



Risky driving behaviour in urban Ghana: the contributions of fatalistic beliefs, risk perception, and risk-taking attitude

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ABSTRACT

There is rapid motorisation in Ghana, leading to increases in risky driving and road crashes. Understanding pathways through which traffic risk perception and traffic fatalism affects risky driving behaviour can help with effective road safety education and health promotion interventions among drivers in Ghana. Yet, the pathways are not well understood. Structural equation modelling (SEM) was conducted to assess the hypothesised model that attitudes towards risky driving would mediate the association of traffic fatalism and traffic risk perception with risky driving behaviour. Licensed drivers ($N = 519$) aged 18 to 73 years ($M = 27.98$, $SD = 9.23$) completed a survey on fatalistic beliefs, traffic risk perception, and risky driving attitudes and self-reported risky driving behaviour. The model shows a good fit to the data. Attitudes towards risky driving mediated the effects of fatalistic beliefs and risk perception on risky driving behaviour. Further, fatalistic beliefs were positively associated with attitudes towards risky driving. Risk perception was negatively associated with attitudes towards risky driving. Moreover, attitudes towards risky driving positively predicted risky driving behaviour. Other multivariate results showed that risk perception and risk-taking differ among male and female drivers and among married and never married drivers. The results provide opportunities for the National Road Safety Commission to design safety promotion interventions to target the belief that road crashes are influenced, in part, by fate and destiny other than by road user behaviour. Road safety education should target favourable attitudes towards risk-taking through which fatalistic beliefs and risk perception affect driving behaviour.

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Introduction

Road traffic crash is an important global public health issue. Ghana has a major public health problem resulting from road traffic crashes. The road crash problem is further compounded by the inadequate emergency and post-traumatic care services in the country (Mould-Millman, Rominski, and Oteng 2014; Ojo, Agyemang, and Afukaar 2018; Osei-Ampofo et al. 2013).

Road crash problem in Ghana

According to the World Health Organisation's Global Status Report on Road Safety (2015), 42% of pedestrians, 18% of passengers of 4-wheeled and light vehicles, 8% of drivers and passengers of buses, 8% of drivers and passengers of heavy trucks, 6% of drivers of 4-wheeled and light vehicles, 14% of riders of 2-wheelers, and 4% of cyclists were killed on Ghana's roads in 2012. Taken together, the crashes hamper attempts to achieve target 3.6. of the Sustainable Development Goal 3, which mandates Ghana, including other countries, to reduce road crashes by 50% by the year 2020. They also thwart government's efforts to reduce poverty and to create wealth, as road crashes in Ghana affect mostly people in the economically productive age bracket (Teye-Kwadjo 2011, 2017).

In Ghana, as in other parts of the world, human factors seem to be driving the road crash problem. Further, there is a rapid motorisation in Ghana because road transport is the major mode of travel. Air and train travel are now developing. Occupational driving (i.e. driving commercial passenger-ferrying taxis and minibuses) has become a major source of employment for the youth (see, e.g. Agyeman, Kwarteng, and Zurkalnaine 2019). This has come with a price because it is common to see drivers whose driving capabilities on the road, including comprehension of road traffic rules and regulations, leave much to be desired (Teye-Kwadjo, Knizek, and Rundmo 2013). A related problem is that while there is rapid improvement in road infrastructure in the country due to donor funding, little work has been done regarding road safety education and health promotion. Nevertheless, there seems to be little interest in investigating aspects of Ghanaian drivers' personal characteristics that predispose them to road crashes. In the sections that follow the literature pertinent to the variables of interest in this study is described.

Personal factors in road crashes in Ghana

Risky driving behaviour

Research in Ghana indicates that risky driving, including traffic rule violations and speeding, is particularly responsible for the injuries and deaths of drivers, car occupants, and of pedestrians (Damsere-Derry et al. 2008; Damsere-Derry, Palk, and King 2017; Teye-Kwadjo, Knizek, and Rundmo 2013). Given the consistency with which risky driving occurs on Ghana's roads, it would seem that most Ghanaian drivers know very little about road safety or they have intentional dispositions to break known traffic rules. It is well known that violating established traffic rules affects road safety, with dire consequences for road users. What personal factors give rise to risky driver behaviour in Ghana? In an earlier qualitative study in the Eastern Region of Ghana, Teye-Kwadjo (2017) and Teye-Kwadjo, Knizek, and Rundmo (2013) found that unsafe attitudes, inadequate driver training, low perceived crash risk, and fatalistic beliefs were important determinants of risky driving. The focus of the current research was to extend the findings of this qualitative study to other regions of Ghana by using quantitative approaches. Other research has demonstrated that a person's attitudes towards road safety may guide his or her actions on the roadway (Vardaki and Yannis 2013).

