

# Fatalistic Beliefs, Invulnerability to Danger, Risk Perception and Risk-Taking among Cameroonian Motorcycle Taxi Drivers

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## Abstract

Driving condition is an extraordinary context which requires the driver to make appropriate decisions in order to be able to overcome and protect others. This study aimed to explore relationship between the feeling of invulnerability, fatalistic beliefs, risk perception and road risk-taking among Cameroonian motorcycle taxi drivers. One hundred and seventeen men Cameroonian motorcycle taxi drivers aged 18 to 50, from three associations of motorcycle taxi drivers in the city of Yaoundé took part in this study. Data was collected through scales of fatalism, Invulnerability to Danger, Risk Perception and Protective Motivation Questionnaire. According to hypothesis, results showed predetermination (H1), perception of the accident and perception of the penalty (H2) and feeling of invulnerability to danger (H3) is associated with the motivation to protect oneself against traffic accidents among Cameroonian motorcycle taxi drivers. The road risk-taking is linked to the cognitive processes involved in the situation. Those processes must be taken into account when developing prevention messages for motorcycle taxi drivers.

## Keywords

Protective Motivation Theory, Feelings of Invulnerability, Fatalism, Risk Perception, Road Risk-Taking

## 1. Introduction

Road risk-taking is a concept which is increasing in social and scientific relevance. On the social level, it highlights behaviors that most often lead to traffic accidents, considered as one of the leading causes of death in the world (WHO, 2015). Scientifically, the concept has found fertile ground in social psychology

and is increasingly the subject of several major publications (Ngah Essomba, 2017). Road risk-taking is a driving situation where individual opts for behavior which increases probability of an accident or behavior which would increase the severity of that potential accident (Giscard, 1967). This is the case, for example when a motorcycle driver rides at a prohibited speed and/or does not wear a protective helmet. It is therefore very often a voluntary behavior with a fatal outcome and which is not imposed by work or existence conditions, but actively sought to experience strong sensations, play with danger and often with death (Adès et al., 1994; Mvessomba et al., 2017). Risk-taking concerns all road users, in particular, vulnerable road users. The latter (pedestrians, cyclists and motorcyclists) refer to those who lack external protection and therefore constitute almost half of individuals killed in road accidents (WHO, 2015). Motorcyclists, especially motorcycle taxi drivers targeted by this study, take risks when they do not wear helmets, do not respect speed limits, slalom between cars, do not respect traffic lights, transport more than one person on the motorcycle at the same time, etc.

Several models of both a theoretical and operative nature are generally used to study road risk-taking: Theory of Planned Behavior, Health Belief Model, Protective Motivation Theory (PMT), etc. (Ajzen, 1991; Lapsley, 2003; Rogers, 1983; Mvessomba et al., 2017; Ngah Essomba et al., 2022a). Those models have advantage of highlighting the psychological mechanisms directly responsible for risky behaviors. The model of motivation for protection tends to be the richest and most used in the Cameroonian context (Mvessomba, 2016; Mvessomba et al., 2017; Ngah Essomba et al., 2022a). That model has the particularity of judiciously exploiting the two main reference theories which preceded it: Theory of Planned Behavior and Health Belief Model (Mvessomba, 2016). The PMT is based on an emotional basis, which is the fear generated by educational information to stimulate adoption of safe behaviors on the road. In that context, messages must arouse fear among road users with the aim of adopting protective behaviors. It shows the degree of motivation to protect oneself results from two parallel cognitive processes in response to a health threat: assessment of the threat and evaluation of measures to deal with it (Rogers, 1983). Those two processes are primarily used to predict behavioral intentions.

The behavioural intent which leads to the adoption of safe behaviour on the road is underpinned by several other variables: perceived vulnerability, perceived severity, recommendation effectiveness, self-efficacy, perceived benefit, perceived cost, attitude, past behaviour (Donovan et al., 1995; Ngah Essomba et al., 2022a; Rogers, 1983). Several studies have shown how those variables are associated with risk-taking or safe behaviors. In this case, Hoog et al. (2007) showed that perceived vulnerability was a predictor of security behavior. However, young drivers consider themselves less vulnerable to an accident than their peers (Finn & Bragg, 1986). Lewis et al. (2008) showed response efficiency is a key cognitive factor that influences the effectiveness of emotion-based calls. The same is true for perceived gravity. Hoog et al. (2007) uncovered when perceived severity is

