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The role of values in road safety culture: Examining the valuation of freedom to take risk, risk taking and accident involvement in three countries

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ABSTRACT

National focus on individual freedom versus paternalistic values is a fundamental theme, which defines the status of traffic safety in different countries. The present study examines the role of such values in road safety culture based on survey data from car and bus drivers from three countries with distinctly different road safety records: Norway (N = 596), Israel (N = 129) and Greece (N = 386). While Norway has the highest road safety level in Europe, and Israel also performs better than the EU average, the road safety level in Greece was far below the EU average. As these positions reflect differences in policies and national regulations in drivers' freedom to take risk, we hypothesize a higher focus on individual freedom to take risk and lower focus on paternalism among the Greek drivers. Results indicate, in accordance with our hypothesis, that the Greek drivers value freedom to take risk in traffic higher than drivers from Norway and Israel. Greek drivers also expect higher levels of risk taking from other drivers in their country, they report higher levels of risky driving themselves, and are more often involved in accidents. Thus, it seems that values have an important role in Road Safety Culture (RSC), legitimizing and motivating risky driving, which are related to accidents. We found, however, contrary to our hypotheses, that the Greek drivers also had the most paternalistic attitudes among the drivers in the three countries. In the present paper, we try to solve this Greek paradox.

1. Introduction

1.1. Background

About 1.35 million people are killed annually on the world's roads, while between 20 and 50 million people are non-fatally injured (WHO, 2018). The numbers of people killed or severely injured in road crashes have gradually been reduced in recent years. There is, however, good research-based knowledge of measures that could be implemented to further reduce the number of people killed and seriously injured in traffic (Elvik & Høy, 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

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example, in current debates on speed limits, automatic traffic controls, alco locks and various applications recording driving behavior. Such debates have also been prevalent in discussions over traffic safety measures for decades. In the US, the car is referred to as the “freedom machine” (Lonerio, 2007). 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.¹

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”² 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 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. Based on Dworkin (1972), Elvebakk defines paternalism as “the interference with a person’s liberty of action justified by reasons referring exclusively to the welfare, good, happiness, needs, interests or values of the person being coerced” (Dworkin, 1972). This happens without the consent of the person whose freedom is being limited. This means that paternalistic measures force people to do something for the sake of their own good, although they themselves would not, or might not, have chosen to do so. Clear cases of paternalism in road safety policy include mandatory helmet-wearing for motorcyclists and seat-belt laws. Even though you as an individual might have preferred taking the risk of driving unprotected, the law forbids it (Elvebakk, 2015). Other relevant examples are intelligent speed adaptation (ISA) or alco-locks. Elvebakk (2015) also mentions bicycle helmet-wearing laws (introduced in for instance Australia and New Zealand), and more invasive measures that have been suggested, but not yet adopted, such as banning the use of motorcycles or novel forms of surveillance and control.

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). 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). Correspondingly, the risk of road fatalities per million population is twice as high in the US, as the European average (WHO, 2018). This indicates that there might be a link between cultural values involving acceptance for paternalistic measures, low focus on individual freedom to take risk in traffic and traffic safety.

Values make up a central component in our definition of road safety culture (RSC). We define road safety culture (RSC) as shared values and attitudes signifying what is important (e.g. safety, mobility, respect, politeness), shared norms prescribing certain road safety behaviours, and thus shared patterns of behaviour and shared expectations regarding the behaviours of others (Nævestad et al., 2019a; Nævestad & Bjørnskau, 2012). Values and attitudes legitimize and motivate road user behaviours and the norms prescribing behaviours (Gehlert et al., 2014; Kaçan et al., 2019).

The present study examines road users’ focus on paternalistic values and individual freedom to take risks in three countries: Norway, Israel and Greece. These countries were selected for comparison since their road safety status differ significantly. Norway had the lowest road mortality rate in Europe with 20 road deaths per million inhabitants in 2017, and the lowest road death risk (ETSC, 2018). The mortality rate on Israeli roads in 2017 was 36 road deaths per million inhabitants. In comparison, the mortality rate in Greece in 2017 was 69 road deaths per million inhabitants, which was well above the EU average of 50 (ETSC, 2018). Previous research points to serious flaws in the way road safety is managed at all levels in Greece (Yannis & Papadimitrou, 2012; Papadimitriou et al., 2015). Based on the national differences in road death risk and policies in the three countries, we expect that drivers from these countries have a different focus on individual freedom to take risk and paternalism.

Previous research also indicates that RSC and road safety behaviours may differ between private and professional drivers (Maslać et al., 2018; Nævestad et al., 2019a). The driving behaviour of professional drivers is more heavily regulated than that of private car drivers, both by regulatory authorities and employers. Professional drivers are often members of organizations, which impose several restrictions on their possibilities to take risks in traffic. Transport organisations often have policies on speed, driving style and seat belt use, and other measures aiming to influence the safety culture among their employees (cf. Wills et al., 2005; Davey et al., 2006; Öz et al., 2013; Nævestad et al., 2020). They might also have alco locks installed in the vehicles. Professional drivers are also subject to more regulatory measures than private drivers. The driving time and rest periods of professional drivers are regulated by driving hours’ rules, and buses (100 km/h) and lorries (90 km/h) have speed limiters installed. Professional drivers must also undergo mandatory training each fifth year. Based on the comprehensive regulation of the road safety behaviours of professional drivers, we may also expect a higher acceptance of paternalistic values and less focus of individual freedom to take risks among professional drivers than among non-professional drivers, across the countries that we study (Elvebakk, 2015).

By comparing different groups (car and bus drivers) within the three countries, we will be able to examine the importance of nationality against the professional versus non-professional dimension for values as a key component of RSC. If certain values vary less among driver groups within than across the national samples, we may hypothesize that this could be due to the influence of national RSC.

¹ <https://www.history.com/news/seat-belt-laws-resistance>

² <https://dictionary.cambridge.org/dictionary/english/freedom>

1.2. Aims

The aims of the present paper are to: 1) Compare the values related to individual freedom to take risk and paternalism among car drivers and bus drivers in Norway, Greece and Israel, 2) Examine the factors influencing values related to individual freedom and paternalism among car drivers and bus drivers in the three countries, and 3) Examine the relationship between values and safety outcomes (i.e. road safety behaviours and accident involvement).

1.3. Hypotheses

In the present paper, we test four hypotheses:

- 1) The drivers in the country with the lowest road safety level and the least comprehensive (paternalistic) road safety policies (i.e. Greece) will have the highest focus on individual freedom to take risk and the lowest focus on paternalism (H1).
- 2) Bus drivers in all the three countries will value individual freedom less and be more paternalistic, as their driving is more heavily regulated than car drivers (H2).
- 3) The drivers who value individual freedom to take risk in traffic over paternalism, take more risks themselves (H3).
- 4) Higher levels of risk taking in traffic is related to higher accident involvement (H4).

We expand more on the basis for these hypotheses in the next section.

1.4. Theoretical perspective and previous research

1.4.1. Regulation of road user freedom in Norway, Israel and Greece

Road safety policy and legal regulations of road users have important elements in common in all highly motorized countries. All countries have speed limits (except part of the motorways in Germany), all countries have blood alcohol limits, and all countries have mandated the use of seat belts. These elements of road safety policy may be viewed as paternalistic, and have been in place for at least 30–40 years in all countries. Nevertheless, if one looks closer at road safety policy and road user behaviour in different countries, important and interesting differences emerge. This certainly applies to Greece, Israel and Norway. [Table 1](#) shows some key indicators of road safety in these countries.

The formation of culture is often said to be influenced by the commitment and example set by community leaders. The government of a country can show its interest in and commitment to improving road safety by setting targets for reducing the number of fatalities. Such targets exist in all three countries, but the target set in Norway has the longest time horizon and requires the largest annual percentage reduction in the number of fatalities in order to be realised. It thus shows a stronger and more long-term commitment to improving road safety than the targets set in Greece and Israel.

Norway has a lower blood alcohol limit than Greece or Israel and lower speed limits on motorways. Interestingly, the ESRA survey made in 2016 ([Meesmann et al., 2018](#)) shows that a higher percentage of drivers in Norway state that they exceed the speed limits on motorways than in Greece or Israel. On the other hand, there are strong social norms condemning drinking and driving in Norway (cf. [Nævestad et al., 2019a](#)), and the ESRA data presented in [Table 1](#) indicate that fewer drivers admit doing in Norway than in Greece or Israel (3% versus 12% and 5%).

Motorcycles, which have a high risk of injury, are considerably more popular in Greece than in Israel and Norway. Norway has the highest rate of seat belt wearing, Greece the lowest. The most recent figures for seat belt wearing in Greece are from 2009, whereas Israel and Norway monitor seat belt wearing annually.

Support for a zero BAC-limit is lowest in Greece, but somewhat surprisingly, higher in Israel than in Norway.