Attitudes towards risky driving

Attitudes towards traffic rule violations and speeding may be processed on a positive-negative continuum such that drivers are more likely to engage in road safety behaviour associated with positive outcomes than one associated with negative outcomes. For example, Ghanaian drivers who evaluate speed violations positively (i.e. speeding makes me arrive at my destination faster, speeding thrills) will be more likely to speed than those who evaluate speeding negatively (i.e. speeding kills, exceeding speed limits violates traffic rules). Speeding is an important determinant of road crashes in Ghana (Afukaar 2003; Atombo et al. 2017b; Teye-Kwadjo 2017). Speed limit law in Ghana requires that drivers do not exceed 30 km/h on school and residential roads, 50 km/h on urban roads, 90km/h on rural roads, and 100km/h on motorways (Republic of Ghana [Road Traffic Regulation LI 2180], 2012). However, Damsere-Derry et al. (2010) found that excessive speeding in residential areas in Ghana was rampant and accounted for about 65% of vehicular-pedestrian crashes. Previous research demonstrated that favourable attitudes towards speeding predicted risky driving behaviour (Iversen 2004; Lucidi et al. 2014; Ulleberg and Rundmo 2002; Warner and Aberg 2008). In accordance with this research, the following hypothesis is proposed:

H1: Attitudes towards risky driving would be positively significantly associated with self-reported risky driving behaviour.

Traffic fatalism

Road traffic fatalism refers to the belief that road crashes are predestined and inevitable (Kayani, King, and Fleiter 2012). Traffic fatalism, therefore, reflects beliefs about whether or not Ghanaian drivers think that road crashes can be prevented or changed through personal action. Research shows that fatalistic beliefs affect health behaviour because they prevent individuals from taking action to enhance their health (Henson et al. 2006; Morgan, Tyler, and Fogel 2008; Powe and Finnie 2003). Recent work has demonstrated that people with higher levels of fatalism underestimate dangerous driving situations and are less likely to engage in safe driving behaviour (Ngueutsa and Kouabenan 2017a). Omari and Baron-Epel (2013) reported that drivers with higher levels of fatalism were less likely to restrain their children in the car than those with low levels of fatalism. Moreover, Kayani, Fleiter, and King (2014) found a positive relationship between fatalism and attitudes towards under-reporting of road crashes among drivers. They noted that, respondents believed that road crashes were fated or predestined and therefore did not warrant a police investigation. Similarly, Kayani, King, and Fleiter (2012) reported that fatalistic beliefs prevented the uptake of road safety messages, giving rise to risky road use. In addition, Peltzer and Renner (2003) found that, superstitious beliefs were positively related to road traffic crashes. They noted that superstition was pervasive among minibus drivers and called for advocacy to address it. Mahembe and Samuel (2016) found that fatalistic beliefs were prevalent among taxi drivers, and that individuals with high religiosity perceived road crashes to be controlled by destiny. Correspondingly, in a previous research in Ghana, Teye-Kwadjo, Knizek, and Rundmo (2013) reported that 'Some drivers ascribe fatalistic

meanings or magical thoughts to some road traffic crashes and are of the belief that individuals destined to die through road accidents would die irrespective of what human beings do' (458). Thus, it is expected that a Ghanaian driver who believes that road crashes are predetermined would do very little to engage in safe driving behaviour and health promotion. Teye-Kwadjo et al.'s (2013) study did not assess the potential of a putative third variable (e.g. mediators) intervening in the relationship between fatalism and driving behaviour. Understanding pathways through which fatalistic beliefs affect risky driving behaviour can help clarify the strength of this association. From this literature, the following hypotheses are proposed:

H2: Traffic fatalism would be positively associated with attitudes towards risky driving and self-reported risky driving behaviour.

H3: Attitudes towards risky driving would mediate the relationship between traffic fatalism and self-reported risky driving behaviour.

Traffic risk perception

Traffic risk perception reflects beliefs about potential danger during driving. Poor risk judgments, while at the wheels, can be fatal for road users, including drivers. In Ghana, most drivers perceive low traffic crash risk (Teye-Kwadjo 2011; Teye-Kwadjo, Knizek, and Rundmo 2013) and therefore engage in high traffic rule violations and speeding. Other investigators have reported significant negative associations between traffic risk perception and risk-taking attitude (Lund and Rundmo 2009; Rhodes and Pivik 2011; Rundmo and Iversen 2004), suggesting that the higher the perceived crash risk the lower the risk behaviour. For example, work among drivers in Iran and in Turkey showed that higher traffic risk perception was associated with safer driver behaviours such as speed reduction and seat belt use (Şimşekoğlu et al. 2013). Therefore, gaining a better understanding of how traffic risk perception affects driving attitudes and behaviour among Ghanaian drivers may help to inform the design of safety interventions to mitigate its effect.

