



# Psychosocial factors as predictors of risky driving behavior and accident involvement among drivers in Oromia Region, Ethiopia



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## ABSTRACT

This study was designed to examine the influence of selected psychosocial factors (alcohol /substance use, driving anger, altruism, and normlessness) on risky driving behavior and accident involvement of drivers. A total of 343 freight transport and minibus drivers were made to fill the Amharic version of self-reporting scales of alcohol and/or substance use, driving anger, altruism, normlessness, risky driving behavior and accident involvement adapted from various sources. To test the proposed hypotheses, correlation, multiple regression and path analyses were conducted. Results of the study elucidated that selected psychosocial factors, particularly driving anger, normlessness, and alcohol/substance use significantly predicted variability in risky driving behavior. The study also revealed that risky driving behavior accounted for limited variability in accident involvement. Furthermore, risky driving behavior mediates the link between psychosocial factors and involvement in road traffic accidents. Implications of the findings have been discussed in terms of improving drivers' training curricula and enforcement of traffic laws.

## 1. Introduction

Road traffic accident (RTA) is one of the serious challenges facing humankind in the 21<sup>st</sup> century. According to World Health Organization (WHO), on average, it claims the lives of 1.25 million people worldwide every year while causing another 20–50 million injuries across the globe (WHO, 2015). In low and middle income countries, where 81 percent of the world population shares about 20 percent of the world's registered vehicles, traffic fatality rate ranges from 19.5 to 21.5 per 100,000 population. About 90 percent of the World's RTA occurred in low and middle income countries (Agbonkheshe et al., 2013; WHO, 2015). WHO forecasted that road traffic related deaths and injuries worldwide will rise by 65 percent between 2000 and 2020. Agbonkheshe and his associates have also estimated that RTAs can claim the lives of up to 1.9 million people annually by 2020. The annual cost of the world's RTA is estimated to be USD 518 billion, which accounts for 1–2 percent of the Growth National Product (GNP) of countries. In addition to causing disabilities, road traffic injuries are becoming big burden to health institutions (WHO, 2009). Countries are losing productive work force since 75 percent of road traffic casualties are young and productive adults (Bhat, 2016; WHO, 2004) (see Fig. 1).

In Ethiopia, the rate of road traffic deaths and injuries is found to be

high although the country still has at low level of motorization, that is, 5.1 vehicles per 1,000 people (The World Bank, 2016). Nearly 2000 deaths and 10,000 injuries are recorded in the country every year (Ethiopian Federal Police Report, 2010/2011). A local study by Fesseha and Sileshi (2014) revealed that, between 2007 and 2011 alone, 2,761 people died and 3,890 were injured (mostly in the age range of 15–50), in the 10,162 recorded RTAs in Ethiopia. Of these accidents, accidents due to vehicle-pedestrian interaction take the lion's share (54.5 percent), followed by vehicle-road structure crash (35.5 percent). Fikadu (2015) also indicated that the average annual RTAs of Ethiopia was 8115 for the year (1996–2015).

Drivers' behavior on the road, vehicles' technical problems, and environmental conditions actively interact in causing RTAs. However, research results and reports from relevant offices elucidated that drivers' behavior, otherwise called psychosocial factors, play a significant role in causing RTAs (Shenge, 2010). Ulleberg and Rundmo (2003), quoting Sabey and Taylor's (1980), stated that human factors in which driving behavior is central, contributed to 95 percent of the accidents. Data from Ethiopian Federal Transport Authority (2017) also show that faulty driving is the cause for 86 percent of the recorded RTAs in the country.

Many traffic safety studies have been conducted focusing on drivers' behavior as a causative factor (Oltedal and Rundmo, 2006; Ulleberg &

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Rundmo, 2003). In studies related to drivers' behavior, cognitive psychological approach and personality traits lines appear to be dominant. The cognitive approach considers individuals as active and goal-directed participants in which the internal mental processes of an individual are emphasized as being the driving force behind all behaviors (Hatakka et al., 2002). Elliot and Thomson (2010) tested the efficacy of an extended theory of planned behavior (TPB) and found out that instrumental and affective attitude, subjective and descriptive norm, self-efficacy, perceived controllability, moral norm, anticipated regret, self-identity, and past speeding behavior account for a significant amount of variability in intention and actual behavior of drivers.