high, adaptation response information is processed deeply rather than superficially. [Donovan et al. \(1995\)](#) have shown the model is successful if benefits which individuals derive from complying with the recommendation are taken into account. For [Rogers \(1983\)](#) and [Cismaru et al. \(2009\)](#), self-efficacy was identified as the most important of all the call to fear components. All of those cognitive mechanisms allow driver to make a deliberate choice according to a cost-benefit approach. If the individual finds behavior he seeks to adopt will be beneficial for him, he will adopt it, otherwise he will not adopt it. As the driving situation is a complex situation involving various cognitive processes, some may think they are safe from road risks because of their skills or invulnerability feeling or supreme beings who protect them from the risk of a road accident ([Kouabenan, 2012](#); [Ngah Essomba et al., 2022a](#); [Ngah Essomba et al., 2022b](#)).

Beliefs are important elements in decision-making in individuals. To assess the risk, the road user must simultaneously process five records of information, which can lead to the use of beliefs ([Cadet & Kouabenan, 2005](#)). [Ngah Essomba et al. \(2022a\)](#) showed the role of those beliefs on risk-taking among French and Cameroonian road users through PMT. In France, invulnerability predicts attitude for crossing red light, while in Cameroon it is religiosity which predicts attitude. The attitude predicts intention to cross red light in both samples as well as the cost and benefit. Self-efficacy predicts the intention to cross red light in France but not in Cameroon. Cameroonians have a higher feeling of invulnerability than the French; on the other hand, the French have a more favorable attitude to risk-taking than Cameroonians ([Ngah Essomba et al., 2022b](#)). From above studies, it seems the feeling of invulnerability to danger and fatalistic beliefs are strong beliefs among drivers.

The feeling of invulnerability manifested by an individual consists in believing himself protected from negative events or their consequences. In this sense, "People who have not experienced unfortunate life events such as serious illness, accidents, or crime tend to perceive themselves as exceptionally invulnerable, and therefore less vulnerable than others" ([Perloff, 1983: p. 41](#)). The work of [Guppy \(1993\)](#) reveals feeling of invulnerability to danger leads people to focus on their own abilities and overestimate their control behavior while trivializing risk factors such as poor visibility, heavy drinking. Indeed, drivers who feel invulnerable take more risks by driving under the influence of alcohol ([Machin & Sankey, 2008](#); [Ravert et al., 2009](#)). Thus, there is every reason to believe the feeling of invulnerability to danger is assimilated to a belief of supernatural protection in which individual perceives himself as immune to danger, even indestructible. So, it seems closely related to fatalistic beliefs.

Fatalism is a trait formed by fatalistic beliefs which are characterized by a type of information processing denying personal control and belief death is inevitable in case of serious danger ([Powe et al., 2005](#)). Fatalistic beliefs highlight notions of fate, destiny, and predestination of an unfortunate problem or event ([Cohen & Nisbett, 1998](#); [Davison et al., 1992](#); [Straughan & Seow, 1998](#)) and perceptions of helplessness, despair, and insignificance due to expectations of negative con-

sequences (Scheier & Bridges, 1995; Powe & Johnson, 1995). Such beliefs can influence risk-taking and cause the individual to make no effort to respect road rules, that is, he will not be motivated to protect himself (Rudmo & Hale, 2003). Motorists with high degree of those beliefs easily attribute accidents to factors beyond their control (infrastructure, others, exits) and consider factors involving their responsibility or initiatives to be less important (Kouabenan, 1998). In some ways, however those beliefs appear to promote “the intention to engage in protective behaviours in adolescents” (Ngueutsa, 2012: p. 87). But the majority of research argues there is a positive correlation between fatalistic beliefs and accident experience (Kouabenan, 1998; Mvessomba et al., 2017). Peltzer and Renner (2003) found being the victim of accidents revives fatalism and leads to the belief accidents are inevitable and that it is useless to take precautions. In general, it seems the feeling of invulnerability to danger and fatalism leads individuals to perceive themselves as being immune to certain events or their consequences, that is to say, alters their risk perception.