However, an important methodological gap in the traffic risk perception literature is that, to my knowledge, no study has examined possible mediators in the relationship between traffic risk perception and driving behaviour. There is, therefore, the need to clarify the strength of this relationship, especially with robust statistical procedures. Viewed from this methodological perspective, this study assessed the mediating role of risk-taking attitude in the relationship between traffic risk perception and self-reported risky driving behaviour. Consistent with the literature, it is expected that Ghanaian drivers who perceive a driving condition to be more risky would demonstrate safer driving attitudes and behaviour. Thus, the following hypotheses are proposed:

H4: Traffic risk perception would be negatively associated with attitudes towards risky driving and self-reported risky driving behaviour.

H5: Attitudes towards risky driving would mediate the relationship between traffic risk perception and self-reported risky driving behaviour.

Gender, accident involvement, marital status, and risk-taking

Regarding differences in gender relative to risk perception and risk-taking, several research demonstrated that women are more likely than men to be concerned about traffic crash risks, and that women are less likely than men to engage in risky driving (Cordellieri et al. 2016; Harre, Field, and Kirkwood 1996; Rhodes and Pivik 2011; Oltedal and Rundmo 2006). Other research suggests that traffic crash involvement affects risk perception and risk-taking, such that individuals who are previously involved in multiple road crashes are more likely than those who are involved in only one to perceive lower crash risks and to demonstrate greater risk-taking attitude and behaviour (Ngueutsa and Kouabenan 2017b). Whitlock et al. (2004) investigated the relationship between traffic injury risks and marital status among drivers in a cohort study, using prospective and retrospective data. They found that marital status related to injury risks, such that never married people had a higher risk of driver injury than did married people. It is, therefore, important to assess gender, marital status, and accident involvement differences regarding risk perception and risk-taking among this sample. In accordance with the literature, the following hypotheses were proposed.

H6: That the population means on risk perception, risk-taking attitude and behaviour (dependent variables) would vary by gender, road crash involvement, and by marital status (grouping variables), even after controlling for the effect of age and fatalistic beliefs. Specifically, that (a) male drivers would report lower risk perception, riskier driving attitudes and behaviour than female drivers, (b) drivers with a previous involvement in multiple road crashes would report lower risk perception, riskier driving attitudes and behaviour than would drivers with no history of crash involvement, and that (c) married drivers would report greater risk perception, lower risk-taking attitudes and behaviour than would never-married drivers.

Method

Participants

Data were obtained from 519 commercial and private vehicle drivers aged 18 to 73 years ($M = 27.98$, $SD = 9.23$). Of this sample, 75.5% ($n = 392$) were male and 24.5% ($n = 127$) were female. There were 310 drivers of commercial vehicles and 209 drivers of private vehicles. Participants' demographic data indicated that they drove between 1 and 22 h a day with mean driving hours of 4.57 ($SD = 3.13$). Driving tenure ranged from 1 to 38 years with a mean tenure of 6.43 years ($SD = 6.69$). In addition, among the participants 28.1% ($n = 146$) reported a previous involvement in a road crash. Approximately, 29.3% ($n = 152$) of respondents indicated that they were married, whereas 70.7% ($n = 367$) indicated that they were never married (single). Moreover, 91.5% of the respondents indicated that they were Christians, whereas 6.2% and 1.7% indicated that they were Muslims and Traditionalists, respectively.

Procedure

Drivers were recruited at Adenta and Tema in the Greater Accra Region and at Koforidua in the Eastern Region, using opportunity sampling. Commercial vehicle drivers were recruited at bus terminals and taxi ranks. Private vehicle drivers were recruited at their workplaces. The inclusion criterion for participation in this study was the possession of a license to drive in Ghana. Participants completed a survey questionnaire on traffic fatalism, traffic risk perception, attitudes towards risky driving, and self-reported risky driving behaviour together with consent forms. A few commercial vehicle drivers who were not literate in the English language enough to complete the survey on their own were assisted to do so by two research assistants. Participants also provided information on demographic variables such as age, driving tenure, and involvement in road crashes. This study was approved by the Departmental Research Ethics Committee of the Department of Psychology, University of Ghana.

Measures

Fatalism

Traffic fatalism refers to beliefs about the role of fate in road safety. Fatalistic beliefs about road crashes were assessed by six items adapted from the fatalism subscale of the Multidimensional Fatalism Measure developed by Esparza, Wiebe, and Quiñones (2015). Scale reliability for the subscale was $\alpha = .76$ on a Spanish sample (Esparza, Wiebe, and Quiñones 2015). In this study, respondents judged their agreement with a given statement on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scale scores were calculated such that higher scores indicated greater fatalistic beliefs about road crashes. The six items demonstrated good reliability (see Table 1).