The personality trait line of studies, on the other hand, focus on the predictive value of personality traits which can be defined as dimensions of individual differences in tendency to show consistent patterns of thoughts, feelings and behavior (Thørrisen, 2013; Ulleberg and Rundmo, 2003; Walters, 2000). Various personality variables such as sensation-seeking, normlessness, driving anger, altruism, social deviance, and Big Five personality factors have been examined as correlates of drivers' behavior on the road (Amit, 2008; Dahlen and White, 2006; Forward, 2013; Nayum, 2008; Schwebel et al., 2006; Ulleberg and Rundmo, 2003; Zhang and Chan, 2016). Dahlen and White (2006) found out that openness, emotional stability, agreeableness, driving anger, and sensation seeking predicted driving behavior. Bachoo, Bhagwanjee, and Govender (2013) also found out that drivers with higher driver anger and sensation-seeking scores are more likely to report riskier driving acts. Likewise, Iversen and Rundmo (2002) showed that drivers who scored high on sensation-seeking, normlessness and driver anger reported more frequent risky driving behavior compared to those who scored low on these variables. In general, personality trait line of the research shows that drivers' personality traits influence the cautions that they may take on the road and their level of involvement in risky driving behavior, which may in turn lead to road traffic accidents.

Road safety studies that focus on drivers' behavior also vary in terms of the methods they adopted. Some studies, (e.g. Dula and Ballard, 2003; Lajunen and Parker, 2001) employed drivers' self-reporting questionnaire, while others (e.g. Bachoo et al., 2013; Gianfranchi et al., 2017; Richer and Bergeron, 2009) used both self-reporting questionnaire and driving simulator in controlled environment. Both approaches led to more or less similar findings regarding the association between psychosocial factors and driving behavior on the road.

In connection with drivers' behavior on the road, previous studies have revealed the presence of strong correlation between risky driving behaviors and accident involvement (Fergusson et al., 2003; Iversen and Rundmo, 2002; Mohamed and Lotfi, 2016; Nayum, 2008; Parker et al., 1995). Risky driving behavior is often categorized into three as violations, errors and lapses (Parker et al., 1995; Reason et al., 1990). 'Violation' refers to an intentional deviation from traffic rules such as disregarding speed limit, sounding horn, running red lights, and giving chase to another driver when angered (Nayum, 2008). 'Error', on the other hand, is taken as failure to take precautions such as failing to check one's rear-view mirror before pulling out or changing lanes. 'Lapse' is defined as an inattentive behavior which has less contribution for RTA (Amit, 2008). Thus, due to the link between risky driving behavior and road crash involvement, drivers' behavior on the road has remained the major area of concern in road safety research for quite a long time.

Many road safety studies also investigated the correlation between alcohol and or substance use and risky driving/accident involvement. Richer and Bergeron (2009) found out that driving under the influence of cannabis is associated with dangerous driving. Elvik (2011) has conducted meta-analysis of research in this area and reported the presence of statistically significant correlation between cannabis intoxication and involvement in motor vehicle crash. About 30% of drivers killed in the road traffic accident were also found to have high concentration of alcohol in their blood (Aavik, 2010). Some drugs prescribed by health professionals for medical treatment may also affect the normal function of brain and lead to road traffic accident (Aavik, 2010; Agbonkhese et al.,

2013).

Hence, studying the association between drivers' personality/behavior and their involvement in risky driving and/or accident involvement can contribute a lot to improving road safety. Therefore, the present study was aimed at examining the extent to which three personality traits (driver anger, altruism, and normlessness) and alcohol/substance use predict risky driving behavior and involvement in RTA. *Driving anger* is operationalized as the tendency to become angry when encountering frustration and provocation on the road (Dahlen and White, 2006), while *normlessness* is defined as engagement in socially unacceptable behaviors to meet one's objectives or goals (Ulleberg and Rundmo, 2003), and *altruism* as individual's tendency of becoming cooperative or kind-hearted towards others (Witt and Boleman, 2009). Alcohol/substance use is conceptualized as drinking alcohol and or taking some stimulants shortly before driving or while driving or driving under its influence. In the present study, personality traits and alcohol/substance use are together operationalized as psychosocial factors.

