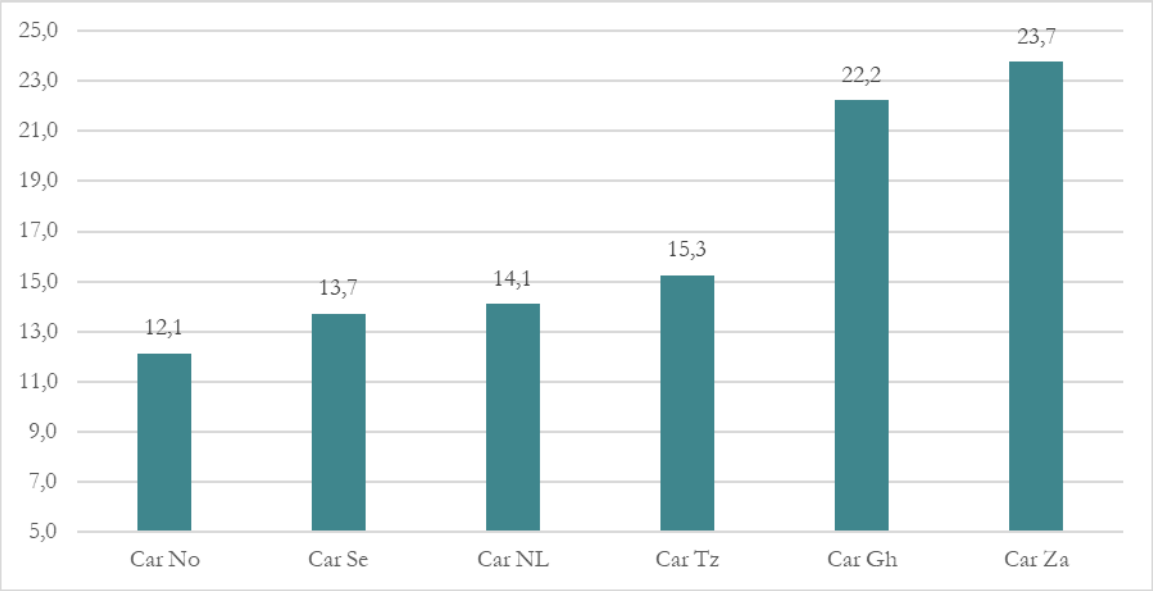

Figure 4.5 Mean scores on the index measuring car drivers' road safety violations in the different countries.

Figure 4.5 shows a higher level of violations in the African countries (except for Tanzania), compared with the European countries. The Norwegian drivers have the lowest level of violations, while Zambian drivers have the highest level. We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way ANOVA (based on a variable with one value for each country). Norway was significantly lower than all the other countries. The scores of Sweden, Tanzania and Netherland were not significantly different from each other. The scores of Ghana and Zambia were significantly different from all the other countries.

4.3.2 Pedestrians

The study includes 4 questions about road safety behaviour for pedestrians. The questions are based on the pedestrian DBQ. We chose to focus on aggressive violations, as these have been found to be related to accident involvement in previous research (McIlroy et al, 2020).

- I get angry with another road user (pedestrian, driver etc.), and I yell at them
- I get angry with another road user (pedestrian, driver etc.), and I make a hand gesture
- I get angry with a driver and hit their vehicle
- I cross very slowly to annoy a driver

Figure 4.6 shows mean scores on the index measuring pedestrians' road safety violations in the different countries, sorted according to the scores. The higher the scores on the index, the higher the level of violations is.

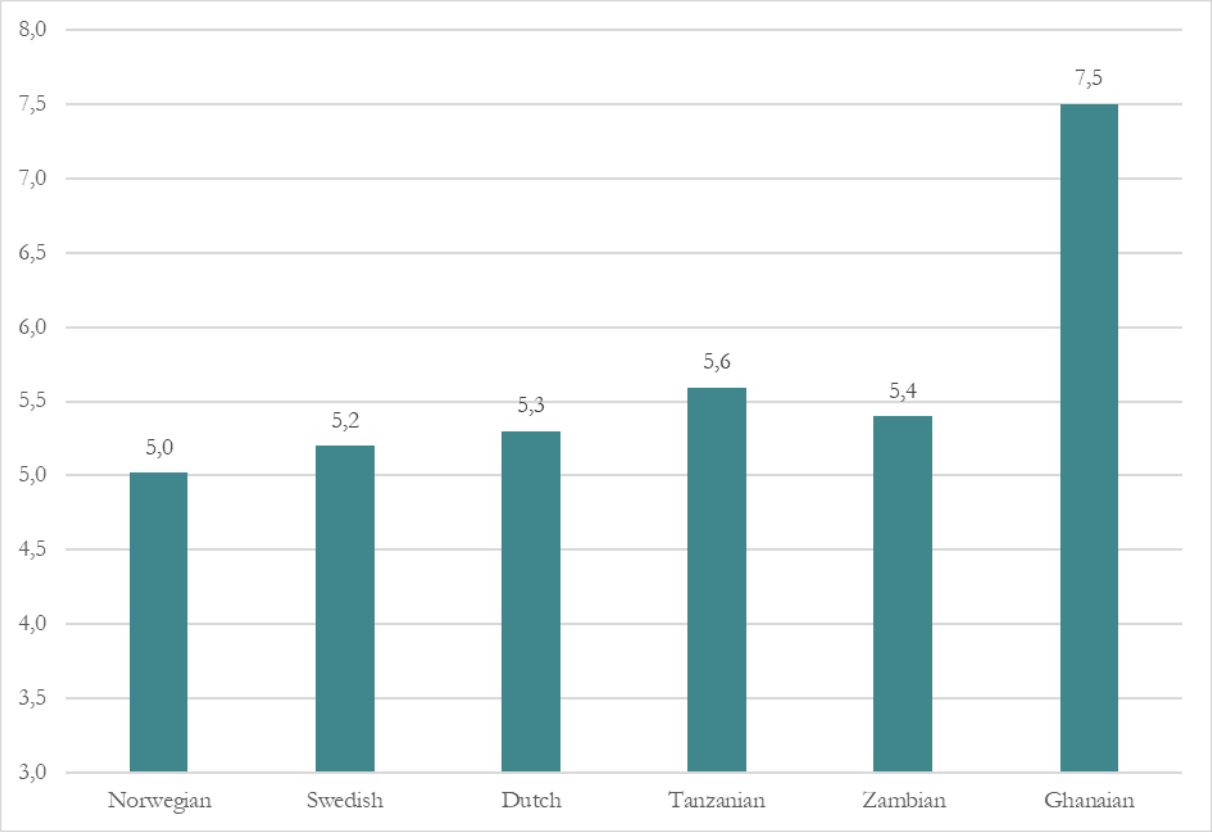

Figure 4.6 Mean scores on the index measuring pedestrians' road safety violations in the different countries.

Figure 4.6 shows higher scores among the pedestrians from the African countries, indicating higher levels of aggressive violations among these respondents. The differences are, however, not big. The main difference is between the Norwegian and the Ghanaian pedestrians. We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way ANOVA (based on a variable with one value for each country). The scores for pedestrians in Norway, Sweden, Netherlands, Zambia and Tanzania were not significantly different. The score in Ghana was statistically significantly different from the other countries.

4.4 Fieldwork results

There are two main results from the fieldwork data of RSC observation. First, fieldwork data indicate a more congested, chaotic, hectic and unregulated traffic picture in the African countries than in the European countries. Second, we observed a generally higher level of risk taking in traffic, which included types of risk taking that are very unusual from a European perspective, e.g. people sitting on top of truck loads in traffic, families of four on motorcycles, people sitting or walking along high-speed roads in the dark etc.

There is a high level of congestion at rush hours, and a high number of motorcyclists which navigate between cars. The mobility of the motorcycles is higher, as they can merge through congested roads. There is also a high number of (mini) buses, which seem to push their way through in the traffic congestion. The minibuses are full of passengers (15-20 people) and seem to offer a low level of physical protection. Additionally, there is also a high number of hawkers, selling their products in the middle of the road at certain places, also in road stretches with relatively high speed limits, although congestions stop the cars and "creates a market". There is also a high level of pedestrians along the roads, no wheelchair users and very few bicyclists.

Spaces between the vehicles are small compared to the situation in European countries. The cooperation between road users seem to some extent to be based on the "right of the strong"; you have to push your way through in congestion and bigger vehicles often "win". Bigger vehicles and offensive drivers tend to "win" in this situation, while vulnerable road users (MC, pedestrians, cyclists) "lose" and must give way for cars.

Especially in Tanzania (Dar es Salaam), the situation on the main roads resembles a "race to get ahead", with everyone trying to get ahead as fast as possible. This creates a lot of overtakings and manoeuvrings in traffic, and a relatively chaotic traffic picture. Taking two-way traffic into account, and road users trying to get onto the road from the side roads, this leads to a high level of near misses and conflicts, which was observed on every trip that the researchers made in traffic. There seemed to be a considerable number of near "head-on collisions" and "near side-collisions" The situation was especially unclear and chaotic because of all the motorcycles, which merged with the vehicles from different sides, and generated a lot of conflicts and near misses, often with considerable differences in speed. The "fight to get ahead in traffic" means that road users "use all parts of the road network, including shoulders, centre and roadsides to get ahead", make unexpected turns in the road to choose different routes. Additionally, there was also high numbers of pedestrians along the road several places, also trying to cross the road several places; running to escape from the oncoming vehicles.

The respect for vulnerable road users in the African countries is lower than in the European setting, especially in Norway and Sweden, where motorist usually give way to vulnerable road users. The roads and road infrastructure in the African countries are also to a lesser extent than in the European countries, adapted to vulnerable road users. There is seldom physical separation between cars and pedestrians, neither on high-speed roads, which may go through village areas with children in and around the roads. Additionally, pedestrians walk along roads with high-speed vehicles.

Fieldwork data also indicate relatively low use of protective equipment (helmet, seat belt), and a seemingly high tolerance for risk. We often saw families on motorbikes, including small children, often without helmets. Such observations are never made in a European setting. The main author remarked in a conference presentation in Winneba, Ghana 2023, that if such a thing had happened in Norway, it would have reached the national news. This actually happened in Norway, three days after the conference presentation: a seven-year-old was delivered at school sitting in front of the rider; on the tank of the motorbike (Bil24 2023). The fact that this reached a national news website dedicated to cars and transport, indicates that this is seen as a very rare and condemnable action ("newsworthy") in Norway, indicating that it breaches with the national norms related to road safety, the national RSC. Thus, the main differences between the national RSC in the African countries compared with the European countries, based on the fieldwork, is that the former is more risk tolerant, that the traffic picture is more chaotic and unregulated, that there is a high level of conflicts and near misses, and that the road system is less in line with Safe system principles. Vulnerable road users in European countries are less exposed to high-speed cars.

4.5 Elements of road safety culture

The focus of this section is the third aim of the study, which is to compare elements of national RSC among car drivers and pedestrians in European and African countries (to identify the elements where we see the biggest differences).

4.5.1 Descriptive norms related to road safety

The first element of RSC that we focus on is descriptive norms. The car driver and the pedestrian survey include the following questions, that we hypothesize to be different among the European and African countries. The questions were introduced like this: "When driving/walking on roads in my country, I expect the following behaviour from other drivers:"

- That they become angered by a certain type of driver and indicate their hostility by whatever means they can
- That they sound their horn to indicate their annoyance to another road user
- That they overtake a slow driver on the inappropriate side
- That they drive when they suspect they might be over the legal blood alcohol limit
- That they drive without using a seatbelt

Figure 4.7 shows mean scores on the index measuring descriptive norms in the different countries. The higher the scores on the index, the more violations road users expect from car drivers in their country.

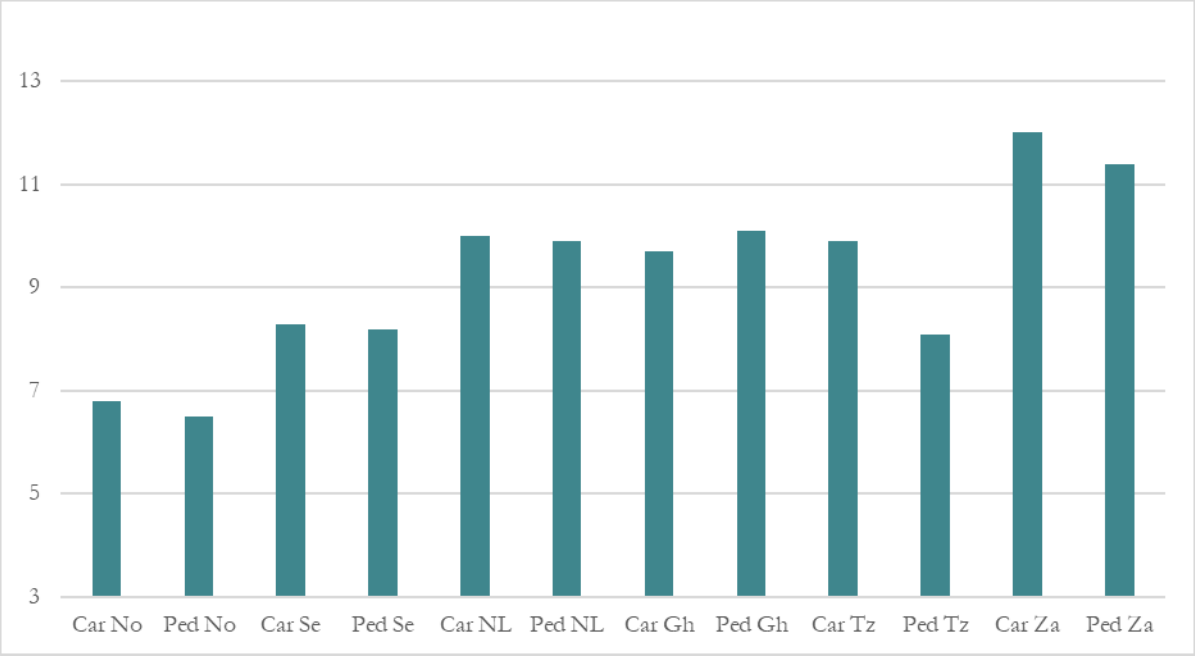

Figure 4.7 Mean scores on the index measuring descriptive norms in the different countries.