Traffic risk perception

Traffic risk perception was assessed by six items adapted from Rundmo and Iversen (2004). This scale tapped into both cognitive and affective components of risk perception. Scale reliabilities were $\alpha = .81$ on a Norwegian sample, $\alpha = .96$ on a Haryana sample (Ram and Chand 2016), and $\alpha = .76$ on a Turkish sample (Şimşekoğlu et al. 2013). In this study, respondents judged their agreement with a given statement on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scale scores were calculated such that higher scores indicated greater perceived traffic crash risk. The six items demonstrated high reliability (see Table 1).

Attitudes

Attitudes toward risky driving (rule violations and speeding) were assessed by four items adapted from Iversen (2004) and Ulleberg and Rundmo (2002). The measure showed a high-reliability coefficient on Norwegian samples $\alpha = .92$, (Ulleberg and Rundmo 2002; $\alpha = .85$; Iversen 2004). In this study, respondents judged their agreement with a given statement on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scale scores were calculated such that higher scores indicated more favourable attitudes towards risky driving (rule violations and speeding). The four items showed good reliability (see Table 1).

Table 1. Factor loading, scale reliability and internal consistency of the measures.

Factor and items	Factor loading	Composite reliability	Average variance extracted
Traffic fatalism		.85	.48
I feel that nothing I do can change things in my life.	.67		
If road accidents happen, it is because they were meant to happen.	.77		
I feel I do not have any control over the things that happen to me.	.63		
Life is very unpredictable, and there is little one can do to prevent road accidents.	.68		
There is no sense in driving too carefully, if you will not get accidents, you will not.	.70		
If something bad is going to happen to me as a driver, it will happen no matter what I do.	.72		
Traffic risk perception		.90	.60
It is probable that I could be involved in a road traffic crash.	.79		
It is probable that I could be injured in a road traffic crash.	.82		
It is probable for other people to be injured in a road traffic crash.	.82		
It is probable for other people to be involved in a road traffic crash.	.81		
I am concerned about road traffic crash risks and think that I could be a victim.	.74		
I am concerned about road traffic crash risks and think that other people could be victims.	.68		
Attitudes towards risky driving (speeding & rule violation)		.85	.58
If the road is good it is fine to exceed speed limits.	.84		
If you are an experienced driver it is fine to exceed speed limits.	.80		
It is acceptable to exceed the speed limit if there is no passenger in the car.	.76		
Exceeding speed limit in order to get to work or reach one's destination early is fine.	.64		
Risky driving behaviour		.80	.50
How often do you disregard the speed limit posted on a road?	.54		
How often do you park at a 'no-parking' area and risk a fine?	.72		
How often do you cross a junction knowing that the traffic lights already turned red against you?	.82		
How often do you drive so close to the car in front that it will be difficult to stop in an emergency?	.72		

Self-reported risky driving behaviour

Four items from the Ordinary Violations subscale of the Driver Behaviour Questionnaire (DBQ; Lajunen, Parker, and Summala 2004; Rowe et al. 2015) were used to assess risky driving behaviour. The items demonstrated acceptable reliabilities $\alpha = .80, .79$, and $.75$ on a Finnish, British, and Dutch samples, respectively (Lajunen, Parker, and Summala 2004). In this study, respondents judged their agreement with a given statement on a five-point Likert scale ranging from 1 (*never*) to 5 (*always*). Scale scores were calculated such that higher scores indicated greater self-reported risky driving behaviour. The four items showed good reliability (see Table 1).

Results

Analytic strategy

Preliminary analyses were conducted on the adapted measures used in this study despite the fact that they were selected from questionnaires with validated psychometric properties. Normality assumptions, construct unidimensionality, and internal consistency were examined in SPSS (v21). Construct unidimensionality was calculated with exploratory factor analyses (EFA) with a maximum likelihood (ML) estimator. Factor loading was determined

using the practically significant loading criterion ($\geq .50$; Hair et al. 2010). Due to the limitations associated with Cronbach's alpha (see, for example, Dunn, Baguley, and Brunsden 2014; Peters 2014; Sijtsma 2009), composite scale reliability and internal consistency were calculated using coefficient omega (Padilla and Divers 2015; Raykov 2004). Because fewer indicators of latent constructs are considered optimal for structural equation modelling (SEM), scales with more than four indicators per latent variable (i.e. Fatalism scale and Risk Perception scale) were parcelled (Little et al. 2013), using the item-to-construct balancing approach described by Alhija and Wisenbaker (2006). Bivariate correlations between the indicators and descriptive statistics are presented in Table 2.

Both parcel-and-item level indicators of the latent constructs were validated via confirmatory factor analysis (CFA) in Mplus (v6.12; Muthén and Muthén [1998]2017)). To test the hypotheses, a latent variable structural equation model was estimated with a maximum likelihood (ML) estimator. Statistical mediation effects were examined using the bootstrap approach (Preacher and Hayes 2008). Model fit was evaluated with the following indices; chi-square test statistic (χ^2) with degrees of freedom, comparative fit index (CFI $\geq .95$), root-mean-square error of approximation (RMSEA $\leq .07$) with 90% confidence interval, and the standardised root-mean-square residual (SRMR $\leq .08$; Hu and Bentler 1999; West, Taylor, and Wu 2012; Yu 2002). Missing data were handled with the full information maximum likelihood procedure in Mplus. Anderson and Gerbing (1988) two-step SEM approach were utilised to test the latent variable structural model depicted in Figure 1.