Risk perception is a subjective activity because it involves consciousness (Assailly, 2010). A risk may seem high for one individual and lower for another. Some social psychology researchers establish a positive correlation between risk perception and the adoption of preventive measures (Assailly, 2010; Lapsley, 2003; Kouabenan, 2007) while other researchers show this relationship is not always obvious and may even be negative especially in individuals who seek risk like sensation seekers (Arnett, 1992; Zuckerman, 1974). The population of motorized two-wheeler drivers is largely made up of young people under the age of 30 (Carré & Filou, 1994), who do not have the same perception of risk as adults (Kouabenan, 2007). For example, young drivers tend to overestimate their ability to avoid accidents (Matthews & Moran, 1986). They value risk-taking and overestimate their driving skills (Delhomme et al., 2009), their skills in dealing with critical situations and underestimate the dangerousness of situations (Têtard, 1994). Studies of experienced and non-experienced motorized two-wheeler drivers show differences in their perceptual skills (Lin, 1998). However, drivers who have a low risk perception of a traffic accident report being highly effective in dealing with the risk (Machin & Sankey, 2008).

### Overview of the Current Study

Feelings of invulnerability, fatalistic beliefs and risk perception are prominent mechanisms in driving activity and relevant factors in road risk-taking. They have already been explored in various studies on road risk-taking (Ravert et al., 2009; Machin & Sankey, 2008; Peltzer & Renner, 2003). But, none of those studies deal at the same time with those three mechanisms, even though the driving situation due to its complexity is likely to engage those three mechanisms simultaneously (Cadet & Kouabenan, 2005). Moreover, no study on those cognitive mechanisms and road risk-taking has yet been conducted among Cameroonian motorcycle taxi drivers. While in Cameroon, human factor is responsible for more than 75% of personal injury accidents and road accidents are the second

leading cause of death (WHO, 2015; ONISR, 2017). Also, in Cameroon, beliefs in supreme beings occupy a central place in the lives of some individuals, to the point where some believers believe it is necessary to have one's motorcycle blessed or to make prayers or to do rituals recommended to avoid road accidents (Fouellefack Kana, 2005). In addition, the regulation around the activity of motorcycle taxi (urban transport using motorcycles) is still at an embryonic stage, giving free rein to several risky behaviors. The only studies which try to focus on that category are those of Ngah Essomba et al. (2022a, 2022b). But, they did not investigate those three cognitive mechanisms simultaneously, compared French and Cameroonian samples, and was about overall vulnerable road users, not only motorcycle taxi drivers.

The current study aimed to fill those gaps by exploring relationship between the feeling of invulnerability, fatalistic beliefs, risk perception and road risk-taking among Cameroonian motorcycle taxi drivers. Road risk-taking has been captured through the Protective Motivation Theory. We have formulated three main hypotheses: fatalistic beliefs are associated with the motivation to protect against traffic accidents among Cameroonian motorcycle taxi drivers (H1); risk perception is associated with the motivation to protect against traffic accidents among Cameroonian motorcycle taxi (H2) drivers; and invulnerability to danger is associated with motivation to protect against traffic accidents among Cameroonian motorcycle taxi (H3) drivers.

## 2. Method

### 2.1. Participants and Procedure

Our sample consisted of 117 men Cameroonian motorcycle taxi drivers aged 18 to 50 ( $M = 29.23$ ;  $SD = 6.45$ ). They were recruited using technique of sampling by convenience within associations of motorcycle taxi drivers of the city of Yaoundé. That technique is a non-probabilistic one which allows researcher to undertake research with participants who are generality available and accept to. Participants had work experience ranging from 1 to 30 years ( $M = 4.96$ ;  $SD = 4.35$ ). Among them, 29.9% have already been victims of traffic accidents, 70.1% have not yet been and 94.6% are believers. Three motorcycle taxi drivers' associations agreed to participate in the study. Participants were surveyed in their respective meeting rooms. Once the agreement of leaders of the different groups was obtained, researcher set with them a day for the collection of the data. During data collection, potential participants were previously informed verbally of the goal of the study, and the confidential and voluntary nature of their participation. Those who agreed to participate completed the questionnaire and gave it back to the researcher.