Figure 4.7 shows that Norway and Sweden have the lowest scores on the index and expect the lowest level of road violations from car drivers in their country. Road users in Zambia have the highest score on the index and expect the highest level of violations from car drivers in their country. It is also important to note that the mean scores are relatively similar between car drivers and pedestrians within countries. The exception is Tanzania.

We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way ANOVA (based on a variable with one value for each country). The scores of pedestrians and car drivers in Norway was not significantly different internally, but significantly different from the other groups. The scores of pedestrians and car drivers in Sweden (and pedestrians in Tanzania) was not significantly different internally, but significantly different from the other groups. There was another cluster with scores that were not significantly different, comprised of car drivers and pedestrians in Ghana and the Netherlands and car drivers from Tanzania. Finally, the scores of pedestrians and car drivers in Zambia was not significantly different internally, but significantly different from the other groups.

Table 4.11 shows the detailed scores in each country, with standard deviations.

Table 4.11 Mean scores on the index measuring descriptive norms in the different countries.

Groups	Mean	N	Std. D.

Car No	**6,8**	**544**	**2,2**
Ped No	**6,5**	**545**	**2**
Car Se	**8,3**	**293**	**2,9**
Ped Se	**8,2**	**285**	**3,7**
Car NL	**10**	**284**	**3,5**
Ped NL	**9,9**	**279**	**3,8**
Car Gh	**9,7**	**282**	**4,3**
Ped Gh	**10,1**	**258**	**4,8**
Car Tz	**9,9**	**216**	**3,9**
Ped Tz	**8,1**	**250**	**3**
Car Za	**12**	**291**	**5**
Ped Za	**11,4**	**245**	**5,3**
Total	**8,9**	**3772**	**4**

4.5.2 Fatalistic beliefs related to road safety

The second element of RSC that we focus on is fatalistic beliefs related to road safety. The survey includes six statements about fatalistic beliefs:

- I believe that some people die in road crashes as punishment for some bad deeds
- I believe that spiritual intervention, such as prayers, can prevent road crashes
- I pray before embarking on a journey
- I believe that road crashes are the will of God
- Human beings cannot do anything to prevent people from dying in traffic
- People cannot prevent their own death (e.g. in road crashes), they die when it is their time to die

Figure 4.8 Shows the proportions of respondents agreeing with the different statements in the European and the African samples of car drivers and pedestrians.

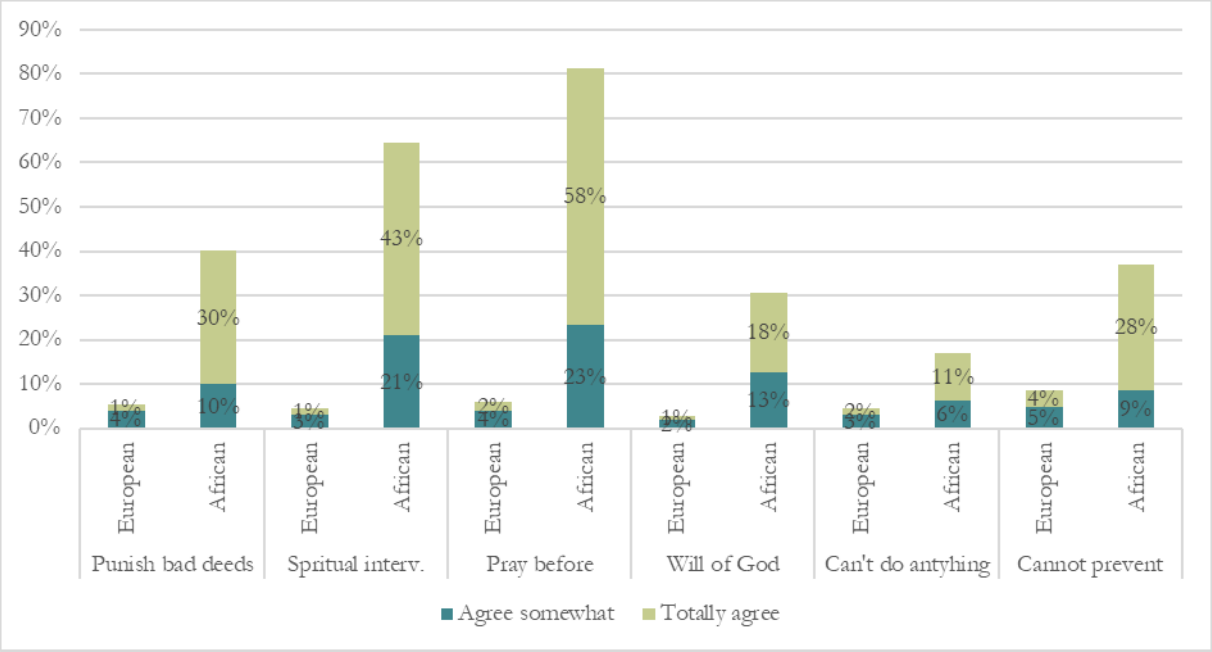

Figure 4.8 Proportions of respondents agreeing with statements about fatalistic beliefs related to road safety in the European and the African samples of car drivers and pedestrians.

The figure shows strong differences between the African and the European respondents. The shares agreeing with the statements are in some instances 16 times higher in the African sample, e.g. for the statement: "I believe that spiritual intervention, such as prayers, can prevent road crashes".

The six statements were combined into a sum score index measuring fatalistic beliefs. Figure 4.9 shows mean scores on this index, sorted after size. The higher the score, the more fatalistic beliefs.

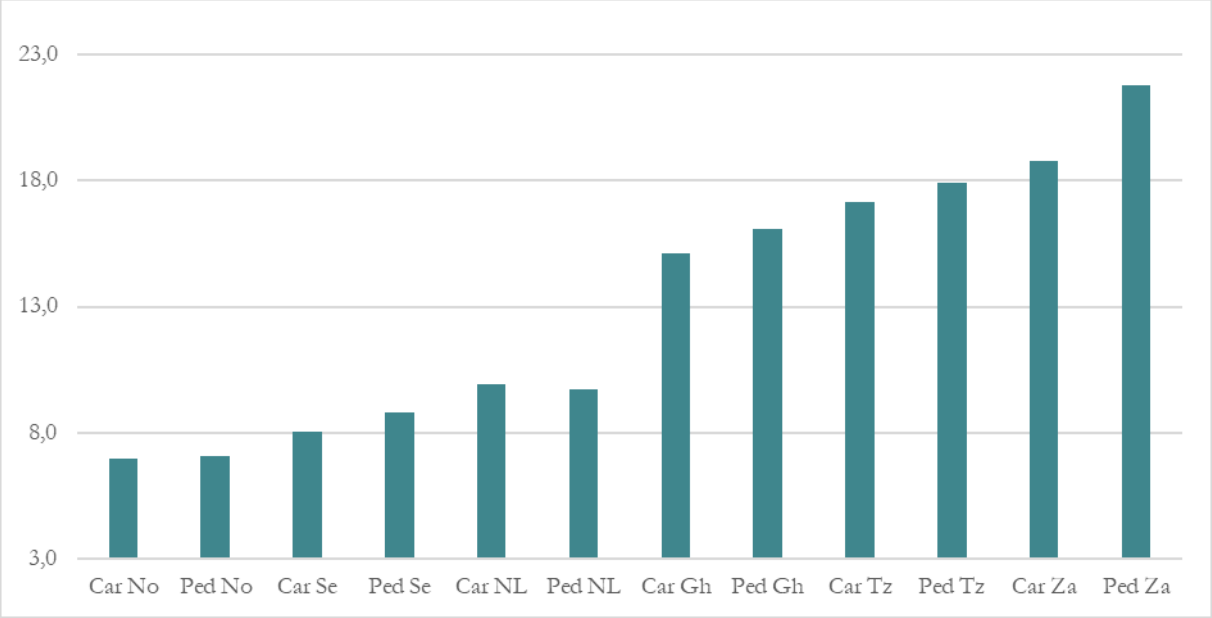

Figure 4.9 Mean scores on the index measuring fatalistic beliefs related to road safety in the different countries.

Figure 4.9 shows that the respondents in the European countries have considerably lower scores on the index measuring fatalistic beliefs than the respondents in the African countries.

Table 4.12 shows the detailed scores in each country, with standard deviations.

Table 4.12 Mean scores and standard deviations on the index measuring fatalistic beliefs related to road safety in the different countries.

	Mean	N	Std. D.
Car No	7,0	544	2,0
Ped No	7,1	545	2,4
Car Se	8,0	293	3,6
Ped Se	8,8	285	4,5
Car NL	9,9	284	3,9
Ped NL	9,7	280	4,7
Car Gh	15,1	282	4,5
Ped Gh	16,1	258	4,6
Car Tz	17,1	216	4,6
Ped Tz	17,9	250	6,0
Car Za	18,8	291	5,4
Ped Za	21,8	245	5,2
Total	12,0	3772	6,5

4.5.3 Values/attitudes related to individual freedom to take risk and paternalism

The survey included two questions measuring attitudes related to individual freedom to take risk in traffic:

- Drivers should be able to do whatever they want in traffic, as long as they do not expose others to risk
- A skilled driver can take more risks than others

The two questions were combined into a sum score index measuring attitudes related to individual freedom to take risk in traffic, which is the opposite of paternalism. We hypothesized that road users in the European countries would score lower on this index, as the European countries have implemented Safe system road safety policies and Vision Zero. Comparing the European and the African countries, we see that the mean score in the former is 3.4 points, while the score in the latter is 4 points (p=<0.001). Although the difference is statistically significant, it is not substantial, and we do not see a clear pattern comparing African and European countries. Ghana stands out with low scores among the African countries and Netherland with high scores among the European countries. Mean scores on the index measuring individual freedom to take risk for each country are presented in Figure 4.10.

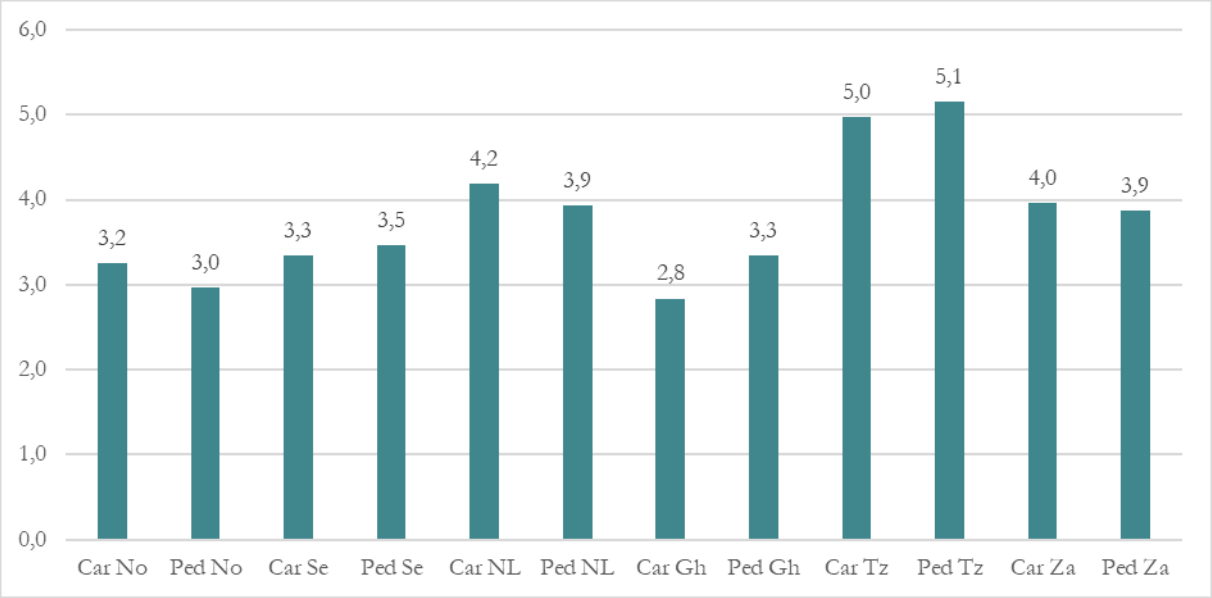

Figure 4.10 Mean scores on the index measuring attitudes to individual freedom to take risk in traffic in the different countries.

