

Examining the Relationship Between Driving Anger and the Violation of Traffic Laws and Differences Based on Gender

Getrude C. Ah Gang Grace^{1,*}, Shazia Iqbal Hashmi¹, Nurul Hudani Md Nawi¹, Valerie Fung Yun Li² & Sharifah Haszeqah S. Jainal Abdibin²

*Corresponding author: getrudec@ums.edu.my

¹Faculty of Psychology and Education, University Malaysia Sabah, Sabah, Malaysia

²Sabah Skills and Technology Centre, Sabah, Malaysia

ABSTRACT

The implementation of traffic laws may promote safety and reduce potential risks for all road users. Nevertheless, not all road users, particularly drivers comply with traffic laws when they feel negative emotions, such as anger. To understand this phenomenon, a study was conducted to examine the relationship between driving anger and the violation of traffic laws. The difference between male and female drivers in terms of driving anger and the violation of traffic laws was also measured. A total of 222 drivers, 130 (58.6%) males, 91 (41%) females and one who did not mention his/her gender participated in this study, and the mean age was 34.43 years (SD=10.20). This study focused on drivers with a valid driver's licence in the area of Kota Kinabalu, Sabah. A set of questionnaires consisting of three (3) sections was used; Section A (demographic profile comprising age, driving experience, gender, academic level, and driving experience); Section B (self-reported violation of traffic laws) and Section C (driving anger). Data were analysed using simple regression analysis and an independent t-test. The study showed that driving anger contributed to 3% of the variance in the violation of traffic laws. Moreover, the male drivers scored higher on the violation of traffic laws than the female drivers. By contrast, the female drivers scored higher on driving anger than the male drivers. The results provided an insight into the effects of anger on the violation of traffic laws and the difference between males and females in terms of driving anger and the violation of traffic laws. The outcomes can be used as guidelines for relevant authorities in creating a road safety programme that focuses on strategies for managing and controlling anger while on the road. These guidelines may reduce the negative effects of anger, such as the violation of traffic laws, on driving behaviour.

© 2020, Malaysian Institute of Road Safety Research (MIROS). All rights reserved.

ARTICLE INFO

Article History:

Received 29 August 2019

Received in revised form

06 Dec 2019

Accepted

10 Mac 2020

Available online

01 May 2020

Keywords:

Traffic laws

Driving anger

Traffic violation

1. Introduction

The global rise in the amount of road crashes, which result in large numbers of fatalities and disabilities, is recognized as a major public health concern. More than 1.2 million people worldwide die on the roads every day, and about 50 million are injured (World Health Organization, 2009). Malaysia has the third highest fatality rate from road traffic accidents in Asia and ASEAN, behind Thailand and Vietnam (Lum, 2019). Road accidents in Sabah increased from 462 cases in 2014 to 525 cases in 2016 (Borneo Post, 2016). According to the State Social Security Organisation and director Azhar Md Nadzri, this increase of 13.63% is a major concern, and more programmes on road safety need to be conducted in Sabah (Borneo Post, 2016). The number of private cars on the road has increased at an alarming speed within Kota Kinabalu City over recent years. Nowadays, it is very common for every household to own a personal car. Everyone wants to own a car, and the main reason behind it is that everyone thinks that it is very inconvenient to travel around Kota Kinabalu City without a car (Thien, 2007). This, however, causes road congestion which may make some drivers angry. The situation has become worse with the road construction in Kota Kinabalu, and people get frustrated when they are caught up in

the middle of traffic jams. The increasing traffic congestion in Kota Kinabalu has developed into a more serious problem than we originally thought (Morpi, 2015). The road congestion in Kota Kinabalu is aggravated by problems with road design and maintenance in the city, a style of driving which shows little respect for other road users, faulty information on traffic conditions and unsuitable management by insensitive authorities (Borneo Post, 2019).

According to the statistics from the Malaysian Institute of Road Safety Research (MIROS), fatalities due to road accidents in 2011 numbered on 6,877, which was a slight increase from 6,872 in 2010. The MIROS is committed to continuing to find ways to combat the forecast increase in road accident fatalities, which are estimated to reach 10,716 in 2020 (Rohayu et al., 2012).