## 2. Related work

The ever increasing magnitude and severity of road traffic accident in Ethiopia has become a major challenge to socio-economic advancement of the nation. Local studies so far conducted in the area have mainly focused on causes and magnitude of RTA, types of risky driving behaviors, and types of vehicle most frequently involved in RTA (Fesseha and Sileshi, 2014; Fikadu, 2015; Getu et al., 2013; Girma, 1996; Haile and Demeke, 2014). These studies indicate that violation of traffic rules which include speeding, improper use of road, and the use of alcohol and drugs (coupled with lack of proper training and loose enforcement of traffic laws), have contributed for RTA in the country. The studies also show that freight vehicles and minibuses are most frequently involved in RTA in Ethiopia.

Nevertheless, to the best knowledge of the present researchers, none of these studies have addressed personality traits of drivers despite a long-established research in the area worldwide. Also, in terms of coverage, the above mentioned local studies did not directly address the problem in Oromia National Regional State in particular though the region is at the heart of the nation with the highest traffic flow.

Thus, the current study was aimed at examining the influence of selected psychosocial factors on risky driving behavior and accident involvement of drivers in Oromia Region, Ethiopia. To this end, the following theoretical framework and research hypotheses were formulated.

## 3. Theory

The current study employed Traffic Psychology perspective, which focuses on the behavior of drivers and the psychological processes underlying that behavior (Rothengatter, 2001). It adopted Ajzen (1991) Theory of Planned Behavior (TPB), which depicts the link between attitude and behavior. Thus, drawing on Traffic Psychology notions, Theory of Planned Behavior, and objectives of the study, the researchers have formulated the assumption that selected personality traits (driving anger, altruism and normlessness) and alcohol/substance use, (operationalized as psychosocial factors), influence risky driving behavior which in turn may lead to accident involvement. This assumption is schematized as follows.

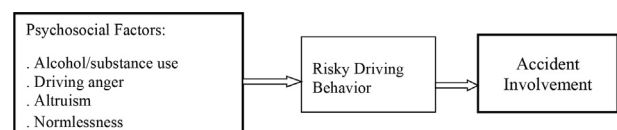


Fig. 1. Research model.

#### 4. Hypothesis

Drawing on the review of previous studies and the theoretical model considered, the following hypotheses have been formulated:

- H1. Alcohol/substance use, driving anger and normlessness are positively related with risky driving behavior and accident involvement.
- H2. Altruism is negatively related with risky driving behavior and accident involvement.
- H3. Risky driving behavior is positively related with accident involvement.
- H4. Psychosocial factors account for a significant variability in risky driving behavior.
- H5. Risky driving behavior mediates the relationship between selected psychosocial factors and accident involvement.

#### 5. Materials and methods

##### 5.1. Participants

A cross-sectional descriptive survey has been used to address the objectives of the current study. Data were collected from freight transport and public transport drivers in four zones of Oromia National Regional State: East Shewa, West Arsi, Finfinne Zuria and North Shewa. The zones were selected mainly due to the size of traffic flow in the areas and their geographical proximity to the researchers' home institution while vehicle types were selected because of their high involvement in RTA as revealed in previous studies. According to Oromia Road and Transport Authority, there were 4275 public transport operators and 724 freight transport operators in the region by the time the data were collected (June, 2017). Considering the size of the population, 427 public transport drivers (10 percent) and 72 freight drivers (10 percent) were selected from the target zones by using random sampling. Out of 414 questionnaires distributed, 343 (82.85 percent) were properly filled in and returned. The proposal of the study was approved by School Scientific Committee for Research and Publication and Senate Standing Committee for Research, Community Service and Technology Transfer. The purpose of the research was also clearly explained for the participants to obtain their consent to participate in the current study.

##### 5.2. Instruments

Previous studies on drivers' behavior have utilized various approaches: drivers self-report questionnaire, driving simulation, and a combination of the two to collect relevant data. Among these approaches, drivers self-report using standardized scales was found to be more convenient to study a larger sample (Richer and Bergeron, 2012). It is also the most commonly used method (Venter, 2014) although some scholars argue that the approach is susceptible to social desirability and memory biases (Richer and Bergeron, 2009). Hence, in the current study, an Amharic version of a standardized self-reporting questionnaire was used. The questionnaire includes close ended items on participants' bio-data, and scales on driving anger, altruism, normlessness, alcohol and/or substance use, risky driving behavior, and accident involvement.

The *Driving Anger Scale*, which is the short version of the "Driving Anger Scale", is composed of 14 items developed by Deffenbacher et al. (1994). The items in the scale focus on measuring the tendency to become irritable, frustrated and angry in various traffic situations. The respondents were asked to imagine that each situation described was actually happening to them and then to rate the amount of anger that would be provoked in them using five-point Likert scales ranging from "Not at all" to "Very much."