Measurement model

The measurement model validated by means of confirmatory factor analysis provided a good fit to the data, χ^2 (71, $N = 519$) = 214.26, $p < .001$, CFI = .959, RMSEA = .062; 90% CI [.053, .072], SRMR = .044. Factor loadings for all the indicators of the latent constructs varied from .55 to .90. A square of these loadings (i.e. .55 and .90) showed that each factor explained between 30% and 81% of the variance in their respective indicators. All factor loadings were significant ($p < .001$).

Structural model

Having obtained a good measurement model, the latent variable structural model was fitted to the data to test the hypotheses. The latent variable structural model described the data well, χ^2 (73, $N = 519$) = 243.52, $p < .001$, CFI = .952, RMSEA = .067; 90% CI [.058, .076], SRMR = .063. The latent variable structural model is depicted in Figure 1.

Direct effects

As can be seen in Figure 1, fatalism was significantly positively associated with attitudes toward risky driving ($b = .61$, 95% CI [.46, .75], $p < .001$), providing support for hypothesis two (H2). Perceived traffic crash risk was significantly negatively associated with attitudes toward risky driving ($b = -.16$, 95% CI [-.27, -.05], $p < .05$), providing support for hypothesis four (H4). Further, attitudes towards risky driving were significantly positively associated with risky driving behaviour ($b = .36$, 95% CI [.26, .47], $p < .001$), providing support for hypothesis one (H1; see Figure 1).

Table 2. Bivariate Correlations between the indicators and descriptive statistics (N = 519).

Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Fatalism1	–													
2. Fatalism2	.70***	–												
3. Fatalism3	.65***	.66***	–											
4. Risk perception1	.07	.16***	.07	–										
5. Risk perception2	.13**	.20***	.10*	.76***	–									
6. Risk perception3	.15***	.22***	.11**	.74***	.79***	–								
7. Attitude1	.44***	.41***	.39***	.00	.05	.05	–							
8. Attitude2	.28***	.30***	.35***	–.06	–.03	–.02	.61***	–						
9. Attitude3	.26***	.26***	.20***	–.05	.01	.05	.63***	.67***	–					
10. Attitude4	.30***	.24***	.31***	–.14**	–.04	–.02	.47***	.57***	.47***	–				
11. Behaviour1	.10*	.09*	.12**	–.15**	–.12**	–.11**	.23***	.25***	.23***	.29***	–			
12. Behaviour2	.25***	.23***	.22***	–.20***	–.08	–.08	.26***	.23***	.25***	.27***	.46***	–		
13. Behaviour3	.17***	.16***	.12**	–.22***	–.15**	–.13**	.24***	.20***	.19***	.22***	.34***	.59***	–	
14. Behaviour4	.20***	.14**	.15**	–.24***	–.16***	–.13**	.19***	.30***	.26***	.32***	.41***	.57***	.52***	–
M	2.04	2.05	2.02	3.72	3.52	3.59	2.19	1.99	2.10	2.11	2.28	1.88	1.80	1.61
SD	1.01	1.02	1.02	0.95	1.05	1.01	1.27	1.16	1.18	1.19	1.08	0.98	1.03	0.95
Skewness	.89	.77	.97	–.57	–.32	–.43	.85	1.05	.82	.83	.73	.99	1.27	1.58
Kurtosis	.03	–.08	.30	–.15	–.74	–.39	–.48	.12	–.45	–.38	–.12	.39	.92	1.74

Highlighted portions indicate intra-construct correlations. * $p < .05$, ** $p < .01$, *** $p < .001$.