1.4.2. Values and attitudes as aspects of road safety culture

The organisational safety culture concept is usually traced to aftermath of the Chernobyl disaster in 1986, when the IAEA described the organisational context leading up to the disaster. Since then, the organisational safety culture concept has gained considerable popularity, both as an academic concept and as a management concept. Organizational safety culture can be defined as “safety relevant aspects of culture in organizations” ([Antonsen, 2009](#), [Hale, 2000](#), [Nævestad, 2010](#)).

As a consequence of the focus on organisational safety culture following the Chernobyl disaster, the safety culture concept has also been applied to road traffic (cf. [Edwards et al., 2014](#)). Although there are no commonly accepted definitions of road or traffic safety culture ([Edwards et al., 2014](#)), several of the existing definitions include values and attitudes (e.g. [AAA, 2007](#), [Moeckli & Lee, 2007](#), [Lonerio, 2007](#); [Özkan & Lajunen, 2011](#)).

In the present study, we focus especially on the importance of values and attitudes as aspects of RSC. We define RSC as shared values and attitudes signifying what is important (e.g. safety, mobility, respect, politeness), shared norms prescribing certain road safety behaviours, and thus shared patterns of behaviour and shared expectations regarding the behaviours of others (cf. [Nævestad et al., 2019a](#)).³ More specifically, we measure attitudes in the present study, which we hypothesize to represent underlying values.

³ We have explored the role of descriptive norms and shared expectations to other road users as aspects of national RSC in [Nævestad et al \(2019a,b\)](#).

Table 1

Key road safety indicators for Greece, Israel and Norway. Based on ITF-OECD annual report on road safety and on ESRA-2017 report (Meesmann et al., 2018).

Road safety indicator	Greece	Israel	Norway
Target for reduction of fatalities	Yes for 2020	Yes for 2021	Yes for 2030
Time horizon of target (base year 2018)	2 years	3 years	12 years
Targeted annual reduction of fatalities	–5.2%	–1.9%	–5.3%
Blood alcohol (BAC) limit (percent)	0.05	0.05	0.02
Speed limits on motorways (km/h)	130	100/110/120	90/100/110
Motorcycles as share of all vehicles	19%	4%	5%
Seat belt wearing among car drivers	77%	94%	98%
Seat belt wearing among front seat passengers	73%	91%	96%
Percent (ESRA) speeding on motorways	71%	79%	89%
Percent (ESRA) driving after drinking too much	12%	5%	3%
Percent (ESRA) supporting zero BAC-limit	60%	77%	68%
Road fatalities per million inhabitants (2017)	69	36	20

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 behavior 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 behavior. 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).

1.4.3. The relationships between national road safety levels, road safety policies and RSC values.

Previous research indicates a relationship between the level of road safety in countries and the scope of road safety policies regulating road user freedom to take risk (cf. Elvik et al., 2009). This especially applies to regulation of speeding, drunk driving and seat belt use, which are key risk behaviours influencing drivers' accident risk (cf. Elvik et al., 2009). Information about such policies in the three studied countries is provided in Table 1. Table 1 generally indicates that the regulation of drunk driving and speeding is stricter in Norway than in the two other studied countries. Additionally, we see a lower prevalence of risky driver behaviour in Norway related to drunk driving and non-use of seatbelts. Table 1 also indicates that the national road safety levels (road fatalities per million population) largely corresponds to the scopes of the road safety policies regulating road user freedom to take risk in the different countries.

Previous research also indicates a relationship between the scope of road safety policies in countries and cultural values related to the freedom to take risks and paternalism. This is noted by Elvebakk (2015), comparing the regulation of road safety in Europe and the US. She states that cultural values indicating freedom to take risk in traffic and skepticism towards paternalistic road safety measures have been far more prominent in the US than Europe. Because of this, the US has been slower to adopt paternalistic road safety measures regulating risky behaviour, e.g. seat belt use, speeding, drunk driving. Moeckli and Lee (2007) relate the cultural values of freedom to take risk in traffic in the US to the lower road safety level in the US, e.g. compared to Europe. The risk of road fatalities per million population is twice as high in the US, as the European average (WHO, 2018). It is, however, important to note that the relationships suggested by Elvebakk (2015) and Moeckli and Lee (2007) are merely hypotheses, as these studies have not actually measured values related to paternalism and individual freedom to take risk in traffic in specific countries. Thus, the present study provides an important contribution within this research field, as it provides a measurement of such values.

The hypothesized relationship between (paternalistic) road safety policies and national RSC can be explained by the fact that road safety policies is one of several national factors that may influence RSC. Several factors that could influence cultural values and attitudes among road users are national e.g., national traffic safety policies (e.g. Vision Zero), traffic rules, the police enforcing the rules, road user training, road user behavior and interaction, infrastructure). Thus, we may expect different traffic safety values and attitudes in different countries. National cultural values and attitudes come about through our socialization in our own country and interaction with other members of society. They become a "taken for granted" way of seeing the world, which motivates and legitimizes behavior.

Based on the preceding discussion, we may assume that countries with few paternalistic measures regulating drivers' risk taking in traffic have a lower road safety level (Elvik et al., 2009), and drivers who display a greater valuation of freedom to take risk in traffic (Moeckli & Lee, 2007; Elvebakk, 2015). The above mentioned studies form the basis of Hypothesis 1: *The drivers in the country with the lowest road safety level and the least comprehensive (paternalistic) road safety policies (i.e. Greece) will have the highest focus on individual freedom to take risk and the lowest focus on paternalism (H1)*. It should, however, be noted that it is difficult to ascertain whether paternalistic values precede paternalistic measures, or whether the influence is the opposite. We return to that in section 4.5.1 and

4.6.2.

It is also important to remember that road safety policies are not the only variable influencing values concerning freedom to take risk in traffic and paternalism. Values related to individual freedom and paternalism also vary according to demographic criteria. Elvebakk et al. (2016) find a higher focus on paternalism in road safety among older respondents, women and people voting for political parties on the political left. Eriksson and Bjørnskau (2021) report similar results, but they also find that people with high incomes and higher car use are more negative to paternalistic measures.

1.4.4. *The relationship between the employment relationship and paternalistic attitudes*

Previous research indicates that the driving behaviour of professional drivers in general and bus drivers in specific is more heavily regulated than the driving behaviour of private car drivers. First, professional drivers' behaviour is regulated by national authorities. Driving time and rest periods are regulated: European bus drivers must take a "real brake" of 45 min after 4.5 h of driving, they may drive up to maximum 9 h a day etc. Additionally, buses (100 km/h) and lorries (90 km/h) have speed limiters installed, which regulate their maximum speed level. Professional drivers must also undergo a basic mandatory training programme when they get their license, followed by regular follow-up training. Regulations of these different aspects of driving and work (e.g. driving time and rest periods) also apply to Israeli bus drivers.

Second, unless they are self-employed, professional drivers' behaviour is also regulated by their employers, and their membership in work organisations. Because of the employment relationship, employers have a right and a duty to ensure the safety and health of their workers. Based on this, transport organisations often have policies on speed, driving style and seat belt use (Nævestad et al., 2020a). They might also have also locks installed in the vehicles, as well as fleet management technology registering driving behaviour, and speed limiters limiting the maximum speed of the vehicles below the limits set by national regulations. Additionally, previous studies have found that managers' focus on safety issues and organizational safety culture influence professional drivers' perception of organisational safety culture and subsequently their road safety behaviours (Wills et al., 2005; Davey et al., 2006; Öz et al., 2013). It should also be mentioned that professional drivers differ from private drivers in the sense that their exposure (kilometres driven per year) is far higher than that of private drivers, and that their perceived levels of time pressure and stress induced by e.g. deadlines or customers may influence their road safety behaviours (Wills et al., 2005; Öz et al., 2013).

This previous research indicates that the RSC and the driving styles of private and professional drivers differ, due to the work context of professional drivers, where regulators and employers influence the safety of drivers. This has also been indicated in previous research (e.g. Maslač et al., 2018). Elvebakk (2015) asserts that we accept different levels of regulation and intervention in different areas in our lives: we are willing to be controlled and monitored as employees, in a way we would not accept in our private lives. She suggests that an important reason that we are willing to act in a certain way as employees, is that we are financially compensated for doing so. Based on this previous research we therefore hypothesize that bus drivers hold more paternalistic attitudes than private car drivers in the three countries. This is *Hypothesis 2: Bus drivers in all the three countries will value individual freedom less and be more paternalistic, as their driving is more heavily regulated than car drivers (H2)*. As for hypothesis 1, it is difficult to ascertain whether paternalistic values precede paternalistic measures, or whether the influence is the opposite (cf. section 4.5.1 and 4.6.2)

1.4.5. *The relationship between road safety culture values and road safety behaviours*

Based on Ajzen (2012), Seymer (2013) and Gehlert et al. (2014) we hypothesize that the influence of RSC values on road safety behaviors generally is mediated analytically through attitudes, as they are more specific. Attitudes can be defined as a summary evaluation of an entity with some degree of favour or disfavor (Ajzen, 2001). Thus, while freedom to take risk in traffic may represent a general RSC value, more specific attitudes may be related to specific types of risk taking, e.g. speeding, non-use of seat-belt and driving under the influence. According to Gehlert et al. (2014), attitudes consist of a cognitive, an affective and a behavioural component. If we take attitudes to driving under the influence as an example, the cognitive component contains thoughts and ideas that a person holds about this ("it is dangerous"), the affective component consists of feelings and emotions concerning driving under the influence ("it is morally despicable") while the behavioural intention component concerns the practical implications ("I will never do it"). These studies (Ajzen, 2012; Seymer, 2013; Gehlert et al., 2014) form the basis of *Hypothesis 3: The drivers who value individual freedom to take risk in traffic over paternalism, take more risks themselves (H3)*.