Figure 4.10 do not show clear patterns across the countries in Europe and Africa when it comes to attitudes to individual freedom to take risk. Both Norway and Ghana have low scores, while Tanzania has the highest scores.

Table 4.13 shows the detailed scores in each country, with standard deviations.

Table 4.13 Mean scores and standard deviations on the index measuring attitudes to individual freedom to take risk in the different countries.

Group	Mean	N	Std. D.
Car No	3,2	544	1,7
Ped No	3,0	545	1,6
Car Se	3,3	293	1,9
Ped Se	3,5	285	2,0
Car NL	4,2	284	2,1
Ped NL	3,9	280	2,1
Car Gh	2,8	282	1,6
Ped Gh	3,3	258	2,1
Car Tz	5,0	216	2,7
Ped Tz	5,1	250	2,3
Car Za	4,0	291	2,1
Ped Za	3,9	245	2,2
Total	3,6	3772	2,1

4.6 Factors influencing safety outcomes

The focus of this section is the fourth aim, which is to examine the factors influencing safety outcomes (accidents, road safety violations) focusing especially on different elements of national RSC (to identify the elements that are most strongly related to behaviours).

4.6.1 Factors influencing accident involvement

4.6.1.1 Car drivers' accident involvement

In Table 4.14, we examine factors influencing car drivers' accident involvement in the las two years. As noted, 28% of the African car drivers report that they have been involved in a car accident in the last two years, while 10% of the European car drivers report the same.

Table 4.14 Logistic regression. Dependent variable: Drivers' accident involvement as in the last two years. Odds Ratios (statistically significant coefficients in bold). (Accident: 1=yes, 0=no)

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod.5	Mod. 6	Mod. 7	Mod. 8	Mod. 9
Km's driven last two years	**1.000***	**1.000***	**1.000***	1.000	1.000	1.000	1.000	1.000	1.000
Gender (Male=0, Female=1)		**.675*****	**.660*****	**.684****	**.707****	**.739****	.940	.928	.921
Age (>26=0, <26=1)			**1.909*****	**1.624****	**1.522****	**1.476****	**1.448***	**1.359****	**1.349****
Experience (0>20years, 1>20 years)				**.439*****	**.426*****	**.441*****	**.665****	**.695***	**.696***
Education (University=1, Other=0)					**.688*****	**.687*****	**.623*****	**.693*****	**.588*****
Road safety violations index						**1.019*****	.993	.990	.986
European vs. African countries							**3.518*****	**2.094*****	**2.118*****
Fatalistic beliefs index								**1.064*****	**1.061*****
Descriptive norms index									1.020
Nagelkerke R2	.001	.011	.020	.040	.047	.053	.112	.129	.130

First, we see that gender contributes significantly and negatively to car drivers' accident involvement, in Model 1-6. The contribution is lower than 1, indicating that being female is related to decreased probability of being involved in an accident. Gender ceases to contribute significantly in Model 7, when the European vs. African countries variable is included, indicating a relationship between the two variables. (Perhaps a somewhat lower proportion of female car drivers in African countries).

Second, age contributes significantly. The odds are higher than 1, indicating that being younger than 26 years, is related to increased probability of accident involvement.

Third, experience contributes significantly. The odds are lower than 1, indicating that a driver experience of more than 20 years, is related to decreased probability of accident involvement, compared with those with a lower experience.

Fourth, University education contributes significantly. The odds are lower than 1, indicating that university education, is related to decreased probability of accident involvement, compared with those with a lower level of education.

Fifth, the road safety behaviour index contributes significantly, and the odds are higher than 1, indicating that a higher level of driver violations is related to increased probability of accident

involvement, compared with those with a lower experience. The road safety behaviour index ceases to contribute significantly in Model 7, when European vs. African countries variable is included. This is because there is a strong relationship between road safety violations and African vs. European: the latter scores higher on the index.

Sixth, the European vs, African countries variable contributes significantly, and the odds are higher than 1, indicating that African nationality is related to increased probability of accident involvement, compared with the European sample.

Seventh, fatalistic beliefs contribute significantly, and the odds are higher than 1, indicating that fatalistic beliefs are related to increased probability of accident involvement. The fact that the contribution of the variable European vs. African is reduced when fatalistic beliefs is included in Model 8 indicates that fatalistic beliefs to some extent explains the higher accident involvement of the drivers in the African countries. However, the beliefs do not explain all of the accident involvement, as the variable European vs. African still contributes statistically significantly in model 8 and 9.

Moreover, we should expect that the contribution of fatalistic beliefs on accident involvement is mediated through road safety violations, which we assume to be the mechanism between drivers' fatalistic beliefs and accident involvement. In other words, we assume that fatalistic beliefs are related to more risk taking, which leads to more accident involvement. The fact that fatalistic beliefs contribute statistically significantly in Model 9, although we have already included an index comprised of 10 road safety behaviour items, seems to indicate that we have not been able to include all relevant road safety violations in our study. Perhaps the risk taking not only includes driving, but also e.g. maintenance behaviour, other factors related to vehicle risk, road choice, timing of trips etc.

Finally, the Nagelkerke R2 value in Model 9 is .130, which indicates that the variables in Model 9 explains 13% of the car drivers' accident involvement.

4.6.1.2 Pedestrians' accident involvement

The share of pedestrians in the African sample who had been involved in an accident involving a vehicle in the last two years, was 19%, while it was 7% in the European sample. In Table 4.15, we examine factors influencing pedestrians' accident involvement in the las two years.

Table 4.15 Logistic regression. Dependent variable: pedestrians' accident involvement as in the last two years. Odds Ratios (statistically significant coefficients in bold). (Accident: 1=yes, 0=no)

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod.5	Mod. 6	Mod. 7	Mod. 8	Mod. 9
Walking frequency	**.892***	**.902***	**.905***	**.909***	**.859*****	**.874*****	**.873*****	**.882****	**.884****
Age (>56=1, <56=0)		**.410*****	**.398*****	**.424*****	**.486*****	.671	.675	.677	.681
Education (University=1, Else=0)			**.635*****	**.657****	**.709***	**.732***	**.733***	**.727***	**.719***
Aggressive road safety violations				**1.085*****	**1.072*****	**1.060****	**1.061****	**1.053****	**1.049****
Pedestrian infrastructure					**.944*****	.989	.989	.987	.987
European vs, Afrian (=0 vs. 1)						**2.468*****	**2.294*****	**2.283*****	**2.298*****
Fatalistic beliefs index							1.008	1.003	1.001
Descriptive norms index								1.030	1.028
Individual freedom index									1.030

Nagelkerke R2	.006	.024	.032	.046	.060	.083	.083	.086	.087

The results shows that walking frequency contributes significantly to pedestrians' accident involvement. The less pedestrians walk, the higher value they get on the frequency variable. The contribution is lower than 1, indicating that less walking is related to decreased probability of being involved in a pedestrian accident.

Second, age contributes significantly in Model 1-5. The odds are lower than 1, indicating that being older than 56 years, is related to decreased probability of pedestrian accident involvement.

Third, university education contributes significantly. The odds are lower than 1, indicating that university education, is related to decreased probability of pedestrian accident involvement, compared with those with a lower level of education.

Fourth, the aggressive road safety behaviour index contributes significantly, and the odds are higher than 1, indicating that a higher level of aggressive pedestrian violations is related to increased probability of pedestrian accident involvement.

Fifth, the pedestrian infrastructure index contributes significantly, and the odds are lower than 1, indicating that a higher level of pedestrian infrastructure is related to decreased probability of pedestrian accident involvement. The pedestrian infrastructure index ceases to contribute significantly in Model 6, when European vs. African countries variable is included. This is because there is a strong relationship between pedestrian infrastructure and African vs. European: the latter scores higher on the index.

Sixth, the European vs, African countries variable contributes significantly, and the odds are higher than 1, indicating that African nationality is related to increased probability of pedestrian accident involvement, compared with the European sample.

Finally, the Nagelkerke R2 value in Model 9 is .087, which indicates that the variables in Model 9 explains 9% of the pedestrians' accident involvement.

4.6.2 Factors influencing road safety violations

4.6.2.1 Car drivers' road safety violations

In Table 4.16, we examine factors influencing car drivers' road safety violations. As noted above, this variable contributed significantly to drivers' accident involvement until the variable European vs. African was included in the model.

Table 4.16 Linear regression. Dependent variable: car drivers' road safety violations. Standardized beta values.

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod.5	Mod. 6	Mod. 7
Gender (Male=1, Female=2)	**-.110*** **	**-.112*** **	**-.112*** **	**-.100*** **	**-.069*** **	**-.057*** **	-.014
Age (>26=1, <26=2)		**.062*** **	**.062*** **	-.002	-.018	-.029	**-.031***
Education (University=1, Other=0)			.002	-.017	-.029	-.029	**-.032***
Descriptive norms index				**.528*** **	**.429*** **	**.394*** **	**.372*** **
Fatalistic beliefs index					**.244*** **	**.224*** **	-.014
Freedom to take risk attitudes						**.169*** **	**.207*** **
European vs. African							**.343*** **

Adjusted R2	.012	.015	.015	.289	.337	.363	.417

First, we see that gender contributes significantly and negatively to car drivers' road safety violations. This means that being a female car driver is related to less aggressive road safety violations, controlled for the other variables in the model. The contribution of this variable ceases however to be significant in Model 7, when freedom to take risk attitudes are included in the model. This indicates a relationship between the two variables. The contribution of the gender variable was, however, gradually reduced through Model 1-6, so we should not place too much weight on this.

Second, we see that age contributes significantly and negatively to car drivers' road safety violations, but only at the 10% level, and with a small coefficient in Model 7. The significant contribution means that being under 26 years old is related to lower levels of road safety violations, controlled for the other variables in the model. This is hard to explain. We see, however, that the value of this coefficient changes from positive in model 2-6 (as expected) to negative in Model 7.

Third, university education contributes significantly and negatively to car drivers' road safety violations. The coefficient is however small and it is only significant at the 10% level.

Fourth, the descriptive norms index contributes significantly and positively to car drivers' road safety violations. This means that car drivers who ascribe a high level of aggressive violations and other road violations to car drivers in their own country also report to commit a high levels of road safety violations, controlled for the other variables in the model. This indicates that the road safety violations of car drivers are related to the road safety violations of other car drivers in their country, presumably, as road safety culture is created in interaction between road users.

Fifth, the fatalistic beliefs index contributes significantly and positively to car drivers' road safety violations. This means that holding a high level of fatalistic beliefs as a car driver is related to higher levels of road safety violations, controlled for the other variables in the model. This variable ceases to contribute significantly in Model 7, when European vs African is included, indicating the close relationship between fatalistic beliefs and African nationality.

Sixth, Freedom to take risk attitudes contributes significantly and positively to car drivers' road safety violations. This indicates higher levels of road safety violations among car drivers with attitudes focusing on the freedom to take risk in traffic, controlled for the other variables in the model.

Seventh, the variable European vs. African contributes significantly and positively to car drivers' road safety violations. This indicates higher levels of road safety violations among African car drivers, controlled for the other variables in the model.

Finally, the adjusted R2 value in Model 7 is .417, indicating that the model explains about 42% of the road safety violations of the car drivers.

4.6.2.2 Pedestrians' aggressive road safety violations

In Table 4.17, we examine factors influencing pedestrians' aggressive road safety violations. As noted above, this variable contributed significantly to pedestrians' accident involvement.

Table 4.17 Linear regression. Dependent variable: pedestrians' aggressive road safety violations. Standardized Beta values.

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod.5	Mod. 6	Mod. 7	Mod. 8	Mod. 9
Age (<56=1, >56=2)	**-.098*** **	**-.097*** **	**-.098*** **	**-.069*** **	**-.037***	**-.038***	-.032	-.018	-.022
Gender (Male=1, Female=2)		**-.055** **	**-.054** **	**-.045** **	**-.055** **	**-.055** **	**-.042** **	**-.037***	**-.040***
Education (University=1, Other=0)			-.014	.000	-.014	-.014	-.025	-.025	-.029

Pedestrian infrastructure index				**-.154*** **	**-.123*** **	**-.127*** **	**-.131*** **	**-.108*** **	**-.083*** **
Descriptive norms index					**.250*** **	**.253*** **	**.224*** **	**.222*** **	**.210*** **
Fatalistic beliefs index						-.010	**-.049***	**-.106*** **	**-.125*** **
Freedom to take risk attitudes							**.159*** **	**.164*** **	**.152*** **
European vs. African countries								**.096*** **	.045
Pedestrian risk perception									**.138*** **
Adjusted R2	.009	.012	.011	.033	.093	.092	.113	.116	.127

First, we see that age contributes significantly and negatively to pedestrians' aggressive road safety violations. This means that being a pedestrian who are older than 56 years old is related to less aggressive road safety violations, controlled for the other variables in the model. The contribution of this variable ceases however to be significant in Model 7, when freedom to take risk attitudes are included in the model. This indicates a relationship between the two variables. The contribution of the age model was, however, gradually reduced through Model 1-6, so we should not place too much weight on this.