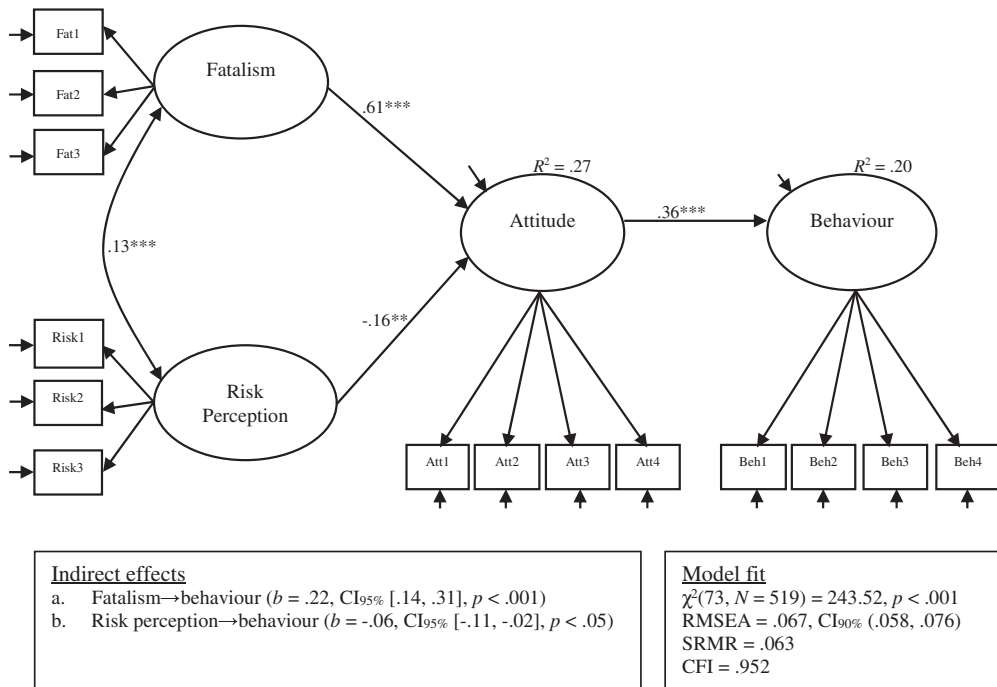


Figure 1. Structural equation model of the effects of fatalism and risk perception on risk behaviour via the mediation of risk attitude among drivers in Ghana. Unstandardised path coefficients are reported.

CFI: comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardised root mean square residual; CI, confidence interval; Fat₁₋₃, indicators for the latent variable 'fatalism'; Risk₁₋₃, indicators for the latent variable 'risk perception'; Att₁₋₄, indicators for the latent variable 'attitude'; and Beh₁₋₄, indicators for the latent variable 'behaviour'; ** $p < .01$. *** $p < .001$.

Indirect effects

The statistical mediation processes described in Figure 1 were examined via bootstrapping with 1000 resamples. As predicted, attitudes toward risky driving behaviour mediated ($b = .22$, 95% CI [.14, .31], $p < .001$) the relationship between fatalism and risky driving behaviour, providing support for hypothesis three (H3). Moreover, attitudes toward risky driving mediated ($b = -.06$, 95% CI [-.11, -.02], $p < .05$) the relationship between perceived traffic crash risk and risky driving behaviour, providing support for hypothesis five (H5). Thus, the mediation hypotheses were supported. The correlation between fatalistic beliefs and traffic risk perception was significant ($r = .13$, $p < .001$). The structural model explained 27% and 20% of the variance in attitudes toward risky driving and risky driving behaviour, respectively.

Multivariate effects

To investigate possible differences in risk perception, risk-taking attitude, and risky driving behaviour relative to gender, road crash involvement, and marital status while controlling for the effect of driver age and fatalistic beliefs, three

separate multivariate analysis of covariance (MANCOVA) tests were conducted. Statistical significance for follow-up univariate tests was computed according to Bonferroni's correction. First, risk perception, risk-taking attitude, and risky driving behaviour were entered into the equation as dependent variables, whereas gender (male vs. female) was entered as a fixed factor, and age and fatalism as covariates. MANCOVA results revealed statistically significant differences on the composite dependent variable by gender, $F_{(1, 461)} = 3.06$, $p = .028$; Wilks' $\lambda = .98$; partial $\eta^2 = .020$, controlling for the effect of age and fatalism. Inspection of the follow-up univariate results showed that, there were only significant differences in risk perception by gender. Specifically, female drivers perceived slightly greater traffic risk ($M = 22.84$, $SD = 0.51$) than did male drivers ($M = 21.40$, $SD = 0.30$); $F_{(1, 463)} = 5.88$, $p = .016$, partial $\eta^2 = .013$.

Next, risk perception, risk-taking attitude, and risky driving behaviour were entered into the equation as dependent variables, whereas marital status (married vs. never married) was entered as a fixed factor, and age and fatalism as covariates. MANCOVA results revealed statistically significant differences on the composite dependent variable by marital status, $F_{(3, 461)} = 5.47$, $p < .001$; Wilks' $\lambda = .97$; partial $\eta^2 = .034$, controlling for the effect of age and fatalism. Inspection of the follow-up univariate results showed that, there were only significant differences in risk perception and risky driving behaviour by marital status. Specifically, married drivers perceived slightly greater traffic risk ($M = 23.49$, $SD = 0.58$) than did never married drivers ($M = 21.03$, $SD = 0.34$); $F_{(1, 463)} = 11.19$, $p < .001$, partial $\eta^2 = .024$. Moreover, never married drivers engaged in more risky driving behaviour ($M = 7.92$, $SD = 0.18$) than did married drivers ($M = 6.72$, $SD = 0.31$); $F_{(1, 463)} = 9.13$, $p = .003$, partial $\eta^2 = .019$.