The *Altruism Scale* was adapted from Witt and Boleman (2009). It contains 11 items which assess intentions related to altruistic behavior.

The researchers excluded three items from the scale because of their less application in the context of the study. For instance, items "I would delay an elevator and hold the door for someone I did not know" and "I would offer my seat on a train or bus to someone who was standing" were excluded because elevators and trains are not common in the study area. The respondents were asked to rate how often they exhibit altruistic behaviors on a four-point Likert type scale ranging from "Never" to "very often". As Witt and Boleman (2009) indicated, the scale has a widespread use and professional endorsement with a reliability of over  $\alpha = .80$ .

*Normlessness Scale* is a four items scale taken from Ulleberg and Rundmo (2003). The scale was originally developed by Kohn and Schooler (1983). Responses were recorded on a five-point Likert scale ranging from "strongly agree" to "strongly disagree". Reliability of the scale is reported to be  $\alpha = .71$  (Ulleberg and Rundmo, 2003).

*Alcohol/Substance Use Scale* includes four items which require the respondents to tell how often they have been engaged in drinking alcohol and or taking various stimulants shortly before or while driving or how often they have driven under the influence of these substances the next day. The responses were recorded on a five-point Likert scale ranging from "Very often" to "Never".

*Risky Driving Behavior* –Manchester Driver Behavior Questionnaire (DBQ) was adapted to examine self-reported aberrant driving behaviors. The DBQ version adapted for the current study includes items on violation and errors as it has been used by Wishart et al. (2006). The scale has 18 items and reliability coefficient of  $\alpha = .71$ .

*Accident Involvement* was assessed by using a single item which requests the participants to report their involvement in accidents that led to either material damage or personal injury over the past five years. The item was adapted from Olteidal and Rundmo (2006).

All the scales used in the current study were translated into Amharic by the authors and then translated back to English by two English language experts in Adama Science and Technology University whose mother tongue is Amharic. After the translators and the authors had agreed upon the meaning equivalence of the two versions, the Amharic version of the questionnaire was pilot tested on 50 sample drivers in Adama City. Based on the results of the pilot study, some modifications such as rephrasing and reducing the number of items were made.

##### 5.3. Data analysis

Descriptive statistics such as frequency and mean were used to summarize the data on demographic and other variables while inferential statistics such as Person product momentum correlation and multiple linear regressions have been used to show the nature of the relationship among study variables. To ascertain the mediational role of risky driving behavior between psychosocial factors and accident involvement, regression path analysis was used. Then standardized path coefficient estimates were considered to determine the magnitude of the path effects.

#### 6. Results and discussion

##### 6.1. Results

###### 6.1.1. Demographic information

In this study, 343 male drivers were included. The vast majority of them (271 or 79 percent) are public transport operators while 72 (21 percent) are freight transport drivers. Female drivers were not included because they are not involved in such services in the study area. Participants' age range from 20- 65 years with an average age of 33 years. The majority, that is, 218 (63 percent), are married, while 114 (33 percent) single, and 11 (3.2 percent) divorced. Over half of them (89 or 55 percent) have attended high school education, 75 (22 percent) have completed primary education, and 64 (18.7 percent) TVET/Diploma level education. The remaining 14 (4.1 percent) of the participants fall in 'others' category. The participants have a driving experience of 1–40

years with an average of 8.43 years.

6.1.2. Basic assumptions, reliability and correlation analyses

Prior to the data analyses, several pre-tests were conducted to check normality, linearity, and item-internal consistency of the data. Skewness and kurtosis analyses and visual inspection of histograms, normal Q-Q plots, and box plots revealed that the data are normally distributed. The assumption of linearity was also checked. Internal consistency of the scales and bivariate relationship between study variables were determined by Chronbach alpha and Pearson Product moment correlation (r) respectively as indicated in Table 1.

As shown in Table 1, the Amharic version of all scales used in the current study demonstrated sufficient internal reliability (α = 0.73 to 0.87). The same table shows that bivariate relationships between driving anger and alcohol/substance use, driving anger and altruism, driving anger and normlessness, and driving anger and accident involvement were found to be statistically not significant. Similarly, the correlation between alcohol/substance use and altruism, risky driving and altruism, and altruism and accident involvement was not statistically significant.