Second, we see that gender contributes significantly and negatively to pedestrians' aggressive road safety violations. This means that being female is related to lower pedestrian aggressive road safety violations, controlled for the other variables in the model.

Third, the pedestrian infrastructure index contributes significantly and negatively to pedestrians' aggressive road safety violations. This means that having a pedestrian friendly infrastructure is related to less pedestrian aggressive road safety violations, controlled for the other variables in the model. This indicates that lacking safe system infrastructure for pedestrians increases the probability of aggression among pedestrians, although we do not know whether there is a causal relationship, as this is a not a controlled experiment.

Fourth, the descriptive norms index contributes significantly and positively to pedestrians' aggressive road safety violations. This means that pedestrians who ascribe a high level of aggressive violations and other road violations to car drivers in their own country is related to higher levels of pedestrian aggressive road safety violations, controlled for the other variables in the model. This indicates that the aggressive behaviour of car drivers is related to the aggressive behaviour of pedestrians, presumably as road safety culture is created in interaction between road users.

Fifth, the fatalistic beliefs index contributes significantly and negatively to pedestrians' aggressive road safety violations. This means that holding a high level of fatalistic beliefs as a pedestrian is related to lower levels of aggressive pedestrian aggressive road violations, controlled for the other variables in the model. This result is unexpected, and probably due to multicollinearity, i.e. that the value of coefficients changes when several correlated independent variables are included at the same time. Bivariate correlation analyses indicate that high levels of fatalistic beliefs are related to higher levels of pedestrian aggressive road violations. Moreover, the fatalism index contributes positively to aggressive pedestrian road safety violations in regression analyses without the other variables measuring RSC elements. This is an issue that needs to be examined further in future research.

Sixth, the variable European vs. African contributes significantly and positively to pedestrians' aggressive road safety violations. This indicates higher levels of aggressive road safety violations among African pedestrians, controlled for the other variables in the model.

Seventh, pedestrians risk perception contributes significantly and positively to pedestrians' aggressive road safety violations. This indicates higher levels of aggressive road safety violations among pedestrians with a higher level of risk perception, controlled for the other variables in the model. This applies to the African pedestrians. The variable European vs. African ceases to contribute significantly in Model 9, when pedestrians' risk perception is included.

Finally, the adjusted R2 value in Model 9 is .127, indicating that the model explains about 13% of the aggressive road safety violations of the pedestrians.

4.7 Factors influencing elements of road safety culture

The fifth aim of the study is to examine and discuss the factors influencing the different elements of national RSC. We have limited information about the factors influencing RSC, as we only have measured some of the relevant factors quantitatively. We provide multivariate analyses of demographic factors influencing elements of RSC in Tables 4.18-4.20. First, we provide, however, relevant results from the qualitative data.

4.7.1 Interview results

4.7.1.1 Factors influencing descriptive norms

As with the fieldwork data, the interview data indicate a more congested chaotic, hectic and unregulated traffic picture in the African countries than in the European countries. This results in numerous conflicts, near-misses, and actual accidents. The interaction between road users appears to be somewhat based on the "right of the strong," with less respect for pedestrians than in Europe and a generally higher tolerance for risk.

Road infrastructure. As with the fieldwork data, the interview data indicates less developed safe system solutions in the road infrastructure in the African countries. Lack of roundabouts, less red-light regulation and lack of road markings was mentioned during the focus groups. In addition, also undivided roads, poor lighting and single carriageways was mentioned when discussion contributing factors to road accidents.

Even though new roads are being constructed, the "safety is lacking." For example, potholes and uncovered drainage systems constitutes major safety hazards. One of the respondents from a focus group in Zambia stated that:

> "the construction is a waste of money, if they [the government] do not pay attention to safety hazards. Do they want to build sustainable solutions, or quick fixes? Safety needs to be a top priority, which it is not today."

During the focus groups the need to build infrastructure converting two lane rural roads info four lane divided roads and build separate dual carriageways was emphasized. This was discussed as measures to prevent head on collisions.

During the focus groups the lack of infrastructure for vulnerable road users was emphasized and discussed. There is a lack of sidewalks, crosswalks, pedestrian crossings and bike lanes. There is often no protective barriers or railings to protect pedestrian and cyclist from vehicular traffic. Encroachment in the sides of the road, including obstacles (cars, shops etc.) were mentioned as a problem for pedestrians, giving less space for footpaths. Roads are typically not being built with ramps or curb cuts for wheelchair users at crossings or along sidewalks, and there are typically no auditory signals at pedestrians crossing or tactile paving for visually impaired individuals. Parking for disabled road users is not prioritized. This is in accordance with our results from the survey data, where African pedestrians score significantly lower on the index measuring pedestrian friendly infrastructure.

Due to the high number of vulnerable road users involved in traffic accidents, initiatives to build road designs that to a larger degree consider pedestrians and cyclist were emphasized during the focus

groups. In Ghana several participants emphasized that the National Road Safety Authority have had intervention activities trying to target pedestrian safety and to target speeding. In Zambia the UN Road Safety Funds (RSF) project Safe Roads Zambia was mentioned. "The objective of the Safe Roads Zambia - Creating Cities for Non-motorized Transportation Users project is to create safe, inclusive, and sustainable road conditions for pedestrians, through encouraging multisectoral partnerships, private sector involvement, advocacy and fundraising towards safe sidewalks, bike lanes and pedestrian crossings" (RSF, 2020).[1] In Tanzania the "Ten Step Project" funded by The United Nations Road Safety Fund (UNRSF) was mentioned (iRap, 2021).[2] A part of the Ten Step Project is the iRAP pilot project, "TanRAP", which evaluates road safety levels and suggests infrastructural measures to reduce accidents and fatalities. Participants from Tanzania discussed its potential in assessing road safety and identifying high-risk areas. iRAP projects typically aim to assess roads using their own developed Star Rating system, which evaluates safety levels and suggests measures to reduce accidents and fatalities. The goal of the TanRAP pilot project in Tanzania is that 70 % of roads corresponds to the iRap Three Star Rating.

Urban planning, road capacity and congestion. Urban planning was not explicitly discussed as part of the interview guide in the focus groups. Heavy congestion and poor road capacity was nevertheless mentioned as obstacles for traffic. Interviewees mentioned the challenge of increasing car ownership in the population, which has not been followed by increased road capacity:

> "*a lot of people with access to money have decided to invest in their own vehicles… now we in Zambia have unregulated overpopulation or subscription of low-capacity vehicles competing for limited road space to drive on because our roads in the country are not expanding*."

Encroachment was mentioned as a factor contribution to congestion. Also, heavy vehicles broken down along the road was mentioned as a contributing factor to accidents. These vehicles are left along the road, taking up space, and other vehicles hit these abandoned vehicles. Whether or not congestion give rise to aggressive interaction patterns between road users was not explicitly discussed during the focus groups, though it was emphasized that motorized road users typically have a sense of urgency and a need to "rush ahead", that creates dangerous situations with wrongful overtaking and speeding. Especially motorcyclist where describes as "impatient" due to time pressure:

> "*There is a surge in motorcyclist because of the whole delivery business. So, you will find that most of them [motorcyclist], on the road are impatient so they will not follow their proper road rules. They will be swerving around in traffic*."

Lack of a viable organized public transport system. Public transport systems were not explicitly discussed as part of the interview guide in the focus groups. It was mentioned, however, that poor public transport systems weaken the mobility of vulnerable road users, and that a lack of a viable organized public transport system contributes to more car driving and more congestion on the roads. There is potential of working with public transport systems to "promote safe and active mobility and safe space for all those that want to use the road".

Several participants described that a lot of people have lost their trust in public transport and that they, if possible, prefer to buy their own vehicles. For some, driving their own car is viewed as safer than traveling by public transport. Each year, several buses are involved in deadly crashes. Also, some of the buses that are used for public transport is often modified, and do not consider the safety and comfort of passengers. Bus drivers can also suffer from fatigue, driving long hours at the expense of passenger's safety.

In Zambia the management of the public transport system was described as "chaotic". A participant from Zambia explained that the public transport system is inaccessible to people in vulnerable

[1] Safe roads Zambia - creating cities for non-motorized transportation users | United Nations Road Safety FundUNRSF

[2] The Ten Step Plan for Safer Road Infrastructure kicks off in Tanzania - iRAP

situations, "like people living with disabilities, pregnant women, the elderly, people with children, people of faith." The vehicles that are imported are not meant for public transport. They are modified locally and do not consider the safety and comfort of passengers. The participant proposed two measures to improve public transport: 1) To go from fixed routing, causing double commuting, to a ring routing system, creating direct connectivity that cuts down on travel time and travel cost and 2) To make isolated or dedicated lanes for public transport.

In Tanzania they have developed a Bus Rapid Transit System (BRT), which is up and on one road stretch, and which will expand in the next year (it is still under construction) It was mentioned that this system has the potential to reduce congestion and improve the traffic environment.

The lack of the public transport systems increases the attractiveness of motorcycles:

> "*It's very difficult to avoid them. There are so many and many of them operate also on the last mile or First mile. Often used to travel when one wants to go for a major bus station … that's normally the easiest means of transport to get*".

The composition of road users. Demographic characteristics of the African countries was not discussed explicitly as part of the interview guide in the focus groups. It was confirmed, however, like we see in the result from the field studies, that the African countries have a high share of motorcyclists, which makes the traffic picture more chaotic, with more conflicts between road users.

The survey indicates less road safety violations among car drivers and pedestrians with increasing age. During the focus groups it was emphasized by some participants that the motorcycle drives are young and with little former experience of driving motorized vehicles.

Drivers that do not respect the right to give way or consider other road users, as well as reckless driving from motorcyclist were mentioned as contributing to conflict between road users. Also, like previously stated, time pressure and the need to "get ahead" was mentioned as reasons for speeding and wrongful overtaking also contributing to conflicts between road users.

The level of enforcement. An important factor potentially influencing national RSC, that was underlined by the interviewees and also in previous research, is the level of enforcement (Özkan et al ., 2006). There is a close relationship between the level of enforcement in countries and road user behaviors (Elvik et al., 2009).

During the focus groups several examples of behavior that violates traffic rules where mentioned: speeding, running red lights, driving without seat belt or helmet, wrongful overtaking, overloading, usin the phone while driving, driving in the dark without lights on, failure to comply with the duty to give way and abuse of alcohol.

In addition to the aforementioned behaviors, a typical behavior described by several participants was a lack of respect for other motorist often attributed to being in a rush and having a need to catch up with time. It was mentioned that this often may lead to dangerous overtaking and risk taking in traffic. Also, some participants did mention that governmental cars will for example run red light because "they think of themselves as above the law".

In general, the enforcement of the traffic police was viewed as insufficient:

> "We need to put more effort in terms of legislation as well as enforcement to ensure that the behavior of the drivers is safe enough to prevent accidents."

Lack of licensing and training for motorcyclist was mentioned as an issue that is not sufficiently supervised and enforced. The motorcyclist is a big challenge. In one of the African countries, it was mentioned that:

> "*The enforcement of traffic rules is very weak. Traffic police are not interested in enforcing traffic rules. As far as two wheelers are concerned, they just leave them to do whatever they like."*

> "*Enforcement of the traffic rules is important. On the part of the police … they need to regard the behavior of the motorcycles. It is very important*."

> "*Simply, they [the traffic police] cannot control them.*"

Interviewees attributed lacking enforcement to partly tolack of resources in the police. Additionally, corruption was mentioned as a hindrance for effective enforcement of traffic rules. Examples of traffic police abusing enforcement measures, like police check points, to raise money for themselves, or examples with police being bought off to drop cases.

Measures. Several enforcement measures were mentioned during the focus groups. Here are some examples mentioned during the focus groups: In Zambia they have been implementing speed cameras at dedicated road sections to fine speeding. Also, it was mentioned that in Tanzania they have put speed limiters on passenger transport. In Ghana there is a use of police check points, and traffic police are placed in several places along the road to inspect traffic.

All focus group participants emphasized that there is a need for more manpower and funding to effectively implement measures and increase the use of police enforcement. In general, there was some uncertainty as to whether the efficiency of the measures was evaluated over time.

Discussing road safety violations with the focus group participants, they emphasized a combination of both enforcement and education to change road user behaviour:

> Are we doing enough enforcement? Are we doing enough education? I think in our country, behavior change…it is quite…for someone's behavior to change you need to do a lot. We need to keep talking about the same thing over and over again. Sometimes you have to punish people, sometimes you just need to educate them.

In the following, we will discuss work shop participants' views on road user education.

Formal driver training. The study presupposes that national RSC, defined partly as our expectations of other road users, to some extent can be "normalized" in formal driver training. Based on the focus group discussion it seems that there is great belief in driver training as means to change behavior.

Work shop participants stated that there is lack of knowledge of traffic rules by all road users, also vulnerable road users. It is also an issue that road users do not consider the traffic rules as adhering to them. Especially, lack of licensing and formal training of motorcyclist is regarded as an issue:

> "*They [motorcyclist] don't know traffic rules or think it does not adhere to them*".