Then, risk perception, risk-taking attitude, and risky driving behaviour were entered into the equation as dependent variables, whereas traffic crash involvement (yes vs. no) was entered as a fixed factor, and age and fatalism as covariates. MANCOVA results did not show any significant differences on the composite dependent variable by road crash involvement, $F_{(3, 458)} = 1.13$, $p = .336$; Wilks' $\lambda = .99$, partial $\eta^2 = .007$, after adjustment for age and fatalism.

Discussion

The present study investigated the role of traffic fatalism and traffic risk perception in risky driving attitudes and behaviour among drivers in the Greater Accra and Eastern Regions of Ghana. Fatalistic beliefs about road traffic crash were positively associated with risky driving attitudes. As can be seen in [Figure 1](#), traffic fatalism indirectly positively predicted self-reported risky driving behaviour through risky driving attitudes. These results suggest that a considerable number of Ghanaian drivers believe in fate and destiny as important factors in road crashes ($b = .61$, $p < .001$). These results are consistent with previous research findings (Kayani, King, and Fleiter 2012; Mahembe and Samuel 2016; Ngueutsa and Kouabenan 2017a). However, whereas Ngueutsa and Kouabenan (2017a) reported a negative relationship between fatalistic beliefs and traffic risk perception ($b = -.07$, $p < .05$) the current results found a positive relationship ($b = .13$, $p < .001$). These differences in results may be due to sample characteristics and measurement issues.

The current results provide support for those of earlier research in Ghana, which reported that, fatalistic beliefs were widespread among drivers to the extent that vehicles thought to have been purchased from proceeds of witchcraft or killing were expected to be involved in road crashes (Teye-Kwadjo, Knizek, and Rundmo 2013). Teye-Kwadjo et al. also found that drivers held the view that people, including drivers who acquired wealth through witchcraft or killing someone, would die in a road crash. Correspondingly, road crashes in Ghana, especially those in which someone died, are interpreted from a fatalistic perspective to the extent that driver error and traffic rule violations are de-emphasised. For example, in a recent road crash involving a popular musician (Ebony Reigns), fatalistic beliefs dominated the discussions surrounding the tragic event to the exclusion of risky driver attitudes and behaviour (see Adofo 2018; Ansah 2018). Thus, fatalistic beliefs seem to present a potential barrier to road safety education and health promotion in Ghana. Relatedly, given the dominant nature of fatalistic beliefs among Ghanaians, they seem to express dispositions that reflect beliefs in a just world relative to road crashes. This is because some road crashes are perceived as 'pay back' for some individuals who may have offended someone. According to just world theory, people believe that the world is just and fair and that some individuals deserve what they get (Dalbert and Donat 2015; Furnham 2003; Lerner 1980). It would appear that some Ghanaians tend to view traffic victims from just world perspectives, making them (traffic victims) seem more deserving of their fate. Taken together, this attribution process tends to blame traffic victims by holding them responsible for the causes of road crashes.

A novel finding in this work is that attitudes towards risky driving (risk-taking attitude) mediated the relationship between traffic fatalism and self-reported risky driving behaviour. Specifically, fatalistic beliefs affected attitudes towards risky driving and attitudes towards risky driving, in turn, affected self-reported risky driving behaviour. Thus, a risk-taking attitude helps to explain the causal pathway by which fatalistic beliefs bring about change in self-reported risky driving behaviour. In other words, the results suggest that a substantial relation exists between traffic fatalism (independent variable) and risk-taking attitude (the mediator), and between risk-taking attitude (mediator) and self-reported risky driving behaviour (dependent variable). This finding provides opportunities for designing road safety interventions to change the causal pathway (risk-taking attitude) through which fatalistic beliefs affects self-reported risky driving behaviour.

Further, traffic risk perception was negatively associated with attitudes towards risky driving. Moreover, risk perception was indirectly associated with self-reported risky driving behaviour via the mediation of risky driving attitudes. The findings are in line with those reported by Okwabi (2014). In a study among commercial and private drivers in Ghana, Okwabi (2014) demonstrated that, risk perception was negatively related to risky driving behaviour, suggesting that the higher the perceived risk, the lower the risky driving behaviour. Similarly, Nordfjærn and Rundmo (2009) conducted a comparative research between Ghana and Norway on traffic risk perception and reported that, Ghanaians perceived higher traffic crash risk than did their Norwegian counterparts. The authors concluded that the frequency of road crashes in Ghana, coupled with the poor traffic environment, served to explain the high-risk perception among Ghanaians.

Besides, the current analysis found a positive relationship between risk-taking attitudes and self-reported risky driving behaviour. This finding compares favourably with those of Atombo et al. (2017a) and Iversen (2004), who reported a significant positive relationship between risky driving attitudes and self-reported risky driving behaviour.