It is, however, important to remember that attitude is not the only variable influencing road safety behaviours. Previous studies have also found that demographic factors influence road safety behaviours: these report e.g. of more violations among younger drivers and among male drivers (e.g. Parker et al., 1998). Violations are in turn the type of behaviours that is most closely related to accident involvement. Sucha et al. (2014) also find lower levels of dangerous violations and dangerous errors with increasing levels of education.

1.4.6. *The relationship between road safety behaviours and accidents*

Previous studies using behavior items from the Manchester Driver Behaviour (DBQ) questionnaire find relationships between self-reported violations in traffic and accident involvement (De Winter & Dodou, 2010; Warner et al., 2011). Studies comparing Northern and Southern European countries have found a larger incidence of aggressive violations in the latter, which are related to drivers' accident involvement (Warner et al., 2011). These results were also supported in the study of Nævestad et al. (2019a), which included car drivers, bus drivers and heavy goods vehicle drivers. These studies make up the basis of *Hypothesis 4: Higher levels of risk taking in traffic is related to higher accident involvement (H4)*. In this case, risk taking refers to different types of violations that is related to accident involvement in previous studies (De Winter & Dodou, 2010), including aggressive violations (Warner et al., 2011; Nævestad et al., 2019a).

2. Methods

Our study is carried out as part of a research project titled “Safety culture in private and professional transport: examining its influence on behaviours and implications for interventions”, funded by the Norwegian Research Council and undertaken by the Institute of Transport Economics – TØI (Norway) and the National Technical University of Athens - NTUA (Greece). Results from this project have been presented in previous studies comparing only bus drivers (Nævestad et al., 2019b) and HGV drivers, bus drivers and car drivers (2019a), car drivers and motorcycle riders (Nævestad et al., 2020b). The present study builds on these previous studies. The present study provides a unique contribution, which is different from these previous studies, as it: 1) Has different aims, focusing on RSC values across countries and factors influencing such values, 2) As it studies values and attitudes an aspect of national RSC, 3) provides a theoretical overview and discussion of the roles of values in RSC, 4) As it relates national RSC values to the road safety records and road safety policies in the studied countries (including the role of Vision Zero in Norway), and as it also studies other factors influencing road safety values in the studied countries, 5) As it discusses whether and how RSC values can be influenced to improve road safety, and 6) As it also includes data about private and professional drivers from Israel.

2.1. Recruitment of respondents

The project was carried out in line with our institute’s ethics policy (www.toi.no). Respondents’ participation was voluntary and their anonymity was guaranteed. Respondents were also informed about the purpose of the project in their own mother tongue.

The Norwegian professional driver respondents were recruited in the last trimester of 2016 through the Norwegian researchers’ contact with Norwegian transport companies and unions. Web links to the questionnaires were distributed along with an introductory text explaining the purpose of the survey and stressing that the surveys were anonymous. The Norwegian private driver respondents were recruited through the Preference Database of the Norwegian Postal Service, consisting of 430 000 people in 2016, who had consented to receive information or advertising through the moving or holiday service of the Postal Service. In September 2017, e-mails with web-links to the survey were submitted to 45,483 people in three Norwegian counties. Of the 45,452 people who received the e-mail, 6727 people (14.8%) opened the e-mail, and 645 (9.6%) completed the survey. In an attempt to increase response rates, Norwegian respondents were informed that they could participate in a draw for a present card of 2000 NOK, if they wanted to. The Greek respondents (N = 416) were recruited through a marketing research company in Greece, which was under the scientific supervision of researchers from the NTUA. Recruitment of drivers in Greece was also difficult, therefore it was decided to approach candidates in person and further explain the scope of the survey. This helped eliminate their doubts and fears about confidentiality, and the use of the information they would provide. The Israeli drivers were recruited by professor Tova Rosenbloom at the Bar Ilan University in Israel in cooperation with the project researchers from NTUA, and in accordance with the SafeCulture data collection scheme, ensuring anonymity and voluntary participation.

When it comes to criteria for recruitment, it can be mentioned that the private drivers in Norway and Greece were recruited from different geographical areas, as one of the purposes of the SafeCulture project was to study the importance of regions for RSC (cf. Nævestad et al., 2019a). Surveys were sent to three Norwegian counties, and one of these was the capital Oslo. Counties were selected based on differences in accident risk and attitudes. The private drivers in Greece were sampled from two different areas: the capital Athens and the Greek island Rhodes. This sampling was based on an assumption that the RSC on an island could be different from the capital, as an island is a geographical enclosed area, and as it has many tourist drivers. The recruitment of Israeli private drivers did not focus on particular geographical regions, but as in the two other national samples, some respondents were recruited from the capital area, while other respondents were from other parts of the country. The importance of geographical region is, however, not an issue in the present study, as we focus on the country level and professional versus private drivers within and across the different countries. The recruitment of professional drivers took the following criteria as a point of departure: 1) Recruited drivers should be mostly involved in urban traffic in cities (with a population of e.g. between 50.000 and 200.000 people), but also drive in rural areas, 2) The drivers should be employed in larger companies, with e.g. about 200 to 400 drivers, working from the organisational units where they were recruited, and 3) The vast majority of bus drivers in the studied companies should be of the main nationality in the studied country (cf. Nævestad et al., 2019b). Recruiting Israeli bus drivers was more difficult (cf. the low sample), and thus these criteria do not apply fully in the Israeli bus driver sample. Recruitment methods and criteria differ somewhat in the national samples, due to the national contexts and challenges related to data collection. As noted, the presumably most efficient recruitment techniques were employed in each country.

2.2. Survey themes

Demographic variables. Both the survey to professional and the survey to private drivers included questions on age, experience as a driver, sex, nationality, kilometres driven with professional or private car in the last two years etc.

Values/attitudes: The survey includes six questions on paternalism and individual freedom related to road safety. These questions are based on Elvebakk et al. (2016), and the question measure attitudes that we hypothesize to reflect underlying values related to road safety, i.e. paternalism and individual freedom. The full wording of these questions are provided in Table 3.5.

Questions to car drivers. For car drivers, questions were also included on their highest attained level of education, their place of living (e.g. rural, urban), for how long they have had their driver’s license, how often they drive, the type of car they usually drive etc.

Questions to bus drivers. The survey to bus drivers included work-related variables with potential safety consequences, e.g. “In my job I experience that time pressure and deadlines may negatively affect traffic safety”. Questions about managements’ focus on

driving style and seat belt use were also included, e.g. “Management emphasizes that drivers must not drive faster than speed limits and conditions allow”, “Management emphasizes that all drivers must wear seat belts”. Questions were also included about drivers’ perceived focus on safety among principals in the sector, e.g.: “Safety is more important than deadlines to our principals”, “Safety is more important than price to our principals”. The bus drivers also answered an organisational culture index, consisting of ten questions from the Global Aviation Information Network (GAIN) scale on organisational safety culture (GAIN 2001), e.g. “Management regards safety to be a very important part of all work activities”, “Management detects drivers who drive unsafely”, “Drivers usually report all safety problems and unsafe situations that they experience in their work”, “Drivers in my company receive adequate training to drive in a safe way”.

National RSC measured as descriptive norms. In addition to examining the role of values as an aspect of national RSC we also measure national RSC as descriptive norms (cf. Nævestad et al., 2019a), reflecting drivers’ perceptions of what other drivers in our country do. Based on previous research (Nævestad et al., 2019a), we include seven such questions into a sum-score index, e.g. “When driving 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 disregard the speed limit on a motor way road”, “That they overtake a slow driver on the inside”, “That they drive when they suspect they might be over the legal blood alcohol limit”. Five answer alternatives ranged between 1 (none-very few) and 5 (almost all/all).