Several participants emphasized the need for the combination of increased enforcement, training and licensing to change behavior.

> "*Lack of formal training combined with weak enforcement of traffic rules contributes to traffic where can "do whatever they like*".

Several of the participants discussed the level of driver education and whether the curriculum had sufficient focus on traffic safety.

> "*The road safety issues as far as I know, for instance, the driver, the driving schools now are only teaching how to drive cars. They don't have Road safety issues in the models, so most of the drivers are being given license without even knowing*."*Anything about road safety They just know how to ride the motorcycles. So, this is the area which we'll need to focus on*."

Economy and socioeconomic factors. Several interviewees mentioned that working as motorcycle taxi riders have provided a way to avoid crime among young people. An increase in the demand for delivery services as well as passenger transport attracts especially younger drivers that want to make a living as a courier and/or motorcycle taxi. It provides employment to the youth and functions as an alternative to crime. Some of the interviewees viewed the motorcycles as an important contribution to transportation , as it provides first mile and last mile delivery. At the same time, it causes challenges for traffic safety.

"*It has put many young people into jobs that otherwise would be causing havoc in our residences and so on, earning an income robbing people and so on … So, it has created a lot of employment*".

"*The motorcycles are providing employment to the youth, which is beneficial to the country, but I think we need to put a limit on the number of motorcycles operating in specific areas*."

4.7.1.2 Factors influencing fatalistic beliefs

This issue was to a low extent covered in the focus group interviews. During or fieldworks and interviews related to these in the African countries, we were told many examples indicating the significance of fatalistic beliefs for road safety. In a discussion about this in a road safety conference in Ghana, we were told that, according to traditional beliefs, it is believed that the souls of perished road users stay on the road where the died until there is a ritual which frees the soul. This could e.g. be the offering of a goat. Until the souls of traffic victims are freed, the souls will stay on the road side and cause new accidents. We were provided an example of a government minister who had been in a traffic accident that ended fatal for one of the road users involved. The minister returned to the accident site after a while, and offered a goat to free the soul of the road user. We were provided several other examples of fatalistic beliefs and superstition among road users. Bus drivers often used different types of artifacts to protect themselves from being involved in accidents. This was known among bus passengers, which meant that the seat behind the driver was popular, as it was considered to the safest place in the bus. One of the participants in the focus groups commented on the prevalence of fatalistic beliefs, stating that:

"*Me, personally, I think that the culture of the country affects the implementation of these factors, simply because, the culture in our nation usually think that accidents maybe cannot usually happen, but the reality is that accidents may happen any day*".

4.7.1.3 Factors influencing freedom to take risk attitudes

This issue was to a low extent covered in the focus group interviews. During or fieldworks and interviews related to these in the African countries, we were told many examples of politicians who wanted to make changes to roads or infrastructure, but who were impeded from doing this by the voting public. This could happen directly, e.g. as large groups of voters organized and campaigned against suggested changes and reforms. Sometimes large groups of driver or car owner unions grouped against the government to protest to new rules, e.g. aiming to improve road safety. This indicates that road safety measures to a considerable extent is impeded by the populations' attitudes focusing on freedom to take risk and skepticism towards paternalistic measures in the African countries. This was e.g. mentioned when it comes to politicians efforts to remove hawkers from the roads, as high numbers of pedestrian salespeople on high-speed roads might lead to accidents. We also learned of an example where a national government had tried to implement a measure to improve safety in professional transport, which was revoked due to popular demand from driver unions. In the fieldworks and interviews related to these, it was stressed that politicians "always think about the next election", and that they therefore might be afraid to implement unpopular measures.

4.7.2 Multivariate analyses based on quantitative data

4.7.2.1 Factors influencing descriptive norms

In Table 4.18, we examine factors influencing descriptive norms.

Table 4.18 Linear regression. Dependent variable: descriptive norms among car drivers and pedestrians. Standardized beta values.

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4
Gender (Male=1, Female=2)	-.009	-.012	-.012	**.041****

Age (>26=1, <26=2)		**.108*** **	**.108*** **	**.049*** **
Education (University=1, Other=0)			.002	-.003
European vs. African				**.286*** **
Adjusted R2	.00	.011	.011	.086

Table 4.18 indicates that being female and being under 26 years is related to higher scores on the descriptive norms variable. The same applies to living in an African country, which is the most important variable in the model. The model (i.e. primarily the variable European vs. African) explains 12% in the variation of the descriptive norms variable.

4.7.2.2 Factors influencing fatalistic beliefs

In Table 4.19, we examine factors influencing fatalistic beliefs

Table 4.19 Linear regression. Dependent variable: fatalistic beliefs among car drivers and pedestrians. Standardized beta values.

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4
Gender (Male=1, Female=2)	**-.109*** **	**-.115*** **	**-.115*** **	.017
Age (>26=1, <26=2)		**.244*** **	**.245*** **	**.099*** **
Education (University=1, Other=0)			.004	-.009
European vs. African				**.712*** **
Adjusted R2	.012	.071	.071	.541

Table 4.19 indicates that being under 26 years is related to higher scores on the fatalistic beliefs variable. However, living in an African country, which is by far the most important variable in the model. The model (i.e. primarily the variable European vs. African) explains 54% in the variation of the fatalistic beliefs variable.

4.7.2.3 Factors influencing attitudes related to freedom to take risk

In Table 4.20, we examine factors influencing attitudes related to freedom to take risk

Table 4.20 Linear regression. Dependent variable: attitudes related to freedom to take risk among car drivers and pedestrians. Standardized beta values.

Variable	Mod. 1	Mod. 2	Mod. 3	Mod. 4
Gender (Male=1, Female=2)	**-.106*** **	**-.108*** **	**-.109*** **	**-.091*** **
Age (>26=1, <26=2)		**.109*** **	**.110*** **	**.090*** **
Education (University=1, Other=0)			.021	.019
European vs. African				**.098*** **
Adjusted R2	.011	.022	.023	.031

Table 4.20 indicates that being female is related to less focus on freedom to take risk in traffic, being younger than 26 years old is related to higher focus on freedom to take risk, the same applies to living in an African countries.

5 Discussion

5.1 Overarching objectives

The point of departure for this study was that there are few studies of national RSC, and that there is a need to develop and test conceptualizations and mechanisms explaining the relationship between RSC, road safety violations and accident involvement. We have also suggested that a study of the African and the European context seems suitable for a comparison of RSC. Several of the factors believed to influence national RSC differ in the African and the European contexts, e.g. road infrastructure, interaction between road users, education, enforcement, economy the composition of road users etc. (cf. Nævestad et al, 2019). Additionally, the road safety records in the European and the African countries differ substantially. Looking at WHO estimates for road fatalities, the number of fatalities is eight times higher in the studied African countries than in the studied European countries. In the present study, we therefore examine whether and how these differences also reflect differences in RSC in the European and African countries.

The overarching objective of the study is to identify the elements of national RSC where we see the biggest differences between the African and the European countries, and the elements of RSC that are most strongly related to road safety outcomes (e.g. road safety violations and accident involvement. We want to examine to what extent we can use the concept of RSC to shed light on different road accident risk levels in the European and the African countries.

5.2 Accident involvement and road safety violations

The first aim of the study was to compare accident involvement among car drivers and pedestrians in the European countries and the African countries. We have seen that the accident involvement among respondents in the African countries is about three times higher than in the European countries. The second aim was to compare road safety violations among car drivers and pedestrians in the European and the African countries. In line with previous research, we find significantly higher levels of road safety violations for the African car drivers than for the European drivers: 21.6 points vs. 13.1 points on the index. This is in line with previous research (Dotse and Rowe, 2021). Additionally, African pedestrians score significantly higher on aggressive pedestrian behaviour index (6.4 points vs. 5.2), although the comparison on the country level is more blurred. These results are in accordance with *Hypothesis 1*.

5.3 Where do we see the biggest differences between the RSCs of the European and African respondents?

The third aim of the study was to compare elements of national RSC among car drivers and pedestrians in European and African countries (to identify the elements where we see the biggest differences). We focus on different elements of national RSC in the study. As far as we know, there are no previous studies testing different conceptualizations of national RSC across countries and continents. Conducting such study designs is useful as a way of developing new knowledge in a young research field.

The first element of national RSC that we examine is descriptive norms, which refer to individuals' perceptions of what they believe drivers in their country do. The link between RSC measured as descriptive norms and road safety violations is a subtle social pressure to act as others do. We made a sum score index measuring descriptive norms, including both car drivers and pedestrians (min 5, max: 25). The descriptive norms focus on aggressive violations, driving under the influence and lacking seat belt use. The mean score of African car drivers on the index was 10,7 points, while it was 10,8 for African pedestrians. Corresponding scores in the European groups were 8 and 7.9 points.

This indicates relatively similar national RSCs between pedestrians and car drivers in the continents, measured as descriptive norms.

These results are in line with *Hypothesis 2*: We expected that the level of violations that car drivers and pedestrians expect from car drivers in their country is higher in the African countries than in the European countries. This means an RSC with more violations among car drivers in the African countries. It is, however, important to note that the differences between countries within the two continents were considerable, indicating the importance of comparing countries and not continents. These differences between the road safety violations attributed to drivers are in line with the self-reported tendency for drivers' own behaviours (Dotse and Rowe, 2021; WHO, 2021).

The second element of RSC that we focus on is fatalistic beliefs (Boua et al 2024), which refer to a tendency for individuals to view life events as predetermined and inevitable (Esparza et al., 2015). People who hold fatalistic beliefs tend to believe that they do not have control over events, as these events are controlled by external factors (Kouabenan 1998). The link between RSC 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. This is where we saw the biggest difference between the road users in the African and the European countries. We made a sum score index measuring fatalistic beliefs, and respondents in the European countries have considerably lower scores on the index measuring fatalistic beliefs than the respondents in the African countries. The scores on the index among African pedestrians were 19, while it was 16.8 among the car drivers in Africa. Corresponding scores in the European sample was 8.3 points and 8.1 points. These results are in line with previous research. Mcllroy et al (2020) cite a wide range of studies from African countries reporting a relatively high level of fatalistic beliefs among road users, and which indicate relationships between fatalistic beliefs and unsafe road behaviours (e.g. Ngueutsa and Kouabenan, 2017; Teye-Kwadjo, 2019). Thus, our results are in line with *Hypothesis 3*: We expected a higher level of paternalistic beliefs among road user in the African countries than in the European countries.

The third element of RSC that we focus on is values and attitudes related to freedom to take risk in traffic, and paternalistic attitudes (cf. Elvebakk 2005; Nævestad et al 2022). The link between RSC measured as attitudes focusing on freedom to take risks in traffic and road safety violations is that individuals have a right to take risks, that "risk taking" is not dangerous for "capable" individuals, and that the state should refrain from interfering. The Cambridge Dictionary defines freedom as "The condition or right of being able or allowed to do, say, think, etc. whatever you want to, without being controlled or limited" When applied to road safety, individual freedom concerns the right to "act as you want" (i.e. take risks) without being controlled or limited. This may apply to e.g. drivers' speeding in traffic, driving without using seat belt, driving when drunk etc. Although values may be important across other national contexts (especially when comparing with the US), we did not see big differences between the African and European respondents on this issue. We saw, however, differences between countries: pedestrians and car drivers in Tanzania had the highest scores. Generally, our data do not support *Hypothesis 4:* We expected a higher level of freedom values and attitudes among road user in the African countries than in the European countries.

Finally, we expected that the descriptive norms, paternalistic beliefs and freedom values/attitudes that car drivers and pedestrians report in their country was similar for drivers and pedestrians within countries, indicating shared RSC within countries (Hypothesis 5). Our results generally support this hypothesis, although we see some exceptions, e.g. for car drivers and pedestrians in Tanzania when it comes to descriptive norms.

5.4 Which elements of RSC are most important in explaining safety outcomes?

The fourth aim of the study was to examine the factors influencing safety outcomes (accidents, road safety violations), focusing especially on different elements of national RSC. One of the purposes of this was to identify the RSC elements that are most strongly related to road safety behaviours.

5.4.1 Factors influencing accident involvement

Examining factors influencing car drivers' accident involvement, we found that this was influenced by road safety violations, which in turn was related to continent (Europe vs. Africa) and fatalistic beliefs. This is in line with previous research, e.g. De Winter and Dodou (2010) and Warner et al (2011). This previous research especially find that violations are related to accident involvement, as we see in our study.

However, we should expect that the contribution of fatalistic beliefs on accident involvement is mediated through road safety violations, which we assume to be the mechanism between drivers' fatalistic beliefs and accident involvement. In other words, we assume that fatalistic beliefs are related leads to more risk taking, which leads to more accident involvement. The fact that fatalistic beliefs contribute statistically significantly to car drivers' accident involvement, although we have already included an index comprised of 10 road safety behaviour items, seems to indicate that we have not been able to include all relevant road safety violations in our study. Perhaps the risk taking not only includes driving, but also e.g. behaviour related to maintenance of vehicles, how drivers respond to vehicle malfunctions that may indicate safety risks etc. This was also indicated in our discussion of results with road safety stakeholders and researchers in Tanzania. This is an important issue for future research. We also found that car drivers young age (<26 years) is related to higher levels of accident involvement, in accordance with previous studies (Charbotel, et al, 2010). The same does higher levels of education and higher levels of experience as drivers.