### 2.2. Instruments

#### 2.2.1. Fatalism Scale (Shen et al., 2009)

The fatalism scale assesses the degree of fatalistic belief. It is made up of 20 items

divided into three dimensions: predetermination (e.g., “My health is determined by fate”), luck (e.g., “I will get coronavirus if I am unlucky”) and pessimism (e.g., “I will suffer a lot from bad health”). For each item, participants were invited to position themselves on a five-point Likert-type response system ranging from strongly disagree (1) to strongly agree (5). Analysis of the internal consistency index ( $\alpha$ ) showed values oscillate between acceptable and good: (global fatalism  $\alpha = .69$ ; predetermination  $\alpha = .72$ ; luck  $\alpha = .71$ ; pessimism  $\alpha = .69$ ).

### **2.2.2. Scale of Invulnerability to Danger ([EID] Ngah Essomba, 2017)**

The EID captures feeling of invulnerability to danger as a one-dimensional construct. It is composed of 12 items (e.g., “Nothing can hurt me”). For each item, participants were invited to position themselves on a five-point Likert-type response system ranging from strongly disagree (1) to strongly agree (5). Analysis of the internal consistency index ( $\alpha$ ) showed good value:  $\alpha = .78$ .

### **2.2.3. Risk Perception Scale (Slovic et al., 1986)**

The risk perception scale measures probability of being affected by an event. Two events were taken into account: the accident and the penalty. For those two dimensions, the scale had a total of 8 items (e.g., “how likely you will have an accident/you will be punished if you drive drunk”). For each item, participants were invited to position themselves on a five-point Likert-type response system ranging from very low probability (1) to very high probability (5). Analysis of the internal consistency index ( $\alpha$ ) showed values were good: perception of the accident  $\alpha = .79$ ; perception of the penalty  $\alpha = .72$ .

### **2.2.4. Protective Motivation Questionnaire (Rogers, 1983; Ngah Essomba 2017)**

The questionnaire based on PMT made it possible to measure road risk-taking through 46 items organized in nine dimensions: Intention (e.g., “over the next 12 months, during my motorcycle trips, it is possible that I violate the speed limit”), Perceived Vulnerability (e.g., “if I make a dangerous overtaking, I will probably be very seriously weakened”) Perceived Severity (e.g., “if I have an accident, I will probably be the victim of serious injuries”); Effectiveness of the Recommendation (e.g., “if I always respect the rules of the road, I will not have an accident”), self-efficacy (e.g., “I am able to never violate the speed limit”), Perceived Benefit (e.g., “running a red light saves time”), Perceived Cost (e.g., “compliance with the instructions on the road makes me waste time”), Attitude (e.g., “for you, making dangerous trips is”), Past Behavior (e.g., “during the past 12 months, during my motorcycle trips, I transgressed the speed limit”). For each item, participants were invited to position themselves on a five-point Likert-type response design ranging from strongly disagree/good/serious/not exciting (1) to strongly agree/good/not serious/exciting (5). Analysis of the internal consistency index ( $\alpha$ ) showed values oscillate between acceptable and good: intention  $\alpha = .65$ ; perceived vulnerability  $\alpha = .70$ ; perceived severity  $\alpha = .74$ ; effectiveness of recommendation  $\alpha = .69$ ; self-efficacy  $\alpha = .77$ ; perceived profit  $\alpha$

= .79; perceived cost  $\alpha = .71$ ; attitude  $\alpha = .76$ ; past behavior  $\alpha = .66$ .

### 2.3. Data Analysis

The data collected was processed from correlation and regression analyses on SPSS version 23 software. We undertook a correlation analysis between different variables of the study. It allowed us to test whether our different variables are related through the estimation of the Pearson coefficient ( $r$ ). That analysis is a preliminary condition for regressions analysis. The regression analysis revealed the amount of variance with which each of the cognitive mechanisms (fatalistic beliefs, sense of invulnerability, and perception of risk) related to the motivation for protection predicts the latter.