Road safety behaviours. The survey reports results from four questions on road safety behaviours, which are combined into a sum-core index. The items are based on DBQ items that Scandinavian and Southern European drivers have scored significantly different on in previous studies, and which were related to accident involvement (Warner et al., 2011; Nævestad et al., 2019a). The items measure aggressive violations and driving under the influence, e.g. “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”, “Drive when you suspect you might be over the legal blood alcohol limit”. The DBQ answer alternatives have been changed from relative to absolute alternatives (e.g. Question: “For every ten trips, how often do you ...?”, Alternative answers: “Never”, “Once or twice”, “Three or four times”, “Five or six times”, “Seven or eight times”, “More than eight times but not always”, “Always”). Answer alternatives were changed to absolute answer categories, as previous research indicates that different demographic groups tend to interpret questions and formulations differently (i.e. what does “often” mean?) (cf. Nævestad et al., 2017).

Accident involvement. The survey includes a question on respondents’ 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.

2.3. Analysis

The IBM SPSS Statistics 27 package was used in the analysis of the data.

Factor analysis. We conducted factor analyses in the paper, of the attitudes measuring underlying traffic safety values. We did this to examine whether the items comprise a smaller number of coherent subscales, “factors” (i.e. paternalism and freedom to take risk in traffic).

Cronbach’s Alpha. We construct several indexes of different concepts (e.g. the factors), to compare how different groups scored on these concepts. Cronbach’s Alpha measures the correlation among responses on the indexes. The value varies between 0 and 1. A Cronbach’s Alpha over 0.9 is very high. a score between 0.7 and 0.9 is good. a score between 0.5 and 0.6 is acceptable and a score below 0.5 is unacceptable.

Comparison of Means. We also compare whether mean scores on the indexes are different. When comparing the mean scores of different groups, we use one-way Anova tests, which compare whether the mean scores are equal (the null hypothesis) or (significantly) different.

Regression analyses. Twelve regression analyses are conducted to examine factors influencing four variables. In the analyses of the three first dependent variables, we use linear regression analysis, examining the factors predicting paternalistic attitudes, attitudes related to freedom to take risks and road safety behaviours. Finally, we conduct a logistic regression analysis to examine the factors predicting respondents’ accident involvement. Logistic regression analysis is used in this analysis, as the dependent variable has two values (no = 1, yes = 2). B values are presented, and they indicate whether the risk of personal injuries is reduced (negative B values) or increased (positive B values), when the independent variables increase by one unit. Of course, it is impossible to conclude about causality, as this is a cross-sectional and correlational study. The term predict is nevertheless used when the regression analyses are described.

3. Results

3.1. Description of the sample

The study sample includes 596 car drivers and 216 bus drivers from Norway, 286 car drivers and 199 bus drivers from Greece and 129 from Israel. In Tables 3.1 to 3.4 the main characteristics of the survey sample are presented.

Table 3.1 indicates, as expected, that the share of male bus drivers is 93% or 100% in the three countries. The main difference between the samples is that the share of males is seven percentage points higher among the Greek bus drivers and that there are four and five percentage points more male car drivers in the Israeli and Greek car driver samples. The sex differences in the national samples are statistically significant at the 1%-level ($P = 0.001$). Table 3.2 compares the age distributions in the groups.

Table 3.2 indicates a higher share of respondents in the oldest group in the Norwegian and Israeli samples of car and bus drivers, compared to the Greek samples. If we compare the two oldest groups in the samples, shares are relatively comparable (42–49%). There are two exceptions: the Norwegian (74%) and Israeli bus drivers (63%). Thus, these majorities in these two groups are 46 years or older.

For the car drivers, questions were also included about their highest level of education. National categories were somewhat different, also including Lyceum (a type of high school; 14–18 years) in the Greek sample. To adapt the coding to Greece, we categorized the answer alternatives into four: 1) Primary school (Norway 3%, Greece: 2%, Israel: 1%), 2) High school (Norway 22%, Greece: 44%, Israel: 30%), 3) 3–4 years university/college (Norway 36%, Greece: 28%, Israel: 17%), 4) > 5 years university (Norway 40%, Greece: 25%, Israel: 52%). Thus, the level of education was highest in the Israeli sample of car drivers, followed by Norwegian and Greek sample. The bus drivers from Norway were recruited from four companies (including 25 drivers with unknown company), while Greek bus drivers in Greece were recruited from two companies.

Table 3.4 compares the kilometres driven in the last two years and the accident involvement in the last two years in the different groups.

The proportion of 37% and 34% accident involvement in the Israeli and Greek bus driver sample respectively is surprisingly high. It is, however, important to note that, in this study, accidents refer to incidents which at least involve property damage. Thus, accidents may refer to events ranging from incidents involving broken wing mirrors to fatal accidents.

3.2. Values related to paternalism and individual freedom

3.2.1. Factor analysis

Based on the previous results of Elvebakk et al. (2016) and Nævestad et al. (2019b), a confirmatory factor analysis (CFA) was conducted in order to validate that the items measuring paternalism and individual freedom tap into two factors. Bartlett's test of sphericity (approx. Chi-square) was 1043.119 ($p < 0.001$). The Kaiser–Meyer–Olkin's (KMO) measure of sampling adequacy showed a value of 0.596. The tests indicated that the items and the data were suitable for factor analysis, although it should be noted that the KMO value was a bit lower than the recommended value of 0.6. We chose to conduct the analysis for three reasons. First, Bartlett's test of sphericity was significant. Second, the correlation matrix indicated several correlations > 0.3 between the items. Third, the KMO was very close to the recommended value. The two first components explained a total of 56.5% of the variance. We used a principal component analysis (PCA) with Oblimin rotation, where we set the number of factors to two and the cutoff values of the factor loadings at 0.3. This produced the following result.

3.2.2. Mean scores among the groups

Based on the factor analyses in Table 3.5, we suggest that the six individual items are attitudes which reflect and measure two underlying values (factors) related to road safety: three of them measure paternalism, and three of them measure individual freedom (cf. Elvebakk et al., 2016). Possible answers ranged from “Totally disagree” (1) to “Totally agree” (5). We made an index comprised of the sumscores of the three factors loading on Paternalism in Table 3.5 (each with minimal value = 3, and maximum value = 15). (Cronbach's Alpha = 0.673). We also made an index comprised of the sumscores of the three factors loading on Individual freedom in Table 3.5 (each with minimal value = 3, and maximum value = 15) (Cronbach's Alpha = 0.520). Table 3.6 compares mean scores on these two indexes among car and bus drivers in three countries

Table 3.6 generally indicate that the Greek drivers have the highest scores on both the index measuring measuring individual freedom to take risk in traffic and the paternalism index. The first result is in accordance with Hypothesis 1, while the second result is in contrast with Hypothesis 1. It is paradoxical that the Greek drivers have the highest score on both indexes, as it seems conflicting to hold both views at the same time. We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way ANOVA. Results indicate that the mean scores of Greek drivers on both indexes were significantly different from the means of the two other countries ($p < 0.01$). The mean scores of Norwegian and Israeli drivers were not significantly different on the two indexes.

We also compare mean scores between car and bus drivers to test Hypothesis 2. Results indicate that the mean score of bus drivers is significantly higher on both the index for individual freedom ($P = 0.048$) and the index for paternalism ($P = 0.001$). The former result is contrary to Hypothesis 2, while the latter is in accordance with it.

Table 3.1

Distribution of drivers per country and group.

Country	Group	Number	Share	Share of males
Norway	Car drivers	596	49%	59%
	Bus drivers	115	9%	93%
Greece	Car drivers	286	23%	64%
	Bus drivers	100	8%	100%
Israel	Car drivers	102	8%	63%
	Bus drivers	27	2%	93%
Total	Car drivers	984	80%	61%
	Bus drivers	242	20%	96%
Total	Car and bus	1226	100%	68%

Table 3.2

Distribution of drivers per group (car bus) and age.

Country	Group	<26 years	26–35	36–45	46–55	56+
Norway	Car drivers	7%	27%	23%	18%	26%
	Bus drivers	0%	11%	15%	38%	36%
Greece	Car drivers	5%	23%	30%	28%	14%
	Bus drivers	0%	11%	40%	42%	7%
Israel	Car drivers	14%	26%	16%	12%	32%
	Bus drivers	0%	0%	37%	33%	30%
Total	Car drivers	7%	26%	24%	20%	23%
	Bus drivers	0%	10%	28%	39%	23%

Table 3.4

Estimated mean thousand kilometres (Kms) driven in the last two years with car or heavy vehicles, including share and number of respondents who answered that they had experienced an accident in the last two years, total number of million kms.

Group	Kms	N	Std. Dev.	Accidents %	Accidents N
Car Norway	22	596	21,5	10%	57
Car Greece	22	286	11,4	17%	49
Car Israel	32	102	31,5	23%	23
Bus Norway	58	115	47,1	21%	24
Bus Greece	107	100	74,3	34%	34
Bus Israel	52	27	90,6	37%	10

Table 3.5

Factor analysis national road safety culture scale -values.