We also examined factors influencing pedestrian accident involvement. We found that a high level of aggressive pedestrian violations is related to increased probability of pedestrian accident involvement, as indicated in the research of McIlroy et al (2020). Moreover, Useche and Llamazares (2022) state that previous studies have associated traffic-rule violations with the injuries and fatalities suffered by pedestrians, especially in high-risk urban locations, such as crossings or intersections (Hashemiparast et al., 2017, Cinnamon et al., 2011).

Useche and Llamazares (2022) also state that the research literature remains limited to explain behavioural-based traffic crashes of pedestrians. We have contributed to this research by examining several factors related to pedestrians' accident involvement. We found, unsurprisingly, that less walking is related to decreased probability of being involved in a pedestrian accident. We also found that the following factors are related to lower probability of being involved in collision with a vehicle as a pedestrian: being older than 56 years, university education, a higher level of pedestrian friendly infrastructure (i.e. physical separation from cars) European nationality.

5.4.2 Factors influencing road safety violations

We also examined the factors influencing road safety violations, focusing especially on different elements of national RSC. One of the purposes of this was to identify the RSC elements that are most strongly related to road safety behaviours. Our sixth hypothesis was that we expected that there is a relationship between RSC measured as descriptive norms, paternalistic beliefs and freedom values/attitudes on the road safety violations of drivers and pedestrians (Hypothesis 6). Our results generally support this hypothesis.

Multivariate regression analyses indicate that car drivers' road safety violations were influenced by all the three elements of national RSC. The RSC element which was most strongly related to road safety violations was descriptive norms. Bivariate correlation analyses indicate Pearsons R values of .696 ($p<.001$) for descriptive norms, .166 ($p=.05$) for the fatalism index and .276 for freedom values ($p<.001$).

Multivariate regression analyses indicate that pedestrians' road safety violations were also influenced by all the three elements of national RSC. Bivariate correlation analyses indicate Pearsons R values of .276 ($p<.001$) for descriptive norms, .163 ($p<.001$) for the fatalism index and .241 for freedom values ($p<.001$).

The relationship between descriptive norms and road safety violations is in line with previous research (Nævestad et al 2019). This mechanism is also underlined by Cestac et al (2019). It is interesting to see that descriptive norms also contribute significantly to pedestrians' aggressive behaviours in traffic. This is in line with our assumption that an aggressive driving culture among car drivers would be related to a aggressive behaviours among pedestrians: the aggressive pedestrian violations generally measure aggression towards car drivers.

The relationship between fatalistic beliefs and road safety violations is also in line with previous research. Boua et al (2024). The mechanism between this element of national RSC and road safety violations is that if your fate is predestined, what you do in traffic (i.e. risk taking) will not make a difference. People who hold fatalistic beliefs tend to believe that they do not have control over events, as these events are controlled by external factors (Kouabenan 1998). In line with this, Boua et al (2024) mention several studies indicate a relationship between fatalistic beliefs and road safety violations. Ngueutsa and Kouabenan (2017) and Teye-Kwadjo (2019) found that road users with high levels of fatalistic beliefs were involved in less safe road behaviours compared to those with low fatalistic beliefs. Similar results were reported by Şimşekoğlu et al. (2013). Additionally, McIlroy et al. (2020) found that pedestrians who reported strong fatalistic beliefs tended to report less safe behaviours and more unsafe road safety attitudes. Omari and Baron-Epel (2013) found that drivers with high levels of fatalism were less likely to make their children wear a seatbelt than those with low levels of fatalism. As noted above, our study indicates that more behaviours than road safety violations, as we have measured it, may influence drivers' and pedestrians' accident involvement. Fatalistic beliefs are the most important RSC element explaining the difference between the African and the European respondents. This seems to be the most important RSC difference between the African and the European respondents.

5.5 Why don't we see bigger differences between road safety violations?

Why don't we see bigger differences between road safety violations, when the differences between the countries' road fatality rates are so big? The number of killed road users per capita is seven times higher in the African countries compared with the European countries. Based on this, we would expect to see far higher differences between the levels of road user violations reported by the road users themselves and the level of violations that they attribute to other car drivers in their country (descriptive norms). Then why don't we see bigger differences between the road safety violations in the European and African countries? One possible explanation can relate to the scaling of the answers, i.e. that the scales used do not capture the differences sufficiently. This might apply to the descriptive norms scale, which only has five answer alternatives, and where we ask about road safety violations with different prevalences (e.g. using the horn vs. driving under the influence). Given that quite few drives under the influence in all countries, none/very few and "less than half" might not be fine grained enough. Another possible explanation can be that other and unmeasured types of behaviour are more important than those we have measured, and would reveal higher differences. It is difficult to conclude about this, but the discussion of behaviours related to fatalistic beliefs might suggest this. The same does our discussion of the fieldwork data (cf. section 5.11.2). Another possible explanation is that the differences in road fatalities between African and European countries to a greater extent are due to other factors than road user violations (e.g. vehicles, roads). Factors related to roads, infrastructure and vehicles are clearly important, and we have not assessed the importance of these factors. Another possible explanation is that respondents under report their road safety violations, perhaps due to fear of reporting illegal actions (e.g. speeding, driving under the influence). We don't see differences related to over speeding. Torfs et al (2021) find less over speeding in African countries. This under reporting effect should, however, not apply to their reporting of other road users' violations. Nevertheless, we see the same pattern for descriptive norms, i.e. not as big differences as we should expect given the differences in road fatalities. Another possible explanation is that the respondents are not representative for their countries. However, respondents in the

European countries are recruited from representative samples. We also aim to recruit representative respondents from the African countries. The main point that can be mentioned is that we recruit from capitals (or largest cities) in the countries. Respondents in the capitals are not necessarily representative for the rest of the countries. Finally, another possible explanation why we don't see bigger differences between the road safety violations and descriptive norms items for European and African respondents, could be that other cultural and behavioural factors are more important for accident risk. We have suggested that this applies to fatalistic beliefs. We have seen that the main differences between European and African respondents relate to these.

5.6 Summing up the main results

In Table 5.1, we provide an overview of RSC elements, mechanisms, influencing factors and how these elements of RSC can be influenced. In most cases, the suggested factors are speculation, based on indications in the data, indicating issues for future research. We discuss the elements in the table in detail in section 5.7 and 5.8.

Table 5.1 Overview of RSC elements, mechanisms, influencing factors and how these elements of RSC can be influenced.

RSC elements	Mechanisms	Influencing factors?	How can it be influenced?
Descriptive norms (Five-item scale) **Results:** **-Influences road safety violations.**	Subtle social pressure to do as others do on the road	Created in interaction, influenced by: road infrastructure, enforcement, training, composition of road users, economy, degree of urban planning, existence of a well- functioning public transport system etc.	**Materialistic approach:** Interaction, road infrastructure, enforcement, training, composition of road users, economy, degree of urban planning, existence of a well-functioning public transport system. **Idealistic approach:** Information campaigns and education.
Fatalistic beliefs (Six-item scale) **Results:** **-Influences road safety violations.**	My actions do not matter, as my fate is predestined	Integrated and deep-seated part of religious views and related to religion.	Priests, imams and other religious representatives, or educators can target specific attitudes related to road safety.
Freedom attitudes (Two-item scale) **Results:** **-Influences road safety violations.**	It is my right to behave as I want	Integrated and deep-seated part of ideological and political views.	Politicians and political parties can target specific attitudes related to road safety.

5.7 Which factors influence road safety culture?

The fifth aim of the study was to examine and discuss the factors influencing the different elements of national RSC. In the following, we will discuss this based on previous research and qualitative data

5.7.1 Factors influencing descriptive norms

Survey results indicate that the African respondents on average ascribe a higher level of road violations to car drivers in their country than the European respondents on the index measuring national RSC as descriptive norms. This especially applies to driving without a seat belt and aggressive violations, e.g. using the horn to indicate annoyance to other road users. It does not apply to over speeding, as indicated in previous studies (Cestac et al, 2014).

Previous research indicates that shared norms prescribing road safety violations continually are created and recreated through interaction among road users in traffic (Özkan et al 2006; Bjørnskau 2014; Luria et al 2014). Cestac et al (2019) describes how descriptive norms are transmitted:

> Informal rules on the other side usually have to be guessed by observation of other drivers (descriptive norm) or are transmitted by social communication (injunctive norm). For example, a visitor driving for the first time in Crete may be surprised by a local driving custom: drivers are expected to drive on the shoulder lane in order to let (speeding) cars behind them overtake easily. This social norm is enforced by social control (headlights flashing, honking, aggressive gestures). After a few days driving there, tourists get used to it and adapt their driving behaviour to local customs. This example is part of what Zaidel (1992) called a "culture of driving". (Cestac et al 2019: 12).

Fieldwork data indicate a more congested, chaotic, hectic and unregulated traffic picture in the African countries than in the European countries. This creates a lot of conflicts and near misses in traffic, and also accidents. The cooperation between road users seem to some extent to be based on the "right of the strong", there is a lower respect for pedestrians than in Europe and there is a generally higher tolerance of risk.

Several factors influence the interaction of road user. The first is road infrastructure, which may set the premise for road user interaction (Nævestad et al, 2019). Our fieldwork data indicates less developed safe system solutions in the road infrastructure in the African countries. There are few roundabouts, and less red-light regulation of intersections (or the red lights are not respected), which creates a lot of conflicts in intersections. Additionally, road markings are lacking, and road users often use the sides of the road and centre areas between lanes and other available areas to get ahead in traffic. Our survey data also indicates less developed safe system solutions in the road infrastructure in the African countries. Aan index measuring pedestrian friendly infrastructure and African pedestrians score significantly lower on this index.

Urban planning, road capacity and congestion. Moreover, the roads are often congested, with a lot of vehicles. In rush hours, there is little movement, due to congestion. It seems that the higher levels of aggressive violations, e.g. using the horn to indicate "aggression to other road users" is related to the congested, hectic and chaotic traffic picture. Describing the consequence of congestion in Ghana, Boateng (2021), writes that high levels of congestion on roads in Ghana, especially in urban areas, give rise to aggressive interaction patterns between road users.

> "Drivers, particularly commercial drivers, held up in traffic for long periods are likely to undertake aggressive and other safety-adverse driving practices to make up for lost time or potential revenue." (Boateng 2021: 5).

Both Boateng (2021) and Hoose (2023) relate this to land use and low level of urban planning:

> "(…) the most important reason for the traffic situation is structural and a result of decades of no, or, at best, insufficient urban planning. Rapid urbanization with almost no governmental regulation and land-use planning has led to a situation where residential areas move further away from workplaces, which are mostly located in the centre of Accra. This results in high amounts of people that must commute a substantial distance to get to work every day." (Hoose 2021)

Lack of a viable organized public transport system. Both Boateng and Hoose also emphasize the lack of a viable organized public transport system, which leads to a high level of car drivers (Boateng 2021; Hoose 2023).

Another factor that should be considered when discussing how national RSC may come about is the composition of road users who interact in the road systems. Our study indicates that demographic characteristics (e.g., gender, age, level of education) influence drivers' behaviours. Thus, an ageing driver population (e.g., like in the European countries) is likely to influence drivers' behaviour,

interaction, and thus RSC. This is likely to be related to lower levels of road safety violations, including aggressive violations in traffic. Our research indicates less road safety violations among car drivers and pedestrians with increasing age. As noted, African countries also have a high share of motorcyclists, which makes the traffic picture more chaotic, with more conflicts between road users. These are issues for future research.

Another important factor potentially influencing national RSC that was underlined by the interviewees and also previous research is the level of enforcement (Özkan et al, 2006). There is a close relationship between the level of enforcement in countries and road user behaviours (Elvik et al 2009). This could e.g. explain the higher level of drivers who do not use a seat belt and who drive under the influence in the African countries. Additionally, it is not unreasonable to expect that national RSC, defined partly as our expectations of other road users, to some extent can be "normalized" in formal driver training. This indicates an area for future research. A final factor that may influence national RSC is economy (Nævestad et al 2019). In the fieldwork data, we note the daily observations of families with small children on motorbikes, often without helmets. A likely explanation for this is family economy; i.e. that many families have a motorbike as their main mode of transport (and not a car).

5.7.2 Factors influencing fatalistic beliefs

Previous research indicates the prevalence of fatalistic beliefs in African countries, both Muslim and Christian countries, e.g. Morocco, Cameroon, Ivory Coast, South Africa, Ghana (Boua et al, 2024; Ngueutsa, and Kouabenan, 2017; Teye-Kwadjo 2019). It is, however, important to note that fatalistic beliefs also exist among the population in European countries and in other cultural spheres and continents.

Describing the Moroccan cultural context, Boua et al (2024) write that beliefs in fate are widespread. The state that such beliefs often are expressed through expressions such as "Mektoub" and "al-qadāʾ wa alqadar,"; expressions that reflect the belief that events are predetermined and that everything that happens is meant to happen. They also underline that the belief that events are predetermined is a fundamental basis of the Muslim religion, and that the Moroccan population by and large is Muslim (99%). Moreover, religious beliefs are an important part of everyday life among the population of Morocco, including road users.