### 3. Results

**Table 1** presents the results of correlations between certain beliefs and motivation to protect oneself. Overall, it is observed that drivers who feel that the probability of having an accident on the road are perceived as vulnerable on the road ( $r(117) = .22, p < .05$ ). The latter also consider that the consequences of a road accident will be serious ( $r(117) = .22, p < .05$ ). Similarly, those who feel that the probability of having a penalty on the road for misconduct is high feel vulnerable on the road ( $r(117) = .19, p < .05$ ); consider that the requirement of compliance with the highway code is effective ( $r(117) = .34, p < .01$ ); feel self-effective in complying with the rules of the road ( $r(117) = .29, p < .01$ ). Subsequently, drivers who feel invulnerable to danger consider that the recommendation to comply with safety instructions on the road is not effective ( $r(117) = -.22, p < .05$ ), do not feel able to comply with the recommendation on compliance with the highway code ( $r(117) = -.18, p < .05$ ), consider that the recommendation on compliance with the highway code is costly for them ( $r(117) = .19, p < .05$ ), is not beneficial ( $r(117) = .24, p < .01$ ) and, have an unfavorable attitude towards compliance with the recommendation on compliance with the highway code ( $r(117) = .33, p < .01$ ). On the other hand, drivers who feel that if someone is supposed to have an accident, regardless of the precautions they take, they will always end up having it perceive the outcome of an accident as serious ( $r(117) = .27, p < .01$ ) and that the recommendation on compliance with the rules of the road will be beneficial for them ( $r(117) = .19, p < .05$ ). In sum, these statistics reveal that certain beliefs are associated with road risk-taking behaviors. Regression analyses will allow a more detailed examination of the predictive effects of each variable.

**Table 2** presents all relevant predictors of motivation to protect oneself by motorcycle taxi drivers. Overall, fatalistic beliefs explain the motivation to protect oneself on the road ( $\beta = .175, t(115) = 2.613, p = .010, F(2, 115) = 6.826, p = .010$ ). More specifically, it is observed at the level of the invulnerability dimension to danger that participants who think they are invulnerable to the danger tend to consider that the recommendation on compliance with the effective



**Table 1.** Mean, standard deviation and correlation between variables.

	M	ET	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1-MeanPercepaccident	3.17	1.05	1													
2-MeanPercepsanction	2.66	1.03	.13	1												
3-MeanVulperçu	3.66	.74	.22*	.19*	1											
4-MeanGravperçu	3.88	.77	.22*	.17	.46**	1										
5-MeanEfficac	3.51	1.11	.01	.34**	.36**	.42**	1									
6-MeanAutoEff	3.05	1.11	-.03	.29**	.17	.12	.27**	1								
7-MeanCost	2.96	1.03	-.07	-.12	-.15	-.08	.18*	.08	1							
8-MeanBenef	2.95	1.07	-.11	-.01	-.17	-.09	.17	.21*	.80**	1						
9-MeanAttitud	2.76	1.17	-.12	.02	-.04	-.05	.18*	.16	.67**	.564**	1					
10-MeanCompPassé	3.21	1.04	-.01	-.20*	-.15	-.02	.01	-.34**	.23**	.22*	.08	1				
11-MeanInvulDanger	2.12	.81	-.11	.25**	-.06	-.04	.22*	.18*	.19*	.24**	.33**	-.13	1			
12-MeanPRETERD	2.98	1.06	.22*	-.03	-.10	.27**	-.12	.05	-.13	-.19*	-.15	-.17	.11	1		
13-MeanPess	2.46	.83	.06	-.01	-.15	.07	-.01	-.09	.11	.01	.11	-.13	.06	.31	1	
14-MeanChanc	2.08	1.09	.22	-.03	-.10	.07	-.13	.04	-.11	-.12	-.13	-.13	.09	.08	.06	1

Note. MeanPercepaccident: Mean perception of accident; MeanPercepsanction: Mean perception of sanction; MeanVulperçu: Mean perceived vulnerability; MeanGravperçu: Mean perceived gravity; MeanEfficac: Mean efficacy of recommendation; MeanAutoEff: Mean auto efficacy; MeanCost: Mean cost; MeanBenef: Mean benefice; MeanAttitud: Mean attitude; MeanCompPass: Mean pass behavior; MeanInvulDanger: Mean danger of invulnerability; MeanPRETERD: Mean predetermination; MeanPess: Mo Mean pessimism.

**Table 2.** Linear Regression between Protective Motivation dimensions and invulnerability to danger, predetermination, perception of accident and perception of penalty.