Items	Paternalism	Individual freedom
1) The fact that accidents still happen in traffic, shows that the authorities should control road users' behaviour to a greater extent than they do today	0.847	
2) The authorities should make it more difficult for people to engage in risky behaviour in traffic (e.g. by lowering speed limits, increasing police enforcement)	0.805	
3) It is morally and ethically unacceptable that people are killed or severely injured in traffic accidents ^a	0.667	
4) Road users should be able to choose risky activities in traffic, as long as they do not expose other to risk		0.795
5) A skilled person can take more risks than others		0.723
6) Road users know best themselves how they should behave in traffic		0.618

^aItem 3, measuring paternalism is one of the key justifications of the “Zero vision” of the Norwegian “National Plan of Action for Road Safety 2018–2021”.

Table 3.6

Mean scores on the indexes for individual freedom to take risk in traffic and paternalism among car and bus drivers in three countries.

	Individual freedom			Paternalism		
	Mean	Number	S.D.	Mean	Number	S.D.
Norway	6.4	711	2.5	10.6	711	2.8
Israel	6.0	129	2.4	10.4	129	2.8
Greece	7.2	386	2.6	13.3	386	1.9
Car	6.5	984	2.5	11.3	984	2.8
Bus	6.9	242	2.9	12.1	242	2.7

The former contradictory result is due to the fact that the Greek bus drivers ($M = 8.2$) score significantly higher than all the other groups on the freedom to take risk index. Bus drivers in both the other countries score lower than the car drivers on the freedom to take risk index. Likewise, bus drivers in Norway and Greece score higher than car drivers on the paternalism index. Thus, the significantly higher score of the bus drivers on the freedom to take risk index is partly the result of a national effect, (i.e. the high focus on individual freedom among the Greek drivers, especially the bus drivers).

3.3. Factors influencing values related to individual freedom and paternalism

3.3.1. Regression analyses of factors influencing freedom to take risk in traffic

In Table 3.7 we show results from three regression analyses, where we examine independent variables influencing respondents' values when it comes to freedom to take risk in traffic: the first focuses on both car and bus drivers, the second focuses on car drivers

and the third on bus drivers.

The analysis involving both car and bus drivers indicates that five variables contribute significantly to attitudes focusing on freedom to take risk. Sex and age contributes negatively, which means that women and older drivers focus less on drivers' freedom to take risk in traffic. Greek nationality contributes positively meaning that Greek drivers focus more on drivers' freedom to take risk in traffic. This is in accordance with hypothesis 1. The analysis involving car and bus drivers also indicates that drivers' perceived enforcement in their country predicts lower focus on freedom to take risk, in accordance with the mechanisms we use to justify Hypothesis 1. We also see a small negative relationship with RSC measured as descriptive norms.

The analysis involving only car drivers by and large includes the same main results as the one with both groups. Education is, however, also included in this analysis, and it contributes significantly and negatively to freedom to take risks, indicating that people with higher education levels are less likely to focus on freedom to take risk in traffic.

In the analysis involving only bus drivers, five variable contribute significantly. The contributions of age and nationality are similar to the other models. The contribution of national RSC measured as descriptive norms is positive, indicating a relationship between attitudes favouring the freedom to take risk in traffic and perceived risk taking in the national population of drivers. Surprisingly, authority priority of traffic safety contributes positively to freedom to take risks in this analysis. This is hard to explain.

Although the three latter variables, measuring organisational and sectorial focus on traffic safety do not contribute significantly, we see that the adjusted R^2 value in the model involving only bus drivers is 0.331, and far higher than the two previous model with R^2 values of 0.066 and 0.062. Thus, the bus driver model explains 33% in the variation in the attitudes related to freedom to take risk in traffic, while the two former explain 7% and 6%.

3.3.2. Regression analyses of factors influencing paternalistic attitudes

In Table 3.8 we show results from three regression analyses, where we examine independent variables influencing respondents' paternalistic attitudes: the first focuses on both car and bus drivers, the second focuses on car drivers and the third on bus drivers.

The analysis involving both car and bus drivers indicates that all the included variables contribute significantly to paternalistic attitudes, except mileage. Greek nationality contributes positively to paternalistic attitudes, meaning that Greek drivers have a higher score on this index, as indicated in Table 3.6 (and in contrast to Hypothesis 1). We also see that sex and age contributes positively, which means that women and older drivers hold more paternalistic attitudes. Table 3.8 also indicates that respondents' perceived authority priority of road safety and perceptions of enforcement contributes positively to paternalism, in accordance with the mechanisms that we draw on to justify Hypothesis 1. Moreover, in accordance with Hypothesis 2, we see that being a bus driver is positively correlated with paternalistic attitudes. Finally, we see that national RSC measured as descriptive norms is negatively related to paternalism, indicating that respondents who attribute higher levels of violations among other road users in their countries are less paternalistic.

The analysis involving only car drivers by and large includes the same main results as the one also including bus drivers. Education is also included in this analysis, but does not contribute significantly.

In the analysis involving only bus drivers, four variable contribute significantly. Nationality contributes positively as in the other analyses and the same does perceived enforcement. In this analysis, we also included organisational safety culture, sector focus on safety, and management focus on seat belt and speed to test the mechanisms justifying Hypothesis 2. In accordance with Hypothesis 2, we see that management focus on seat belt and speed contributes significantly.

The adjusted R^2 value in the model involving bus and car drivers is 0.262, while it is 0.259 in the model including only car drivers and 0.279 in the model involving only bus drivers. Thus, the two former model explain 26% of the variation in paternalistic attitudes, while the latter explains 28%.

Table 3.7

Linear regression. Dependent variable: "Freedom to take risk in traffic" Standardized beta coefficients.

Variables	Car and bus drivers	Car drivers	Bus drivers
Sex	-0.108***	-0.124***	0.099*
Age group	-0.140***	-0.137***	-0.202***
Nationality (Greek)	0.162***	0.105***	0.337***
National RSC (descr. norms)	-0.084**	-0.133***	0.146**
Authority priority	0.024	-0.063**	0.334***
Perceived enforcement	-0.119***	-0.091***	-0.158***
Car vs. bus	0.042	-	-
Education	-	-0.115***	-
Organisational safety culture	-	-	-0.077
Sector focus on safety	-	-	-0.005
Management focus on seat belt and speed	-	-	0.052
Mileage	-0.019	-0.051	-0.050
Adjusted R^2	0.063	0.066	0.329

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 3.8

Linear regression. Dependent variable: “Paternalistic attitudes” Standardized beta coefficients.

Variables	Car and bus drivers	Car drivers	Bus drivers
Sex	0.108***	0.097***	0.113*
Age group	0.090***	0.080***	0.070
Nationality (Greek)	0.533***	0.543***	0.547***
National RSC (descr. norms)	-0.101***	-0.143***	-0.029
Authority priority	0.156***	0.191***	-0.005
Perceived enforcement	0.121***	0.111***	0.152**
Car vs. bus	0.095***	-	-
Education	-	0.005	-
Organisational safety culture	-	-	0.028
Sector focus on safety	-	-	0.108
Management focus on seat belt and speed	-	-	0.142**
Mileage	0.031	0.003	0.050
Adjusted R ²	0.262	0.259	0.279

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

3.4. The influence of values on safety outcomes

3.4.1. Regression analyses of factors influencing road safety behaviours

Road safety behaviours is measured by means of a sum-scale index based on four items focusing on aggressive violations and driving under the influence (min: 4, max: 28). The Norwegian respondents scored 5.4 (car) and 5.9 (bus) on the index. Corresponding scores among the Israeli respondents were 6.2 (car) and 7.1 (bus) while the scores were 7.0 (car) and 7.0 (bus) among the Greek respondents. This indicates safer road safety behaviours among the Norwegian respondents. Results also indicate that the national dimension is more important than the car vs. bus dimension. The score for car drivers in general was 5.9 points, while it was 6.5 for bus drivers ($p < 0.01$). In comparison scores for Norwegian respondents were 5.4 points, while they were 6.4 for Israeli respondents and 7.0 for Greek respondents ($p < 0.001$).

In Table 3.9 we show results from three regression analyses, where we examine independent variables influencing respondents' road safety behaviours.

The analysis involving both car and bus drivers indicates that four variables contribute significantly to road safety behaviours. The most important is national RSC measured as descriptive norms, indicating that the road safety behaviours of the respondents is closely related to the behaviours that they attribute to other drivers in their respective countries: the more violations the drivers attribute to other drivers in their country, the more violations they report to commit themselves. The descriptive norms index is based on seven items (min: 7, max: 49). Norwegian respondents scored 11.2 points, Israeli respondents scored 13 points, while Greek respondents scored 18.8 points, indicating that Norwegian respondents expect the fewest road violations from other drivers in their country.

The second main result is that the respondents' focus on individual freedom to take risk in traffic influences their road safety behaviour. The third variable contributing significantly to respondents' behavior is sex. The contribution is negative, indicating that women report less risky behaviours than men in all the three countries and both among car and bus drivers. Fourth, age contributes significantly and negatively, meaning that older drivers report of less risky behaviours. The adjusted R² value is 0.182, indicating that the model explains 18% of the variation in respondents' road safety behaviours.