On the other hand, a significant, but weak positive correlation was observed between driving anger and risky driving behavior (r = .19, p < 0.01), alcohol/substance use and normlessness (r = .15, p < 0.01), alcohol/substance use and risky driving behavior (r = .18, p < 0.01), alcohol/substance use and accident involvement (r = .14, p < 0.01), normlessness and risky driving behavior (r = .23, p < 0.01), normlessness and accident involvement (r = .16, p < 0.01) and risky driving behavior and accident involvement (r = .29, p < 0.01). Similarly, a statistically significant negative correlation (r = -.22, p < 0.01) was observed between altruism and normlessness. In short, the association among predictor variables of the current study was found to be non-significant associations, whereas the associations between most of the predictor variables and the dependent variables were found to be statistically significant.

With respect to the association between demographic factors and dependent variables, the relationship of educational status with risky driving behavior and accident involvement failed to reach a significance level whereas age was negatively, but weakly associated with risky driving (r = -.14, p < 0.05). Similarly, driving experience was negatively, but weakly correlated with both risky driving behavior (r = -.13, p < 0.05) and accident involvement (r = -.11, p < 0.05).

6.1.3. Multiple regression analyses

Hierarchical multiple regression analysis was conducted to test the association of selected psychosocial factors with risky driving behavior and accident involvement. First, risky driving behavior was regressed over predictor variables by controlling the background factors.

Table 2 shows that 12 percent of variation in risky driving behavior can be explained by the combination of psychosocial factors considered (ΔR<sup>2</sup> = 0.12, F (4, 304) = 10.75, p < 0.01). The standardized path coefficients of driving anger (β = 0.12, p < 0.05), alcohol/substance use (β

Table 1

Mean (M), standard deviation (SD), internal consistencies (Chronbach's α) and bivariate relationships of the study variables for N = 343.

	M	SD	α	Age	Edu	DE	DA	Al/Sub	ALT	NOR	RD	AI
Age	33.36	7.50		1								
Edu	3.45	1.21		-.05	1							
DE	8.43	6.47		.70**	-.03	1						
DA	33	9.5	.84	-.11*	.002	-.09	1					
AlSub	7.74	2.60	.81	-.004	-.09	-.06	.042	1				
ALT	23.15	5.07	.73	-.15	.12*	.01	.058	-.105	1			
NOR	11.75	3.34	.74	-.18**	-.12*	-.04	.080	.147**	-.223**	1		
RD	21.04	5.71	.87	-.14*	.08	-.13*	.191**	.182**	-.058	.229**	1	
AI				.09	.08	-.11*	.107	.140**	-.067	.158**	.290**	1

Notes: \*p < 0.05, \*\*p < 0.01 (two tailed).

Edu- Educational level, DE- Driving experience, DA- Driving anger, Al/Sub-Alcohol/substance use, ALT- Altruism, NOR- Normlessness, RD- Risky driving, AI- Accident involvement, M- Mean, SD – Standard deviation.

Table 2

Results of multiple regressions for predicting risky driving behavior from psychosocial factors.

Variables	β	t
Step 1		
Age	-.033	-.428
Edu	.100	1.857
DE	-.060	-.775
R <sup>2</sup>	.02	
Step 2		
DA	.13	2.33*
AL/sub	.19	3.56**
ALT	-.04	-.75
NOR	.22	3.84**
ΔR <sup>2</sup>	.12	
Total R <sup>2</sup>	.14	

Notes: \*p < 0.05, \*\*p < 0.01 (two tailed).

Edu- Educational level, DE- Driving experience, DA- Driving anger, AL/Sub- Alcohol/substance use, ALT- Altruistic, NOR- Normlessness, RD- Risky driving, AI- Accident involvement.

= 0.19, p < 0.01) and normlessness (β = 0.22, p < 0.01) were found to be positive and significant, indicating the fact that these variables uniquely and significantly contributed to the variation in the risky driving behavior. The remaining variable, altruism, has contributed nothing uniquely in terms of predicting risky driving behavior of the target drivers. Based on these results, H1 and H4 are accepted, whereas H2 is rejected.

6.1.4. Mediation analysis

To test the mediation role of risky driving behavior in the link between psychosocial variables and accident involvement, a regression path analysis was carried out. According to Baron and Kenny (1986), three conditions should be met to establish mediation. First, the independent variable(s) should be related to the mediator. Second, the mediator should be related to the dependent variable (s). Third, a significant relationship between the independent variable(s) and dependent variable(s) will be reduced (partial mediation) or it will no longer be significant (full mediation) when controlling for the mediator. The first assumption has already been met. To test the second and the third assumptions, accident involvement was first regressed over the assumed mediator and then over the whole psychosocial variables controlling for risky driving behavior.