Prédicteur	DV	Beta	T	Sig	Adjusted R <sup>2</sup>	F	Sig
InvulDanger	Eff	.175	-2.613	.010	.026	6.826	.010
	Auto	.182	-1.984	.050	.025	3.936	.000
	Cost	.206	-3.099	.002	.038	.606	.002
	Benef	.243	2.681	.000	.051	7.190	.008
	Att	.205	-3.078	.002	.037	9.472	.002
Predetermination	Grav	.271	3.019	.000	.065	9.116	.003
	Benef	-.194	-2.120	.000	.029	4.494	.003
PercepAcci	Vul	.221	2.434	.000	.041	5.922	.016
	Grav	.225	-2.478	.000	.042	6.140	.015
PercepPenal	Vul	.191	2.082	.000	.028	4.334	.040
	Eff	.342	3.899	.000	.037	9.472	.002
	Auto	.292	3.280	.000	.109	10.757	.001
	PassedBeh	-.167	-1.765	.000	.060	8.439	.000

Note. Eff: Efficacy of recommendation; Auto: Self efficacy; Cost: Cost of recommendation; Vul: perceived of vulnerability; Grav: perceived of gravity.



highway code ( $\beta = .175$ ,  $t(115) = 2.613$ ,  $p = .010$ ,  $F(2, 115) = 6.826$ ,  $p = .010$ ); nevertheless feel able to comply with the recommendation on compliance with the highway code ( $\beta = .182$ ,  $t(115) = 1.984$ ,  $p = .050$ ,  $F(2, 115) = 3.936$ ,  $p = .000$ ); consider that the cost of the recommendation on compliance with the highway code is high ( $\beta = .206$ ,  $t(115) = 3.099$ ,  $p = .002$ ,  $F(2, 115) = .606$ ,  $p = .002$ ); whereas the recommendation on compliance with the highway code is beneficial ( $\beta = .243$ ,  $t(115) = -2.681$ ,  $p = .000$ ,  $F(2, 115) = 7.190$ ,  $p = .008$ ); and have a favourable attitude towards the recommendation on compliance with the highway code ( $\beta = .205$ ,  $t(115) = 3.078$ ,  $p = .002$ ,  $F(2, 115) = 9.472$ ,  $p = .002$ ). On the other hand, in relation to the predetermination dimension, motorcycle taxi drivers who have the belief that if an individual was predestined to be the victim of an accident, regardless of the measures, he will be the victim of that accident tend to believe that the occurrence of an accident on the road will have serious consequences ( $\beta = .238$ ,  $t(115) = 3.609$ ,  $p = .000$ ,  $F(2, 115) = 4.309$ ,  $p = .039$ ). However, they do not feel able to comply with the recommendation on compliance with the highway code ( $\beta = -.182$ ,  $t(115) = -1.984$ ,  $p = .000$ ,  $F(2, 115) = 3.936$ ,  $p = .050$ ). With regard to the perceived dimension of accident risk, participants who perceive their driving on the road as likely to produce an accident, consider themselves vulnerable on the road ( $\beta = .221$ ,  $t(115) = 2.434$ ,  $p = .000$ ,  $F(2, 115) = 5.922$ ,  $p = .000$ ) and tend to consider that the occurrence of an accident on the road will have serious consequences ( $\beta = .225$ ,  $t(115) = 2.478$ ,  $p = .000$ ,  $F(2, 115) = 6.140$ ,  $p = .015$ ). Finally, in relation to the risk perception dimension of the penalty, participants who perceive their driving on the road as likely to be sanctioned consider themselves vulnerable on the road ( $\beta = .191$ ,  $t(115) = 2.082$ ,  $p = .000$ ,  $F(2, 115) = 4.334$ ,  $p = .040$ ); consider the traffic recommendation to be effective ( $\beta = .342$ ,  $t(115) = 3.899$ ,  $p = .000$ ,  $F(2, 115) = 9.472$ ,  $p = .002$ ) and feel able to comply with the recommendation on compliance with the highway code ( $\beta = .292$ ,  $t(115) = 3.280$ ,  $p = .000$ ,  $F(2, 217) = 10.757$ ,  $p = .001$ ). On the other hand, they have exhibited such behavior before ( $\beta = .292$ ,  $t(115) = 3.280$ ,  $p = .000$ ,  $F(2, 217) = 10.757$ ,  $p = .001$ ).