Six variables contribute significantly in the analysis of the car drivers' behaviour. These are generally the same as in the analysis

Table 3.9

Linear regression. Dependent variable: “Road safety behaviours” Standardized beta coefficients.

Variables	Car and bus drivers	Car drivers	Bus drivers
Sex	-0.092***	-0.086***	-0.043
Age group	-0.080***	-0.093***	-0.065
Nationality (Greek)	0.038	0.044	-0.163*
National RSC (descr. norms)	0.364***	0.253***	0.413***
Perceived enforcement	0.022	0.019	0.009
Paternalism	-0.008	-0.030	0.010
Individual freedom	0.107***	0.084***	0.186***
Car vs. bus	0.018	-	-
Education	-	-0.052*	-
Rhodes	-	0.181***	-
Organisational safety culture	-	-	-0.078
Sector focus on safety	-	-	0.063
Management focus on seat belt and speed	-	-	-0.200**
Work pressure and stress	-	-	0.250***
Mileage	-0.018	0.040	-0.002
Adjusted R ²	0.182	0.194	0.250

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

involving both car and bus drivers with two exceptions. Education was also included, and it contributes negatively, indicating that respondents with higher education report that they commit less risky behaviours in traffic. Additionally, Rhodes was included and it contributes positively, indicating riskier driving behaviours among car drivers on Rhodes. The adjusted R² value is 0.194, indicating that the model explains 19% of the variation in respondents' risky road behaviours.

Five variables contribute significantly in the analysis of the bus drivers' behaviour. First National RSC measured as descriptive norms contribute positively, as in the other analyses. Second, freedom to take risk contributes positively and more strongly than in the other analyses. Third, we also see that management focus on bus drivers seat belt use and speed contributes negatively, indicating that managers influence their drivers to take less risks in traffic, by focusing on their speed and driving style. Fourth, bus drivers' perceived work pressure and stress contributes positively, indicating that drivers' who experience work pressure and stress take more risks while driving. Fifth, nationality contributes negatively, indicating less risky behaviours among Greek bus drivers, when we control for the other factors.

3.4.2. Regression analyses of factors influencing accident involvement

A logistic regression analysis was conducted to identify the variables predicting accident involvement among our respondents (Table 3.10). The accident variable has been dichotomized for the analysis, from four values indicating different severities to: 0 = no accident, 1 = accident. B values are presented, and they indicate whether the risk of personal injuries is reduced (negative B values) or increased (positive B values), when the independent variables increase by one unit.

The analysis involving both car and bus drivers indicates that three variables contribute significantly to the drivers' accident involvement. The most important is car vs. bus. This variable contributes negatively, indicating that the accident involvement of bus drivers is lower than that of car drivers, when we control for the other variables in the model. Second, we see that road safety behaviours contribute positively and significantly, indicating that this increases the probability of accident involvement. Finally, we see that nationality contributes negatively and significantly. In this variable, Greek is coded 0 and other nationality is 1. Thus the negative contribution of this variable, indicates that Greek nationality is related to higher accident involvement, also when we control for risky road behavior. The Nagelkerke R² value in the model is 0.063, indicating that the model explains about 6% of the variation in the accident involvement of the respondents.

The model involving only car drivers is poor, with only education contributing significantly to accident involvement, and a Nagelkerke R² value of 0,027. Road safety behavior does not contribute significantly in the model, probably as the model also includes education, which is correlated with behavior. The highest level of education has the lowest level of risky behaviours.

The analysis involving only bus drivers indicates that three variables contribute significantly to the drivers' accident involvement. The first is nationality, which contributes negatively and significantly, indicating that Greek nationality is related to higher accident involvement. The contribution of the variable is stronger than in the model which also includes car drivers, indicating that the national differences in accident involvement is even higher for bus drivers than for car drivers. The second variable contributing significantly to accident involvement among the bus drivers is road safety behaviours, indicating that the riskier behaviours the bus drivers have, the more likely they are to be involved in an accident. The third variable contributing significantly is management focus on seat belt and speed. The contribution is positive, indicating that drivers with managers underlining that their drivers should adjust their speed to conditions and speed limits and use seat belts have a lower risk of being involved in accidents. The Nagelkerke R² value in the model is 0.110, indicating that the model explains 11% of the variation in the accident involvement of the bus drivers.

4. Discussion

4.1. Attitudes and values related to individual freedom and paternalism

The first aim of the study was to compare the values related to individual freedom and paternalism among car drivers and bus drivers in Norway, Greece and Israel. Based on Elvebakk (2015), we hypothesized that the drivers in the country with the lowest road

Table 3.10

Logistic regression. Dependent variable: self-reported crash involvement in the last two years (dichotomized: 0: no crash, 1 = crash involvement). B values.

Variables	Car and bus drivers	Car drivers	Bus drivers
Sex (Female = 0, Male = 1)	-0.095	-0.062	-0.895
Age group	-0.088	-0.118	-0.146
Mileage	0.000	0.004	-0.002
Road safety behaviour	0.067***	0.043	0.091**
Nationality (Greek = 0, Other = 1)	-0.368*	-0.344	-0.898**
Car vs. bus	-0.966***	-	-
Education	-	-0.206*	-
Rhodes (Rhodes = 0, Other = 1)	-	-0.050	-
Organisational safety culture	-	-	-0.025
Sector focus on safety	-	-	-0.099
Management focus on seat belt and speed	-	-	0.125*
Nagelkerke R ²	0.063	0.027	0.110

* p < 0.1 ** p < 0.05 *** p < 0.01

safety level and the least comprehensive (paternalistic) road safety policies (i.e. Greece) would have the highest focus on individual freedom to take risk and the lowest focus on paternalism (Hypothesis 1). Our results support the former part of the hypothesis. Comparing the countries, we found as expected that the Greek drivers have the highest scores on the freedom to take risk in traffic index. We found, however, contrary to our hypothesis, that Greek drivers also had the highest score on the index measuring paternalism. The first result is in contrast with Hypothesis 1, while the second result is in accordance with Hypothesis 1. We concluded that it is paradoxical that the Greek drivers have the highest score on both indexes, as it seems conflicting to hold both views at the same time. We return to this in section 4.3.2.

Based on the more comprehensive regulation of the road safety behaviours of professional drivers than private drivers, we hypothesized less focus of individual freedom to take risks and a higher acceptance of paternalistic values among the bus drivers than among the car drivers, across the countries (Elvebakk, 2015) (Hypothesis 2). Our results partly support hypothesis 2: bus drivers scored significantly higher on the paternalism index ($P < 0.001$). However, the bus drivers also scored significantly higher on the freedom to take risk index ($P < 0.05$), because of the Greek bus drivers' higher score on this index.

4.2. Factors influencing attitudes and values

The second aim of the study was to examine the factors influencing values related to individual freedom and paternalism among car drivers and bus drivers in the three countries. First, our analyses indicate that demographic variables, like sex and age influence these attitudes: women and older respondents are generally less in favour of individual freedom to take risks and more in favour of paternalistic measures. This is in line with results from previous research (Eriksson and Bjørnshau, 2021; Elvebakk et al., 2016). Second, our study also contributes to existing research by indicating that drivers with higher levels of education tend to value freedom to take risk traffic lower than drivers with lower levels of education.

Third, our study indicates, in line with previous research (Elvebakk, 2015), that drivers' attitudes to individual freedom to take risk and paternalism is closely related to nationality. The Greek drivers' high(est) focus on freedom to take risk in traffic was upheld, also when we controlled for demographic variables in the samples.

Fourth, our study contributes to existing research by also testing the hypothesized mechanisms behind this relationship. We find that drivers' perceived police enforcement negatively predicts their focus on individual freedom, and that perceived authority focus on road safety positively predicts paternalistic attitudes. These results indicate as Elvebakk (2015) asserts, that high levels of paternalistic measures are related to paternalistic values, and presumably high national traffic safety levels.

Fifth, results of the regression analyses indicate, in accordance with Hypothesis 2, that the variable "bus drivers" contribute positively to paternalistic attitudes, also when we control for demographic factors like e.g. age. This result is in line with Elvebakk (2015), who contend that the employment relationship makes us accept more intrusive measures limiting our freedom, partly as we are financially compensated (and perhaps also as professional drivers use employer-owned vehicles). We also found that bus company managements' focus on their drivers' seat belt use and speed influences bus drivers' attitudes related to paternalism. Thus, we see that bus drivers who experience tighter follow up of their driving accept more paternalistic measures.

4.3. Traffic safety attitudes/values and safety outcomes

The third aim of the study was to examine the relationship between attitudes and safety outcomes, specified as risky driver behaviour and accident involvement. First, we saw that female drivers and older drivers are less involved in risky driver behaviours. This result is in line with previous research (Parker et al., 1998). The regression analyses also indicate that car drivers' with higher levels of education are less involved in risky drivers behaviours, in accordance with Sucha et al. (2014).