The results in Table 3 show that 9 percent (ΔR<sup>2</sup> = 0.09, F (4, 324) = 9.42, p < 0.01) of variability in accident involvement was explained by risky driving behavior. The standardized path coefficient of risky driving behavior (β = 0.29, p < 0.01) was also found to be positive and significant, demonstrating its influence on accident involvement. Based on these results, H3, which is the second assumption for mediation analysis, is accepted.

To confirm the third assumption, consecutive regression analyses

**Table 3**  
Results of multiple regressions for predicting accident involvement from risky driving behavior.

Variables	$\beta$	t
Step 1		
Age	-.04	-.49
Edu	-.09	-1.66
DE	-.09	-1.14
R <sup>2</sup>	.01	
Step 2		
RD	.29	5.47**
$\Delta R^2$	.09	
Total R <sup>2</sup>	.10	

Note: \*\*p <0.01 (two tailed). Edu- Educational level, DE- Driving experience RD- Risky driving

were performed. First, accident involvement was regressed over psychosocial variables. Next, it was regressed over the same variables by controlling the effects of risky driving behavior.

Table 4 shows that small, but significant amount (4 percent) of variability in accident involvement was accounted for by psychosocial variables considered in the current study ( $\Delta R^2 = 0.04$ ,  $F(4, 305) = 3.45$ ,  $p < 0.01$ ). The standardized path coefficients show the presence of significant level of influence of alcohol or substance use ( $\beta = 0.14$ ,  $p < 0.05$ ) and normlessness ( $\beta = 0.11$ ,  $p < 0.05$ ) on accident involvement.

To test the assumption of reduction in variability of accident involvement due to psychosocial variables while controlling the influence of risky driving behavior, a regression was performed and its result is depicted in Table 5.

The results in Table 5 show that the amount of variability in accident involvement explained by psychosocial variables was reduced from 4 percent to about 1.5 percent ( $\Delta R^2 = 0.015$ ,  $F(4, 303) = 1.26$ ,  $p > 0.05$ ) when the influence of risky driving behavior was removed; thus, its contribution failed to reach a significant level. This confirms the presence of strong mediation role of risky driving behavior in the web of associations between predictor variables considered in the study and accident involvement. Thus, H5 of the study is accepted.

### 7. Discussion

The current study was aimed at examining the influence of some selected psychosocial variables such as driving anger, altruism, normlessness, and alcohol/substance use on risky driving behavior and accident involvement among drivers in Oromia Region, Ethiopia. The results of multiple regression analyses elucidated that driving anger, alcohol/substance use and normlessness have a significant effect on risky driving behavior of the target drivers. Irritable drivers who get frustrated in

**Table 4**  
Results of multiple regression for predicting accident involvement from psychosocial variables.

Variables	$\beta$	t
Step 1		
Age	-.03	-.39
Edu	-.07	-1.34
DE	-.09	-1.15
R <sup>2</sup>	.02	
Step 2		
DA	.06	1.07
AL/sub	.14	2.43*
ALT	-.02	-.33
NOR	.12	2.1*
$\Delta R^2$	.04	
Total R <sup>2</sup>	.06	

Notes: \*p <0 .05 (two tailed).

Edu- Educational level, DE- Driving experience, DA- Driving anger, AL/Sub- Alcohol/substance use, ALT- Altruistic, NOR- Normlessness.

**Table 5**  
Results of multiple regression of psychosocial variables predicting accident involvement while controlling risky driving behavior.

Variables	$\beta$	t
Step 1		
Age	.003	.033
Edu	-.07	-1.31
DE	-.07	-.86
RD	.23	3.9
R <sup>2</sup>	.09	
Step 2		
DA	.03	.61
AL/sub	.09	1.63
ALT	-.009	-.16
NOR	.07	1.18
$\Delta R^2$	.015	
Total R <sup>2</sup>	.106	

Note: \*\*p <0.01 (two tailed).