#### 4. Discussion

The objective of this research was to study the relationship between beliefs, risk perception and risk-taking among Cameroonian motorcycle taxi drivers. Three main hypotheses led to the achievement of this objective and were all validated. The first stated that fatalistic beliefs are associated with the motivation to protect oneself against traffic accidents among Cameroonian motorcycle taxi drivers. The results showed that predetermination is positively related to perceived severity and negatively related to perceived benefits. The second hypothesis stated that the perception of risk is associated with the motivation to protect against traffic accidents among Cameroonian motorcycle taxi drivers. This main hypothesis had two sub-hypotheses: the first sub-hypothesis argued that the perception of accident risk is associated with the motivation to protect oneself against

traffic accidents among Cameroonian motorcycle taxi drivers. The results show that the perception of accident risk is positively associated with perceived severity and perceived vulnerability. The second sub-hypothesis predicted an association between the perception of the risk of punishment and the motivation to protect against traffic accidents among Cameroonian motorcycle taxi drivers. The results show that the perception of sanction risk is on the one hand positively related to perceived vulnerability, recommendation effectiveness and self-efficacy and, on the other hand, negatively related to past behavior. Finally, the third hypothesis of the study stated that invulnerability to danger is associated with the motivation to protect oneself against traffic accidents among Cameroonian motorcycle taxi drivers. The results also showed that invulnerability to danger is positively associated with five dimensions of motivation for protection: the effectiveness of the recommendation, self-efficacy, the cost of risky behavior, the benefit of risk behavior and attitude towards the recommendation. Thus, the results of this study confirm the sociocognitive point of view of road risk (Kouabenan, 1998; Mvessomba et al., 2017; Ngah Essomba et al., 2022b) according to which cognitive filters, in this case fatalism, risk perception and the feeling of invulnerability at stake in the driving situation, guide the behavior of motorcycle taxi drivers during the performance of their duties.

In this study, fatalistic beliefs had three main characteristics: predetermination, pessimism, and luck (Shen et al., 2009). The results showed that predetermination is the most important dimension to explain the road risk-taking among Cameroonian motorcycle taxi drivers. Indeed, it was the only dimension significantly associated with risk-taking (perceived seriousness of risky behavior and perceived uselessness related to compliance with the rules of the road). While these results support our hypothesis, they partially contradict previous work in that they support a positive relationship between fatalism and safe road behavior (Ngah Essomba et al., 2022a; Rudmo & Hale, 2003). The relationship between predetermination and the perceived severity of risky behavior is rather positive, suggesting that a motorcycle taxi driver, who thinks that the course of life is defined in advance by a supreme being, still finds that non-compliance with the rules of the road can lead to harmful effects. In accordance with the model of motivation for protection (Rogers, 1983) and the work on fatalism (Kouabenan, 1998) which argue that, for the fatalist, personal initiatives have no effect on the occurrence of an accident, one would expect an opposite relationship. Especially since the relationship between predetermination and the perceived benefits relating to compliance with the highway code is negative, that is to say that the Cameroonian driver of motorcycle taxis fatalistic does not find it beneficial to respect the rules of the road. This study shows that these two supposedly contradictory cognitions can simultaneously be at work in the individual. Further work is needed to better examine this aspect.

Risk perception has also proven to be an important cognitive filter to account for road risk-taking—particularly among motorcyclists—in the Cameroonian

context. Consistent with the motivation to protect model (Mvessomba et al., 2017; Rogers, 1983), the results showed that perceptions of accident risk and punishment are accompanied by cognitive processes that inhibit risk-taking. These results are consistent with previous work that has shown that risk perception is a predictor of both the intention to engage in safe behaviors on the road (Harbeck et al., 2015; Hoog et al., 2007) and the adoption of safe behaviors (Savadori & Lauriola, 2021; Tanveer et al., 2021). Perception of accident risk was positively related to the perceived severity of risk behavior and the feeling of being vulnerable on the road. This is in line with the motivation to protect model which holds that when the individual feels vulnerable and perceives the violation of the rules of the road as dangerous, he becomes aware of the risk and takes less risk on the road. The perception of the possibility of having an accident is therefore associated with the process underlying the adoption of preventive measures among Cameroonian motorcycle taxi drivers. This relationship has already been shown in other contexts (Assailly, 2010; Kouabenan, 2007).