Second, drivers who value freedom to take risk in traffic report that they take more risk in traffic than those who do not. The relationship between values/attitudes focusing on freedom to take risk and road safety behaviour is in line with previous studies indicating that values and attitudes may comprise an important element of RSC, and that they influence road safety behaviours (cf. Gehlert et al., 2014; Kaçan et al., 2019; Ajzen, 1991).

Third, our regression analyses indicate that national RSC measured as descriptive norms is the variable which has the strongest influence on respondents' road safety behaviour. Descriptive norms are defined as shared expectations to other drivers in your country (Nævestad et al., 2019a). The observed relationship indicates that the road safety behaviours of the respondents are closely related to the behaviours that they attribute to other drivers in their respective countries: the more violations the drivers attribute to other drivers in their country, the more violations they report to commit themselves. We have previously hypothesized, based on Cialdini et al. (1990) that the mechanisms between national RSC and road safety behaviour is drivers' perception of what is "normal" and expected from drivers within their country, generating a mild social pressure to behave in certain ways (Nævestad et al., 2019a).

Fourth, our analyses also indicate, in line with previous research, that work-related variables influence the road safety behaviour of bus drivers. Management focus on bus drivers seat belt use and speed contributes negatively to bus drivers' risky behaviors (cf. Nævestad et al., 2020a). Additionally, results indicate that bus drivers' experience work pressure and stress take more risks while driving (cf. Davey et al., 2006; Öz et al., 2013).

We also examined variables influencing drivers' accident involvement. The most important result here is that we found that road safety behaviours is significantly related to drivers' accident involvement. This result is in line with previous research (De Winter & Dodou, 2010; Warner et al., 2011).

In Fig. 4.1 we provide a conceptual model of the most important relationships identified in regression analyses of variables influencing freedom to take risk, paternalism, road safety behaviours and accident involvement.

The model provides a conceptual overview of the studied variables, based on separate multivariate regression analyses. We have not conducted analyses where we test the whole model.

4.3.1. Why do we not see a relationship between paternalism and road safety behaviours?

As paternalistic attitudes involve low acceptance of risk, and intuitively the opposite of attitudes focusing on freedom to take risk, we would expect the variable paternalistic attitudes to be related to less risky road safety behaviours. The regression analyses do, however, not indicate a significant relationship between paternalism and road safety behaviours. Although this may seem counter-intuitive, we can turn to Ajzen (2012) to explain this. Ajzen (2012) asserts that there is a well-established relationship between attitudes and behaviour, but he also underlines that the strength of this relationship is contingent on the specificity of the attitudes. To be strongly correlated with a behaviour, the attitudes must concern that behaviour. General attitudes are likely to be correlated with several types of behaviour, but have a lower predictive value, while specific attitudes only are related to some behaviours, but they have a high predictive power on these behaviours. Ajzen (2012) refer to this as the bandwidth-specificity tradeoff.

If we look again at the paternalistic attitudes and the freedom to take risk attitudes, the paternalistic attitudes are related to our perceptions of national authorities' road safety measures and not road safety behaviours. The freedom to take risk attitudes are on the other hand related to risk taking behavior in traffic, and thus we may expect a relationship with road safety behaviours. Based on this, we could hypothesize that the paternalism attitudes would predict respondents' (positive) attitudes to specific road safety measures. We have, however, not included this in the present study.

4.3.2. How can we explain the "Greek paradox"?

The discussion above may help us explain what we have referred to as the Greek paradox of holding both paternalistic attitudes and freedom to take risk attitudes at the same time. This is not necessarily a contradiction, as the attitudes are directed to different analytical levels: paternalistic attitudes refer to the authority level (i.e. policy), while the freedom to take risk attitudes refer to the individual road user level (behaviour). Moreover, based on our regression analyses, we may suggest that Greek drivers' high focus on paternalism, despite the lower level of road safety in their country compared to Norway and Israel, reflects Greek respondents' perceived lower level of authority focus on road safety and lower perceived police enforcement of traffic rules. In the qualitative interviews reported in Nævestad et al. (2019a), Greek drivers called for more and better policy controls, better infrastructure, etc. Thus, the paternalism attitudes that we have measured in the Greek sample do not necessarily (only) measure underlying RSC values, but rather a perceived need for more authority focus on traffic safety, more enforcement and more national road safety measures. The point of departure for the present study was that drivers in the three studied countries have different points of departure when it comes to their national authorities' focus on traffic safety. It seems that this is reflected in the different scores on the paternalism index, and not (just) underlying values. Finally, it should be mentioned that the road safety level in Greece improved substantially in the last decade: between 2010 and 2019 the number of annual road fatalities fell by 45%. Thus, although the road safety level in Greece still is lower than in the two other studied countries, it has gone through substantial improvements. The cultural preconditions for and potential changes related to this is an important issue for future research.

4.4. Methodological limitations

4.4.1. Representative national samples?

When concluding about the existence of different national RSC values and attitudes based on the present study, it is important to

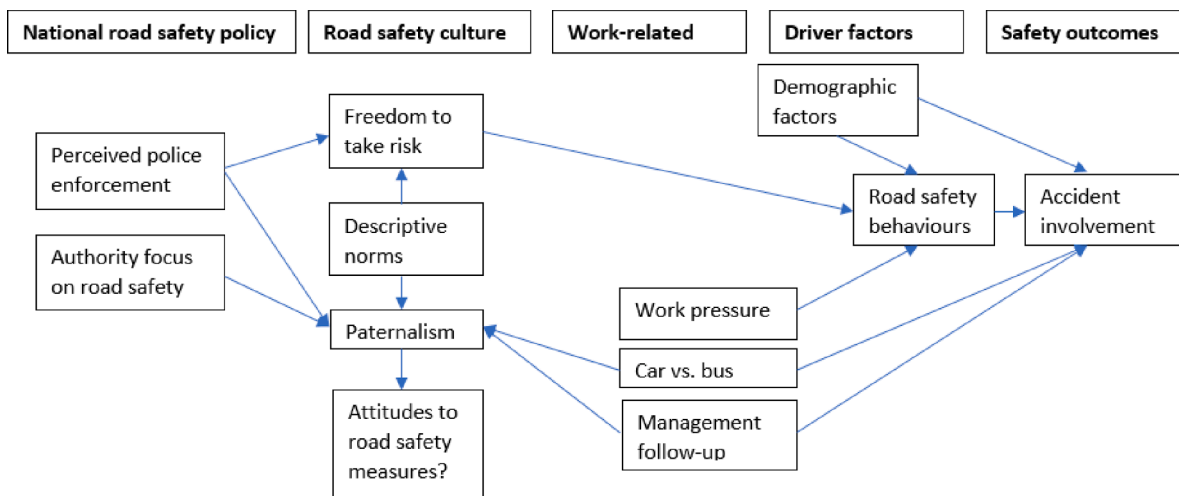


Fig. 4.1. Conceptual model of the most important relationships identified in regression analyses of variables influencing freedom to take risk, paternalism, road safety behaviours and accident involvement.

remember that the national samples are not entirely representative. We compared the demographic characteristics of the car drivers with aggregated data for car license holders in Norway and Greece, and found that women are under-represented in the Norwegian sample and that the proportions of car drivers of 55 years and older are under-represented in both the national samples, but especially in Greece (Nævestad et al., 2019a). We also found that the Israeli sample have higher proportions of older drivers than the other samples. Results also indicated that the level of education was higher in the Norwegian and Israeli sample of car drivers, but comparable objective data on this are lacking. Despite the fact that the samples of car drivers probably are not entirely representative, we nevertheless suggest that we can draw conclusions about the existence of different national road safety cultures for two main reasons. First, we can use bus drivers as a reference group, which we can assume is representative, because they generally have the same gender, relatively similar age, and probably also the same level of education. Second, when controlling for control variables like place of living, gender, sex, age, and education in the regression analyses, we still see significant differences between the groups on key variables

4.4.2. 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 this.

4.4.3. The study is cross sectional

This is a cross sectional study, and it is therefore difficult to conclude about what comes first of road safety policies and RSC values. We expand more on this below.

4.5. Questions for future research

4.5.1. The relationship between road safety policies and values

More research is needed to conclude what comes first e.g. whether existing paternalistic values in the population is a precondition of paternalistic road safety measures, or whether the introduction of paternalistic road safety measures lead to more paternalistic attitudes in the population. We might say the same about the hypothesized relationship between the value of freedom to take risk in traffic and risky behaviour in traffic: we do not know whether values precede risky behaviour, or whether it is the other way around. Other research designs are needed to examine this. Based on previous studies about the relationship between formal road safety policies and RSC (e.g. Nævestad & Hesjevoll, 2021), we may, however, assume that the influencing relationships go both ways, e.g. safety measures may both be a precondition of values and influence values related to paternalism. Additionally, values related to freedom to take risk may also follow from risky behaviour in traffic, to justify and legitimize risky behaviours. These are interesting questions for future research, and they are important for road safety, as paternalistic road safety attitudes to some extent is a precondition of introduction of paternalistic measures, which might increase the level of road safety.