The attitude-behaviour consistency seems to be well documented in other research (Cooke and Sheeran 2004; Teye-Kwadjo, Kagee, and Swart 2017a, 2017b). A contribution of the present study to the road safety literature is that, unlike previous studies (see, for example, Ram and Chand 2016; Rundmo and Iversen 2004), this work examined attitudes towards risky driving as a mediator of the relationship between traffic risk perception and self-reported risky driving behaviour, thus providing more insight into the association of risk perception with risky driving behaviour than has been previously reported.

Furthermore, the non-significant differences in risk perception and risk-taking by accident involvement found in this study seems consistent with the results of Kouabenan (2002), who reported that accident history did not have a substantial effect on risk perception and risk-taking. Correspondingly, Ngueutsa and Kouabenan (2017b) found that, compared with people involved in fewer and less severe road crashes, individuals involved in a greater number and more severe road crashes tended to demonstrate low traffic risk perception and high risk-taking behaviour. A possible explanation for the current results is that, because of the frequency of road crashes in Ghana, accident involvement appears to be giving most Ghanaian drivers the opportunity to confront their worst fears to the extent that they no longer harbour the fear of a crash (i.e. the fear of the unknown), giving rise to a state of learned helplessness.

Moreover, the finding regarding the differences in risk perception and risk taking between male and female drivers are consistent with previous research, which reported that male drivers were significantly more likely than female drivers to report engagement in unsafe driving behaviours, such as speeding (Glendon et al. 1996; Harre, Field, and Kirkwood 1996; Oltedal and Rundmo 2006). Additionally, in this research, married drivers reported perceiving greater accident risk than did never married drivers. As a result, married drivers indicated that they engaged in less risk-taking than did never married drivers. A possible explanation for this result is that because married drivers may have dependants such as spouses and children to support as well as properties and investments to protect, they seem to be more risk-averse on the roadway.

Conclusion

Ghana has a high rate of road traffic crashes resulting from traffic rule violations and speeding. Traffic fatalism and risk perception each predicted self-reported risky driving behaviour through the causal mechanism of risk-taking attitudes. Other multivariate results showed that risk perception and risk-taking behaviour differ among male and female drivers and among married and never-married drivers. These findings have important implications for road safety policy and practice. They provide invaluable information for authorities at the National Road Safety Commission (NRSC) to design road safety campaigns to target the dominant belief that road crashes are controlled by fate and destiny, such that personal actions by drivers could do little to prevent road crashes thought to be predestined and predetermined.

In addition, it would seem necessary and appropriate that the National Road Safety Commission (NRSC) design road traffic crash reduction programmes that target the antecedents of attitude formation and activation to help strengthen safe driving attitudes and to weaken favourable attitudes towards risky driving. Having positive

attitudes towards road safety should be considered an important first step for driver behaviour modification. This is because it is known that attitudes arise from a person's perceptions, beliefs, norms, values, and opinions regarding a phenomenon. Therefore, the NRSC may design informational road safety programmes that use persuasive messages via traditional media, social media, and cell phones targeted at drivers. The information may be in the form of posters, leaflets, flyers, text messages, and social media posts. The NRSC may also hold direct small-group interactions with drivers to discuss pertinent road crash trends they have observed over a period.

Moreover, periodic refresher skills training programmes for drivers on seat belt use, car technology use, traffic regulations, lane manoeuvring, gap selection, and mirror adjustment may prove useful. Movies on driver behaviour and simulation driving activities may also be organised for drivers to help make road safety-relevant attitudes more accessible for recall. The expected cumulative effect of these risky driving prevention campaigns is that they may serve to refine drivers' cognitions by altering unsafe normative driver behaviour. They would also provide drivers with accurate road safety knowledge that may help to deconstruct existing fatalistic beliefs and other misconceptions they have about road traffic crashes. Furthermore, it might be useful to tailor some road safety education messages specifically to male drivers as well as to never-married drivers, given their known propensity for risk-taking.

Limitations and future research

There were a number of limitations in this study. First, cross-sectional data were used in the current analyses. Cross-sectional data are not ideal for examining causal hypotheses. Second, this study focused entirely on the negative outcomes of risk-taking to the neglect of the benefits of risk-taking. It is well-known that some people, especially people with risk propensity, derive benefits from risk-taking such as the thrill and sensation that accompany speeding. While this was not fatal for the current analyses, it had the potential to introduce method effects. Third, because this study utilised a quantitative approach, it could not probe the reasons underlying fatalistic beliefs via qualitative means. Future work should consider the possibility of using a mixed-methods research approach. Future research should also examine the benefits associated with risk-taking together with additional variables that may mediate or moderate the risk perception-risky driving relationship. Besides, further research is needed to clarify the role of marital status in risk perception and risk-taking among drivers in Ghana.

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