The perception of the penalty in case of violation of the Highway Code has shown a bidirectional association with the model of motivation for protection, but consistent with the literature on road risk-taking (Mvessomba, 2016; Mvessomba et al., 2017). Indeed, the results have shown that those who become aware of the sanction in case of violation of the Highway Code feel vulnerable think it is wise to respect the safety instructions, feel able to do so and have done so in the past. The perception of the penalty is therefore linked to safe behavior on the road. It therefore seems that Cameroonian motorcycle taxi drivers have the necessary information to become aware of the threat resulting from non-compliance with the Highway Code and other preventive measures. As a result, they take less risk. Overall, these results on risk perception support the literature on risk-taking (Savadori & Lauriola, 2021; Tanveer et al., 2021). They also oppose other trends that argue that perceiving risk encourages taking risk (Michel et al., 2006; Delhomme et al., 2009).

The results on the feeling of invulnerability in the face of danger are the most contrasting compared to the existing literature on risk-taking. These results highlight a positive relationship between the sense of invulnerability to danger and the cost of risky behavior, the effectiveness of the recommendation, self-efficacy, and attitude towards the recommendation. This means that Cameroonian motorcycle taxi drivers who feel invulnerable to danger still think that risky behavior is expensive, that it is necessary to respect the rules of the road, feel able to do so and are predisposed to do so. These findings contrast with the general trend observed in studies of sense of invulnerability and risk-taking (Greenwald et al., 2018; Milić et al., 2019; Morrell et al., 2016; Ngah Essomba et al., 2022a; Potard et al., 2018). It seems urgent to investigate the psychological mechanisms that explain such a particular cognitive functioning in Cameroonian motorcycle taxi drivers. However, results that support the literature have been obtained. The feeling of invulnerability was also positively related to the benefits of risky beha-

avior. The feeling of invulnerability is accompanied by cognitive biases (the biases of superiority, optimism or illusion of control) that may justify why the individual who feels invulnerable also thinks that risky behavior has benefits (Kouabenan, 2012). Beyond cognitive biases, invulnerability could be akin to a belief in supernatural protection in which the individual perceives himself as immune to danger, even indestructible.

However, the present study has some limitations. First, we can note the use of self-reported measures, as this type of method leads to social desirability that could bias the results (Helfritz-Sinville & Stanford, 2014). Regarding the sample, the difficulty of obtaining participants who are motorcycle taxi drivers limited the size of this sample. This difficulty has also led to the majority of interviewing young drivers who are the category that takes the most risk (Matthews & Moran, 1986). This study also failed to take into account the variable possession of the license when compiling the sample. Future studies will benefit from enriching their sample from these limitations. In terms of results, several relationships were found to be statistically insignificant. This can be explained by the methodological limitations we have just listed. Finally, for meaningful relationships, the interaction between all variables was not explored. The analyses were just bivariate. Given the complexity of human psychological functioning, mediation or moderation analyses seem promising for future studies.

Despite the above limitations, this study has relevant theoretical and practical implications. This study is the first to study the beliefs, risk perception and risk-taking among Cameroonian motorcycle taxi drivers. It fills a gap in the literature and opens up interesting prospects for further study. In this case, it is urgent to understand why the feeling of invulnerability is positively associated with the cost of risky behavior, effectiveness and attitude towards a recommendation. In addition, this study reiterates the role of cognitions in the adoption of complex behavior, including the driving of a motorized machine in a Cameroonian context. It is also a complementary argument in favor of the study of risk-taking through the model of motivation for protection. On a practical level, this study highlights the cognitive mechanisms responsible for behavior which are harmful to road safety. It shows those mechanisms must be taken into account when developing prevention messages for motorcycle taxi drivers. Specifically, results of the current study show the protective motivation model is an effective framework for designing awareness strategies for drivers. Moreover, this study highlights some beliefs which influence effectiveness of prevention messages and that must be taken into account when implementing awareness programs. All of those initiatives can contribute to reducing traffic accidents, which plunge the population into disarray.

## 5. Conclusion

Taking road risks has harmful consequences every year. The driving of motorcycle taxis is a very widespread sector of activity in Cameroon and records more

and more traffic accidents. The objective of this research was to study the relationships between fatalistic beliefs, the feeling of invulnerability, the perception of risk and risk-taking among Cameroonian motorcycle taxi drivers. The results showed that predetermination, perception of the accident, perception of the penalty and feeling of invulnerability to danger are associated with the motivation to protect oneself against traffic accidents. The cognitive processing inherent in the driving situation predicts the behaviors adopted by drivers. It is essential to take into account the cognitive mechanisms that filter the awareness messages to which drivers are exposed in order to be able to adjust strategies to promote road safety.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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