Edu- Educational level, DE- Driving experience, DA- Driving anger, AL/Sub- Alcohol/substance use, ALT- Altruistic, NOR- Normlessness, RD- Risky driving.

various traffic situations and those who drink alcohol/take some stimulants shortly before driving or drive under its influence were found to be more likely involved in risky driving behavior. This happens mainly because when drivers get angry, they engage in various acts of traffic rule violation such as speeding, tailgating, and sounding horn. This finding is consistent with the findings of Zhang and Chan (2016) which elucidated that driving anger is positive predictor of aberrant driving and accident involvement. Previous studies also confirmed that driving under the influence of drugs and stimulants can lead to risky driving by disturbing the function of nervous system and impairing drivers' skill (Aavik, 2010; Agbonkhese et al., 2013; Richer and Bergeron, 2009).

Likewise, normless drivers who tend to engage in socially disapproved behavior to achieve a certain personal goal are more likely to engage in risky driving because normlessness may mirror itself in traffic situations in the form of traffic rule violation or risky driving. Previous studies have also revealed that high score on normlessness is associated with higher score on risky driving (Iversen and Rundmo, 2002). Ulleberg and Rundmo (2003) also reported the presence of positive association between normlessness and risky driving behavior and negative association between altruistic behavior and risky driving behavior. On the other hand, although previous studies have found out a significant negative association between altruism and risky driving (Ge et al., 2014), the result of the current study failed to support this finding. This might have occurred due to culture sensitive nature of altruistic sub-scale.

The present study also revealed that psychosocial factors explain small amount of variabilities in accident involvement. Only normlessness and alcohol or substance use were found to have a significant impact on accident involvement. The examination of the association between risky driving behavior and accident involvement also showed that limited amount of variability in accident involvement was explained by risky driving behavior. Regarding the degree of the association between personality traits and accident involvement, researchers of the current study subscribes to the idea of Ulleberg and Rundmo (2003). According to these scholars, personality traits are weak predictors of accident involvement mainly because road traffic accidents are rare and often influenced by some other factors related to drivers' experience and road environment. It is also difficult to access victims of RTA and obtain better reliable data and minimize the effect of randomization.

In general, the current study revealed that, taken as a group, the psychosocial variables in the current study were found to be significant predictors of risky driving behavior and accident involvement. However, detail analyses of the prediction power of the independent variables indicate that alcohol/stimulants use, driving anger and normlessness uniquely predicted risky driving behavior. Lastly, the study explicated that risky driving behavior mediates the link between psychosocial

variables and accident involvement. In other words, psychosocial variables contribute to drivers' engagement in risky driving behavior on the road, a situation which may in turn enhance the likelihood of these drivers' involvement in road traffic accidents.

## 8. Conclusions

### 8.1. Conclusions

It is commonly acknowledged that human factors contribute greatly to road traffic accidents. In particular, driving behavior was identified as the most central of these factors. From the current study, it can be concluded that driving under the influence of alcohol or other stimulants and having personality traits such as driving anger and normlessness lead to aberrant driving behavior of public and freight transport drivers in Oromia National Regional State, Ethiopia. Besides, risky driving behavior of the target drivers accounts for a limited amount of variability in accident involvement. To summarize, psychosocial variables considered in the current study tend to exacerbate drivers' involvement in risky driving behavior, which in turn has some share in their accident involvement.

### 8.2. Implications

Given the increasing magnitude and severity of road traffic accidents in Ethiopia, road safety campaigns, education, and research seem to have been given less attention. The results of the current study have some implications for future actions and further research on RTA. The influences of psychosocial variables on risky driving behavior and accident involvement observed in the current study call for an integration of these factors into drivers' training curricula, safety campaign, traffic rule enforcement practices, and research. Particularly, alcohol/substance intake while driving or driving under its influence is found to be a critical factor for drivers to partake in risky driving, which may lead to road traffic accident. Thus, random breath testing and checking substance intake should be strictly enforced. Designing safety programs that take personality traits into account may also yield better results.

### 8.3. Limitations

Despite its substantive contributions, this study has certain limitations. Primarily, the cross-sectional design used in this study does not warranty causal relationships among variables. Though theoretically treating the personality traits as exogenous variables seems reasonable, for future research, longitudinal research design is suggested. Besides, the self-report questionnaire utilized in the study, despite its advantage, is susceptible to social desirability and memory biases. Hence, future research using other methods may help in checking the validity of the current study.

## Declarations

### Author contribution statement

Alemu Disassa: Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Habtamu Kebu: Conceived and designed the experiments; Analyzed and interpreted the data.

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### Competing interest statement

The authors declare no conflict of interest.

## Additional information

No additional information is available for this paper.

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