Fatalistic beliefs are also prevalent in predominately Christian countries in Africa. Ngueutsa, and Kouabenan (2017) study fatalistic beliefs among road users in Cameroon, were Christianity is the majority religion, with significant minorities practising Islam and traditional faiths. This study also finds a prevalence of fatalistic beliefs among the road users, which influence their risk perception and risk taking in traffic. The same applies to Teye-Kwadjo's (2019) study in Ghana.

5.7.3 Factors influencing freedom to take risk attitudes

There is good research-based knowledge of measures that could be implemented to further reduce the number of people killed and seriously injured in traffic (Elvik & Høye, 2020). Some measures are not implemented due to costs, while other measures are probably not implemented because they will involve an excessive restriction on the individual freedom of the drivers. This is reflected, for example, in debates in western countries on speed limits, automatic traffic controls, alco locks and various applications recording driving behaviour. Such debates have also been prevalent in discussions over traffic safety measures for decades. Although individual freedom is a crucial value in Western democracies, road users' individual freedom to take risk in traffic are restricted in several ways. Road safety work in the Western world has made tremendous progress, and this is closely related to measures limiting individuals' freedom to take risk in traffic, e.g. limiting their speed, enforcing seat belt use (Elvebakk, 2015). Elvebakk (2015) points out that increased traffic safety is often a result of increased paternalism and less individual freedom for road users.

Elvebakk (2015) holds that the question of paternalism has been very prominent in the road safety discourse in the US, which unlike Europe, has seen considerable debate around several safety measures due to their perceived paternalistic bent. This applies for instance to measures like mandatory seat-belts as well as for compulsory air-bags (Wetmore, 2004). In 1986, the New York Times referred to the introduction of seat belt laws as "violations of human rights". In the early 1980s, only 14% of Americans regularly wore seat belts. These discussions indicate that the balance between individual freedom and state intervention, or "paternalism" is largely a political (ideological) and cultural issue. For example, Moeckli and Lee (2007) link the relatively low level of traffic safety in the United States to the American values of individualism, self-realization and freedom (to take risks).

The issue of freedom to take risk attitudes might not be very relevant question in our sample, at least not in our comparison of African and European countries.). As the three European countries studied are early implementers of Safe system and Vision zero, with a high road safety level, we expected lower focus on values and attitudes related to freedom to take risk (i.e. the opposite of paternalism) in these countries (cf. Nævestad et al 2022).

We did, however, not see systematic differences between the African and European respondents on this issue in the survey data. On the other hand, during or fieldworks and interviews in the African countries, we were told many examples of politicians who wanted to make changes to roads or infrastructure, but who were impeded from doing this by the voting public. This could happen directly, e.g. as large groups of voters organized and campaigned against suggested changes and reforms. This indicates that road safety measures to a considerable extent is impeded by the populations' attitudes focusing on freedom to take risk and scepticism towards paternalistic measures in the African countries. This was e.g. mentioned when it comes to politicians efforts to remove hawkers from the roads, as high numbers of pedestrian salespeople on high-speed roads might lead to accidents.

5.8 Influencing elements of road safety culture

The sixth aim of the study was to discuss how to influence elements of RSC to improve road safety in the African and the European context.

5.8.1 Influencing descriptive norms

It seems relevant to take knowledge about the factors generating road safety culture in the different sociocultural groups as the point of departure and identify how to effectively influence these. Based on our discussion above, RSC measured as descriptive norms should be influenced through focusing on:

1) Increasing and improving enforcement
2) Implementing safe system infrastructure (into a more pedestrian friendly, facilitating modal shift)
3) Improving urban planning
4) Implementing a viable public transport system (facilitating modal shift)
5) Improving urban planning (facilitating modal shift)
6) Improving family economy
7) Improving road user training

Relevant questions in this respect are, e.g.: Which factors are possible to influence? (How) do the factors interact? What are the expected outcomes? Which is the most important factor? (Nævestad et al 2019). A crucial question in this respect is also the extent to which road safety culture is an independent social force, and the extent to which it merely reflects such influencing factors (e.g infrastructure, enforcement). An important question related to this is whether norms for behaviour remain unchanged (in our minds) although the factors that contributed to them in the first place

change, or whether behaviour and norms "follow" from infrastructure, police enforcement, and education. It is for instance conceivable that the interaction between road users creates a dynamic where new norms are developed, which not necessarily "follow" the infrastructure (Bjørnskau 2014). Certain social groups may develop certain norms prescribing unsafe road behaviours, despite good training, infrastructure, and police enforcement (cf. Nævestad 2021).

A second and relatively widespread approach that is already applied in several countries is to change road safety culture through campaigns aiming to change road users' attitudes, norms and thus motivate safe(r) road transport behaviours. Relevant questions in this respect are, e.g.: How do social norms for road safety behaviour come about? To what extent is it possible to change such norms through other ways than the interaction processes in which (we assume) that they are created? How should it be done? Research on road safety campaigns often show that they are more efficient when they are combined with police enforcement. Thus, future research should also shed more light on such relationships and the combinations of mechanisms generating changes in road safety cultures.

A third approach to influencing road safety culture among non-professional road users is to employ a social norms approach, targeting descriptive norms; i.e. what other people in a given group do (Ward et al 2010; Berkowitz 2005). As noted, we hypothesize that the observed relationship between descriptive norms and road safety violations occur as, descriptive norms, create a mild social pressure to behave in certain ways. The basic mechanism in the social norms approach is to use this mild social pressure. The underlying idea behind the social norms approach to interventions is that most people overestimate the prevalence of risky behaviour among other people (e.g. in their country). This effect is referred to as false consensus. Thus, the social norms approach hypothesized that by informing people about the actual prevalence of risky behaviour in given groups, the false consensus effect will be removed, and mild social pressure (i.e. the descriptive norms mechanism) will make people behave in safer ways. This approach has successfully been employed in traffic safety interventions in western countries (Linkebach et al 2005). However, given the substantive underlying structural factors influencing national RSC in the studied African countries, it seems more relevant to address these to begin with.

5.8.2 Influencing fatalistic beliefs

To influence fatalistic beliefs, we might need to influence deep-seated parts of religious views, or perhaps it is sufficient to influence some aspects of religious views? This is likely to be a task for local priests and imams in African countries. The Safe system approach aims to make a road system without fatal and serious injuries through a systematic, scientific approach. Fatalistic beliefs are in a way a competing approach to Safe system, as it assumes that humans cannot prevent road accidents, as they are caused by the will of God. Thus, road users' risk taking will not make a difference; nor will Safe System policies. Thus, fatalistic beliefs may impede both road safety policies and road users' safety behaviours.

These are important issues for priests, imams, and other religious representatives in the African countries to tackle in the future. Focusing on fatalistic beliefs among road users in Morocco, which is a Muslim country, Boua et al (2024), write that places of worship (i.e. mosques), especially during Friday preaching, can be favourable places. Boua et al (2024) has a special focus on Friday sermons, as this holds a predominant place in the social life in Morocco and are also sent directly in public media (TV, Radio). The Friday prayer is one of the main occasions where the faithful are told that belief in fate is one of the main bases of faith, and that everything that happens is meant to happen and that the results are ultimately predestined. Boua et al (2024) suggest that it is possible for preachers to nuance this picture without questioning the fundamental idea of predestination. This can be done if preachers say that it is possible to influence certain events in life (e.g. traffic accidents) to teach them that traffic accidents are not inevitable events, but events that are influenced by our behaviour in traffic. Although the studied African countries have predominantly Christian

populations, we believe that this approach, focusing on religious leaders in these countries also seem promising.

Boua et al (2024) state that especially road users with low levels of education and higher levels of experience should be targeted, as these groups exhibit higher levels of fatalistic beliefs. Boua et al (2024) suggest a scheme where these groups are presented with an accident to be analyzed, to identify possible causes and to propose prevention measures. It is suggested that this might induce a change in these drivers' conceptualization of causality, to become aware of the real causes of road accidents, and most importantly: that accidents can be avoided if appropriate behaviors are adopted. This suggestion is relevant for policymakers and road safety authorities in these countries with high levels of fatalistic beliefs. In this way, road safety campaigns that are sensitive to these cultural contexts can be developed, in manners that increase road safety. Teye-Kwadjo (2019) also suggests education of road users, to prevent the impact on fatalism for risk taking in traffic.

It seems that the Safe system also needs to expand to the religious sector in the African countries to be effective. Safe system implementation also includes the pillar "Safe Road users", and our study indicates that fatalistic beliefs in the studied African countries might be an obstacle to safe road users.

5.8.3 Influencing attitudes focusing on freedom to take risk (and paternalism)

We have seen that attitudes related to freedom to take risk in traffic is related to road safety violations. Drivers and pedestrians in Tanzania had the highest score on this index. To influence attitudes focusing on freedom to take risk in traffic, we need to ask whether we can influence deep-seated parts of ideological and political views. We have several examples on that from the US, where freedom to take risk attitudes and scepticism towards paternalism is widespread. Elvebakk (2015) points out that increased traffic safety is often a result of increased paternalism and less individual freedom for road users. Changing values and attitudes related to freedom to take risk (and freedom from paternalism), might however be difficult.

As with the case of fatalistic attitudes, the most relevant countermeasure seems to be to provide information about the scientific causes of road accidents and effective countermeasures. This might show that excessive road user freedom leads to more fatalities. Moreover, this information should be provided by figures with a high societal standing. This might be an issue for politicians and political parties, as attitudes related to freedom and paternalism are ideological and political.

We have, however, seen analogous debates about scepticism towards paternalism in the US and other countries related to COVID-19 measures and restrictions. In these cases, the scientific facts about effective countermeasures have been questioned, as "false news", and burning face masks have been portrayed as an act of liberation by some people. Additionally, at some stage politicians set a limit for traffic safety interventions restraining the freedom of road users to take risks. It is for instance interesting that passenger cars might reach a speed of 200 km/h, although this is not legal in most countries.

5.9 Do we need to change the society to change the road safety culture?

As noted, we have suggested that the descriptive norms that we observe in the African survey sample, and in the fieldwork, seem to be due to inadequate urban planning, inadequate family economy, inadequate national economy, lacking implementation of Safe system etc. Additionally, we have seen that fatalistic attitudes are an important part of religion and that attitudes related to freedom to take risks are embedded in politics and ideology. Thus, it seems that the aspects of RSC that we study are related to basic aspects of society. These are stable aspects that change very slowly, and they are also intertwined and complex, indicating that changing RSC might be a challenging task.

Relevant measures to improve national RSC in the studied African countries, given our identification of contributing factors could be e.g. improved urban planning, increasing road capacity, improving families' personal economy, establishing a viable organization of public transport, implementing a safe system approach to road safety management, changing religious and political views etc. This approach involves societal transformation as a way of improving national RSC in African countries, and it may not be viable for road safety policy. Is it possible to change RSC without changing society, so to speak? Expanding further on that, we may discuss whether RSC is merely a symptom of more underlying factors (e.g. infrastructure, economy), or whether RSC is an independent factor in itself. Our answer to this question is important, as it has practical implications. We may label the first approach a materialistic approach to cultural change and the latter an idealistic approach. The former means that culture changes when underlying influencing factors change, the latter that culture can change without changing the underlying influencing factors.

Boateng (2021) seem to lean against the former approach, writing about the situation in Ghana. He states that accident inducing driver errors (such as over-speeding, fatigue driving, reckless overtaking) should be viewed as the outcomes of:

> "(…) system-level factors (e.g., government policies, terms and conditions of labor relations and compensation systems) that underlie the sociotechnical road transport system in which drivers operate. (…)at the heart of Ghana's road safety challenge is the lack of viable and variety of (public) transportation systems, which, therefore, encourages the importation of more old cars, and a high dependence on a privately run, deregulated commercial passenger transport sector that is structurally embedded in driver exploitation, and, therefore, coupled with police corruption and traffic congestions induced by private capital-driven land-use patterns, incentivize dangerous driving behaviors and their deleterious consequences in the country. (Boateng 2021: 8).

Contrary to this understanding, Boateng (2021) states that road safety research and practice in Ghana focus on immediate driver errors and frame them as a function of bad attitudes or indiscipline on the part of drivers, which gives rise to increased focus on enforcement and education, which will not do anything with the more important underlying causes of the RSC.

It is of course difficult to conclude on this, but research from the US and Europe supports to some extent the idealistic approach indicating that it is possible to change RSC without changing more underlying factors. This might perhaps be done through increased enforcement (Elvik et al 2009), or perhaps through a social norms approach to interventions (Ward et al, 2010; Berkowitz, 2006; Linkebach et al, 2005).