4.5.2. External versus internal motivation for road safety behaviours

One of the main topics in the present paper has been that national road safety policies regulating individual freedom to take risk influence national values, attitudes norms, and subsequently road safety behaviours in three countries. It should be noted that the behavioural model that is applied in the present paper is a model of road safety culture, which largely assumes an internal motivation for road safety behaviours (i.e. "norm-based-behaviour"). Road safety behaviours may, however, be motivated by both internal and external factors. The former is referred to as internalization, the latter as compliance (Naveh & Katz-Navon, 2015). Internalized values and norms represent internal motivation for road safety behaviours. Internalization, provides an example of an "internally driven" normative influence on behaviour. This occurs when people behave according to a norm "because the content of the induced behavior—the ideas and actions of which it is composed—is intrinsically rewarding". In this case, individuals adopt an induced behaviour as they find it to be "congruent with their value system", and as "they truly believe in its merit (Naveh & Katz-Navon, 2015).

Road safety behaviour that is influenced by external motivation, on the other hand, can be labelled compliance ("rational-calculative-behaviour"). This may be motivated by fear of social sanctions, or other types of sanctions, e.g. related to authorities' enforcement activities. This is a perspective which is under focused in the present study, as it takes a cultural perspective on behaviour, assuming that people behave according to internalized social norms. It may, however, be argued that drivers' knowledge about traffic rules, fines and the level of enforcement are just as important motivators of road safety behaviours. According to this perspective, drivers are not necessarily avoiding risky behaviour because of internalized values, but because they fear punishment. This is a perspective which is provided in Alonso et al. (2015), who assert that the exertion of an effective prevention of traffic accidents use to be preceded by, for instance, a proper knowledge of the traffic rules among road users, a sufficient police supervision, sanctions and justice in the field of road safety. In accordance with this, Alonso et al. (2017) state that although internalization should be the ultimate aim of road safety measures, sanctions are necessary for drivers to perceive the potential consequences of their road misbehaviors, and thus prevent different the occurrence or reoccurrence of different risky behaviors.

This reminds us that enforcement and punishment also are crucial aspects of road safety policies, which might be downplayed by a road safety culture perspective focusing on internalized values and norms providing internal motivation for behaviour. On the other hand, results from our regression analyses indicate that drivers' perceived enforcement influence their attitudes/values and not their road safety behaviour. Based on the discussion above, it is fair to assume that drivers' behaviour are motivated by both norms and rational calculations (i.e. the "chance of being caught"). The balance between internal and external motivation for behaviours is

therefore an important issue for future research.

4.6. Policy implications

4.6.1. Road safety policies should focus on both internal and external motivation

Our results are in accordance with the cultural approach applied in the study: respondents' road safety behaviours are related to their internalized values and (descriptive) norms. Respondents are influenced by their internal motivation, provided by cultural values and norms. Given that authorities' resources for surveillance and sanctions are limited, road safety measures focusing on internal motivation are necessary, but this will not be sufficient for all drivers. Although our results indicate that road safety policies and enforcement practices may influence norms and values, leading to internalization, drivers are influenced by both external and internal motivation. Additionally, there might also be subcultures motivating risky driving within larger RSCs, illustrating that internal motivation not always induce safe road behaviours. Thus, enforcement is needed to uphold the RSC of the majority, and to deter the minority which does not share the RSC of the majority.

4.6.2. Can we influence RSC values and attitudes?

In this study, we have compared three countries with different road safety records and different regulation of road users' freedom to take risk, indicating that the highest level of regulation is related to the highest level of road safety. This indicates that countries should limit the freedom of road users to improve road safety. Our study suggests, however, that such efforts may be limited by national RSCs, which seem to be different when it comes to their focus on individual freedom and acceptance of paternalistic measures. The next questions for policy makers would then be: 1) Whether freedom to take risk is valued so high in the national RSC that a certain level of killed and severe injured in traffic "must" be accepted according to this value, or 2) whether and how such RSC values can be influenced to allow for more paternalistic measures.

To answer point 1 first, all societies value a certain level of freedom to take risk; the speed of passenger cars is for instance not technologically limited to a certain maximum speed, drivers might choose not to use seat belt if they want to etc. Our research indicates, however, that restrictions of road users' level of freedom to take risk in traffic vary between countries, and that this is a cultural issue.

When it comes to the second question, previous research indicates that changing RSC values may be very challenging. We may use the US case as an example. As mentioned, freedom plays a crucial role in the American culture, and this is coupled to freedom to take risk in traffic (Moeckli & Lee, 2007). In this cultural setting, freedom values are also related to identity, emotions, behaviours, and presumably also resistance against state interventions and paternalistic measures limiting the freedom to take risk (cf. the US example of mandatory seat belt laws as a "violation of human rights")⁴. This taken-for-granted and implicit character of values, and the relationships with emotions and identity illustrate the pervasiveness of RSC values, and how difficult it may be to change them.

On the other hand, we have examples of national RSC values that have been changed or influenced. The Norwegian RSC values that we examine in the present study, which are related to the highest road safety levels in the world, are to some extent a result of cultural engineering, starting when the Norwegian parliament adopted Vision Zero in 2002. This new way of thinking was based on the moral conviction that "It is morally and ethically unacceptable that people are killed or severely injured in traffic accidents". This gave rise to road safety policies which contributed to making Norway a world leader in road safety (cf. Elvik, 2021). While road fatalities from 2000 to 2020 were reduced by 71% in Norway, the traffic volume increased by 35% in the same period. Vision Zero is of course not the only cause of this reduction in fatalities.

In accordance with the assumption that RSC values are influenced by road safety policies, results from the regression analyses indicate that RSC values among the respondents are influenced by police enforcement and authority focus on road safety. It may as mentioned be difficult to establish cause and effect. First, we may assume that national authorities introduce more intrusive road safety measures and more enforcement, as the population expects it, due to its paternalistic values ("RSC is a precondition for measures"). Second, we may assume that people who are subject to paternalistic measures start to value freedom to take risk lower, due to the cognitive dissonance mechanism, as their personal values are influenced by official values etc. ("RSC is a result of measures"). We may conclude that both mechanisms probably are relevant. However, turning again to Vision Zero in Norway, this was considered a radical innovation in its early days, involving a breach with the current mindset. This indicates the importance of the second mechanism: policies may change values.

4.6.3. Potential for paternalistic measures among drivers at work

Our study indicates that professional drivers and employees who drive in their work accept more paternalistic measures because of their employment relationship. Previous research indicates, however, that companies with employees driving in their work generally have few systematic organisational measures in place, aiming to increase the road safety of their employees (Nævestad et al., 2020a). Thus it seems that there is a potential for more paternalistic measures among drivers at work. This is likely to increase road safety, given the effectiveness of such measures and their current low prevalence. Taking these issues into consideration, Nævestad et al. (2018) estimate that between 7 and 56 killed and severe injuries could have been avoided with increased measures focusing on organisational safety management and safety culture in heavy goods vehicle companies in Norway in the period 2007–2016.

⁴ <https://www.history.com/news/seat-belt-laws-resistance>

4.6.4. Is the road a private sphere or a public sphere?

Elvebakk (2015) notes that the question of whether the road system is a place for exercising personal freedom to take risk is contingent on whether we conceive of it as a public or a private sphere. As Elvebakk writes:

"The conflict is fundamentally about what kind of sphere road traffic is, and what roles citizens enter into when entering the road system. Are we in the sphere of the private, or in the sphere of the public? Are we free individuals choosing our own actions, or social actors submitting to the rules of a system?" (Elvebakk, 2015: 303).

Based on this, proponents of Vision Zero have emphasized the importance of introducing more restrictive measures (alcohol interlocks and ISA) in cars that are government owned, or in professional traffic. In this way, parts of the car fleet in a country can be defined as more public and less private. This is also a discussion with interesting policy implications. Increased implementation of autonomous cars and connected roads may also involve changes in the way we perceive the road system: as private or public. This is an important issue for future research, as these cultural values are strongly related to road safety.

5. Conclusion

Our results indicate that values make up a central element of national RSC, which is shared among different types of road users (i.e. bus and car drivers) in the studied countries. We have also seen that values are related to drivers' expectations to other drivers in their country and the drivers' own road safety behaviour, which in turn predicts their accident involvement. The Greek drivers value freedom to take risk in traffic higher than drivers from Norway and Israel, they expect higher levels of risk taking from other drivers in their country, they report higher levels of road safety behaviours themselves, and they are more often involved in accidents than drivers from the two other countries. Thus, it seems that values related to risky driving legitimizes and motivates the higher levels of risk taking among drivers in the Greek sample. We have also discussed how and whether such values can be influenced to increase road safety.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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