On the other hand, although the social norms approach has been applied successfully in western countries, this is a context which does not struggle with the same level of structural challenges as in the studied African countries. A social norms campaign directed to the family father who transports his family on his motorcycle every day will not be effective if he cannot afford a car, helmets to everybody etc. In this case, the risk taking is based on a situation with little free will to take risk or not. Finally, there are examples of negative aspects of RSC that are not necessarily reflections of more underlying societal challenges. This might for instance apply to speeding and lacking seat belt use in cars which have seat belts installed. In these cases, enforcement is a viable approach to change RSC (Elvik et al 2009) approaches like the descriptive norms approach, or other information campaigns like this, might be useful. Finding ways to influence RSC is an important area of future research.

5.10 Methodological weaknesses and strengths

1) Comprehensive survey safety data are rarely available. The study contributes with new knowledge. There are few studies linking cultural factors with road safety, and even fewer studies comparing road safety culture across African and European countries. And there are as far as we

know, no studies comparing RSC among both car drivers and pedestrians in both European and African countries. Additionally, comprehensive survey safety data are rarely available from African countries (UNECA, 2015).

2) Positively worded questions are excluded. It must be mentioned that positively worded questions are excluded from our presentation of results in this deliverable. We originally included positively worded questions among the survey questions measuring descriptive norms. These concern what kind of behaviours respondents expect from drivers in their country e.g. "That they always stop for pedestrians who want to cross the road", "That they always slow down, or drive more carefully, when there are pedestrians at the side of the road", "That drivers with small children (under 3 years) in the vehicle always have children in a separate child seat, where they are buckled up", "That they always drive more carefully (e.g. yield, keep a safe distance) around motorcycles". These questions were based on fieldworks and focus group interviews. The challenge with these questions was that they are positively worded, and they follow negatively worded questions in the survey. Thus, several respondents commented that they had not realized the opposite wording before after they had finished the survey, and that they had "answered wrong", or the opposite of what they intended. Many respondents therefore recommended us to discard their answers on these questions. Looking at the results, we saw that the results were contrary to what we expected: drivers in the African countries came out as more pedestrian friendly than drivers in the European countries etc. This is in sharp contrast to our field work experiences: drivers in the African countries were less inclined to stop for pedestrians than European drivers. This tendency is also reflected in the negatively behaviour question about this in the survey, indicating that African car drivers are less inclined to stop for pedestrians who wants to cross the road. Thus, we do not present results for the positive behaviour questions in the survey.

3) Representativeness of the Samples. When concluding about the existence of different national RSCs based on the present study, it is important to remember that the national samples might not be entirely representative. This applies for instance to the car driver sample in Tanzania, which includes a high share of SUVs. These may be unrepresentative of the general private car population in Tanzania. The reason that only these were recruited is due to a misunderstanding in the data collection process. Apart from this, all of the national samples have been drawn from representative populations. The European samples have been drawn from representative panels, and the African samples have been recruited from different city areas at different times. Nevertheless, it is important to note the considerable age differences in the samples from Europe and Africa, reflecting different age profiles in the populations.

4) Self-Reported Data. The study is based on self-reported data, which could be influenced by respondents' memory, truthfulness, and social or psychological biases that may influence reporting. As noted by Nævestad et al. (2017), comparing cross-cultural samples is challenging, as different national samples may be influenced by different baselines, and as expectations may vary between national samples. The levels of experience with surveys and trust in anonymity may vary between national samples. It is difficult to conclude about the importance of this.

5) False Consensus? A potential critique that can be raised against identification of the descriptive norms mechanism is that it also may influence behaviour through the false consensus bias, which involves that people overestimate the prevalence of risky behaviour among others to justify their own behaviour (Cialdini et al 1990). The main argument against this contention is that we see a large degree of consistence between the road safety behaviours that pedestrians and car drivers ascribe to other drivers in their country. Pedestrians answer for car drivers in their country, and thus other types of road safety violations than they are asked about themselves. Thus, their reports on descriptive norms are not likely to merely represent justifications of their own behaviours. Moreover, the relationships with car drivers' different types of behaviours and descriptive norms vary in strengths, depending on the behaviour in question. Thus, contrary to the false consensus mechanism, which implies that perceptions about the behaviours of others reflect respondents' own behaviours, we found

that respondents' perceptions of other drivers' behaviour differed according to the groups and behaviour in question.

6) Our focus is both on national RSC and continental RSC. It is important to note that our focus is both on national RSC and continental RSC, as the overarching objective of the study is to identify the elements of national RSC where we see the biggest differences between the African and the European countries, and examine to what extent we can use the concept of RSC to shed light on different road accident risk levels in the European and the African countries. The basic background for this is the different levels of Safe system implementation in the European and the African countries, the different road safety records, and the different driving culture contexts. A central ambition has been to capture the latter. However, our research also shows differences internally between the studied countries, and we highlight these differences also in our study. This indicates differences in RSC elements between the African countries internally and between the European countries internally. However, on some issues (e.g. fatalistic beliefs), the most important differences are between the European and the African countries. Thus, whether national or continental differences should be highlighted is an empirical question.

Survey response quality. We have filtered out 353 respondents who answered the survey in a shorter time than 2,5 minutes, as the speed of respondents' survey response time is an established measure of survey response quality (Huang et al 2012; Zhang and Conrad 2014). The basis for this, was that a response time of less than 2,5 minutes involves a very fast reading of the survey questions, and perhaps inadequate perception of the content of the questions. The survey questions are in several instances complex and probably require some contemplation. There are, however, no clear-cut lines of demarcation when it comes to assessing survey response quality, but research has been done on the issue (Huang et al 2012; Zhang and Conrad 2014). This research generally conclude that it is difficult to establish threshold times for survey speeding (i.e. for answering surveys too fast), especially since respondents are not likely to speed through all sequences of surveys, and as some respondents answer surveys very fast, without there being indications that their responses are of lower quality than others, meaning that they have not read the questions properly. One solution is to look for straightlining, which indicates that respondents have answered the same answer alternatives on all or many questions. Zhang and Conrad 2014) set the speeding threshold as 300 milliseconds (msec) per word, a rough estimate of reading speed, multiplied by the number of words in the question. The idea behind their approach is that when response times are faster than likely reading times, respondents are unlikely to have given the question adequate thought. Respondents generally use 7,5 seconds on average per survey question in surveys. In our survey with about 50 questions this equals about 6 minutes and 20 second on average. As noted, 353 respondents used less than 2,5 minutes to answer the survey. The majority of these were in the African countries. As noted, answering the surveys fast, would generally take approximately three minutes (about four seconds per question). With a threshold of 2.5 minutes, we take into account that some respondents answer very fast, and that although speeding may occur, it does not necessarily occur in all sequences of the survey. Although the decision to set a threshold value of 2,5 minutes was based on a reasonable principle, it did not have any practical implications for the results. We have conducted all the analyses in the study both including and excluding the respondents who used less than 2,5 minutes. Excluding or including these respondents have no implications for the bivariate results and minor implications for the multivariate results. This is also noted by Zhang and Conrad (2014), who perform multiple analyses of survey data including and excluding speeding respondents.

5.11 Issues for future research

5.11.1 Which types of behaviours are related to fatalistic beliefs?

Our analyses of factors influencing car drivers' accidents involvement indicate that fatalistic beliefs regarding road safety also seems to be related to more types of safety behaviours and safety measures than just driving (i.e. the questions we use to measure road safety violations): Other relevant types of

behaviours guided by fatalistic beliefs may be e.g. car maintenance behaviour, other factors related to vehicle risk, road choice, timing of car trips, driving when tired/fatigued, in bad weather, on bad roads etc. Examining this further is an important issue for future research. In the analyses of factors influencing road safety violations, we also saw that fatalistic beliefs were related to the road safety violations index. More research is needed to examine the relationship between fatalistic beliefs and different types of road safety violations. Previous research also indicates the importance of risk perception as a mediating variable (Ngueutsa, and Kouabenan 2017).

5.11.2 Have we missed the target with our DBQ-based items?

Based on qualitative fieldwork data, we have described types of road safety violations and road safety culture which seem to be important in the studied African countries, and which we have been unable to measure quantitatively with our European DBQ tools, which to a considerable extent presupposes a more well developed and well-regulated road infrastructure and road system. This indicates an important area for future research. Based on our fieldwork in traffic, we stated that the situation on the main roads in Dar es Salaam, Tanzania, resemble a "race to get ahead", with everyone trying to get ahead as fast as possible. This creates a lot of overtakings and manouverings in traffic, and a relatively chaotic traffic picture. It also leads to a high level of near misses and conflicts, which was observed on every trip that the researchers made in traffic. Additionally, there was also high numbers of pedestrians along the road several places, also trying to cross the road several places; running to escape from the oncoming vehicles. We also found the same hectic traffic picture in the other African countries we visited. As this type of interaction created a lot of conflicts and near misses, we also presuppose that it creates a lot of traffic accidents. Vulnerable road users are particularly at risk in this traffic culture, as they do not have a separate infrastructure and often lack places to safely cross the road. Thus, this hectic and chaotic traffic culture could be part of the explanation for the higher fatality rate in the African countries. Additionally, we saw several instances of people sitting on top of truck loads at high speeds, families of four on motor cycles, often without helmets, pedestrians walking or sitting on the side of the road in the dark, without reflection when high speed cars passing by.

With this backdrop from the qualitative fieldwork, it is tempting to ask whether we have managed to measure this traffic culture quantitatively, with all its different types of risk road safety violations. The answer is clearly no. Our survey questions measuring road safety violations focus on classical risk behaviours like speeding, seat belt use, driving under the influence etc. Given the diverse types of risky road user behaviour we saw in our fieldwork, we might suggest that the DBQ questions can be perceived as Eurocentric, presupposing a certain level of Safe system implementation, and a certain basis level or road safety culture. Sitting on top of truck loads of moving vehicles was a common sight in the African countries. As with the family on the motorcycle. This is another example of an incident that would have reached the national news in the European countries. On the other hand, the DBQ items that we have included are universal risky road violations. Additionally, we also have a great emphasis on aggressive violations, which we assumed to be an important aspect of this hectic and chaotic traffic culture. That especially relates to using the horn to indicate annoyance with other road users. Nevertheless, we perceive that there are elements of RSC and behaviour that we have been unable to measure quantitatively with our European DBQ -based tools, which to a considerable extent presupposes a more well developed and well-regulated road infrastructure and road system. There is something not captured by the DBQ type of questions.

Looking at the results, we do not see as big differences on many the DBQ scores as we would expect, based on our experiences in the traffic in the African countries. In this setting, we perceived that something is different and riskier than in Europe. We have tried to describe this as a hectic and chaotic traffic culture with a "struggle to get ahead", and poor conditions for pedestrians. The "fight to get ahead in traffic" means that road users "use all parts of the road network, including shoulders, centre and roadsides to get ahead", make unexpected turns in the road to choose different routes. Etc. Additionally, the main RSC difference between the RSC in the studied European and African

countries is also related to the types of risk taking that are very unusual from a European perspective, e.g. people sitting on top of truck loads in traffic, families of four on motorcycles, people sitting or walking along the road in the dark on high speed roads etc. Future surveys should also measure these aspects of road user violations and RSC. If we aim to capture the most important and striking differences between African and European countries in surveys, we also need to include questions about e.g. people sitting on top of truck loads, families on motorcycles etc. Additionally, future studies should also seek to unveil the road safety violations related to fatalism.

5.11.3 There is a need to measure RSC related to pedestrians

The studied European countries are Safe system pioneers, which involves a pedestrian friendly infrastructure, with a high degree of physical separation between vulnerable road users and cars. We therefore included several questions about the cooperation between pedestrians and car drivers, measuring descriptive norms, in the survey. These questions were, however, positively worded, and they followed negatively worded questions to the respondents, and results on these questions had to be discarded. Results were contrary to what we expected: drivers in the African countries came out as more pedestrian friendly than drivers in the European countries. This is in sharp contrast to our field work experiences. The topic is, however, not less important and future studies should examine this with better tools than we were able to construct (i.e. not mix positively and negatively worded questions).

6 Conclusions

The overarching objective of the study was to identify the elements of national RSC where we see the biggest differences between the African and the European countries, and the elements of RSC that are most strongly related to road safety outcomes (e.g. road safety violations and accident involvement. We wanted to examine to what extent we can use the concept of RSC to shed light on different road accident risk levels in the European and the African countries. Clearly, we cannot use this study to determine the importance of RSC when it comes to explaining the different road accident risk levels in the European and the African countries. Our study indicates, however, that the element of national RSC where we see the biggest differences between the African and the European countries is related to fatalistic beliefs about road safety. Additionally, we have seen that these beliefs are related to road safety violations, which in turn are related to car drivers' and pedestrians' accident involvement. Thus, influencing fatalistic beliefs regarding road safety are likely to improve road safety in the African countries. This is an important issue to implement the Safe system barrier: "safe road users". Reducing the importance of fatalistic beliefs related to road safety is an important issue for priests, imams and other religious representatives in the African countries to tackle in the future. It seems that the Safe system also needs to expand to the religious sector in the African countries to be effective.

7 Acknowledgements

The present study is part of the EU-funded AfroSAFE project (Grant agreement ID: 101069500). The primary objective of the AfroSAFE project is to make a significant progress in propagation of the Safe System modus operandi within the road safety work context in African countries. We are very thankful to all the people who have contributed to the data collection in the participating countries, and all the respondents who have helped us by answering our survey.

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