To reduce the number of road accidents, many relevant authorities have implemented road safety campaigns and programmes. The objectives of these programmes are to inculcate a positive attitude towards and knowledge of road safety and to make road users more alert to potential road accidents. During important celebrations and on special occasions, relevant authorities such as the Police Traffic, Road Transportation Department and Malaysia Road Safety Department intensify their road safety campaigns and

programmes as the rate of road accidents increases, for example during Hari Raya, Chinese New Year, Christmas and Deepavali. For example, the *Ops Selamat Gawai Dayak* statistics reported 572 accidents in the past 14 days since the start of the operation. Among these accidents, 70% were due to attitude and the remaining ones were because of road or vehicle conditions (Wong, 2015).

Although many road safety programmes have been implemented, many drivers remain unaware that human error is a major root cause of road accidents in today's world, as revealed in past studies (e.g., Bekibele et al., 2007; Hojjati-Emami et al., 2012; Iversen et al., 2005; Yilmaz & Elik, 2006). In Malaysia, 94% of road accidents are caused by the negligence of the driver (Lim, 2007). Another factor that may contribute to road accidents is the role of negative human emotions, such as anger. Recent research and media reports have suggested that incidents involving angry drivers are becoming common. Moreover, many studies have indicated that anger is one of the most prevalent factors involved in road accidents. Some authors also reported a relationship between a high level of anger and various risky behaviours on the road, including tailgating, speeding, and light flashing. Therefore, anger contributes to the violations of traffic laws such as speeding, making illegal U-turns, and failing to stop at a red traffic light. Past research (e.g., Nesbit et al., 2006; Sullman et al., 2014) showed that driving anger is a type of anger that represents a significant and dangerous phenomenon that commonly occurs in society. Anger, as a personality trait, is one of the most important issues that has been investigated extensively (Yasak & Esiyok, 2009).

Anger increases the probability of risky driving behaviours, such as driving too fast, flashing bright headlights, and aggressive verbal or physical behaviours. Driving anger, as opposed to aggressive driving, was initially defined as a situation-specific emotional construct comprised of anger-related feelings and thoughts that occur while driving. Anger is an emotion that drivers usually feel and express while driving, and it is believed by researchers to be an important cause of dangerous driving behaviour (Gonzalez-Iglesias et al., 2012; Qu et al., 2016). It also refers to a psychobiological emotional state characterised by feelings of annoyance of variable intensity, largely depending on the inference a subject makes about the intentionality of another. In fact, the attributes of hostility and malevolence can be seen as the key features of anger, and ones that are essential to assessing this emotion; therefore, the relationship of people with their environment is crucial in this context (Miguel-Tobal et al., 2001). Deffenbacher et al. (1994) defined the concept of driving anger as the propensity to become angry behind the wheel. Their study revealed a positive correlation between driving anger and the violation of traffic laws.

Many reasons account for why people feel a general inhibition against breaking the law most of the time. Some may think that it is wrong to violate road regulations, and, that it is costly in terms of receiving a road penalty for not following the rules, and other people follow the rules without thinking about it at all (Sigelman & Sigelman, 1976). Road accidents can happen at any time and in any place. However, apart from implementing road safety programmes and campaigns, the public should understand the effects of driving anger on the violation of traffic laws, which we believe may contribute to the increased rate of road crashes and road penalties. Therefore, one way to promote a positive attitude is by examining the factors that contribute to the violation of traffic laws, such as the level of driving anger, and also the differences in driving anger and the violation of traffic laws across the genders.

2. Literature Review

Implementing traffic laws may reduce the potential risk of road crashes, but not many people comply with road regulations. One of the factors that cause road crashes is negative emotions, such as anger. Past studies (e.g., Nesbit et al., 2006; Sullman et al., 2014; Yong, 2014) revealed that driving anger is a type of anger that represents a significant and dangerous phenomenon that commonly

occurs in society. Ellison-Potter et al.'s (2001) study revealed that drivers who drove in a simulator in anonymous conditions and were exposed to aggressive stimuli tended to drive more aggressively than those who drove in an identifiable condition. The reason for this outcome may be that these drivers experienced deindividuation, which creates a lack of understanding and accountability towards other drivers, particularly when they feel angry. Thus, they tended to show inappropriate behaviour, such as violating traffic laws by failing to follow road regulations, speeding, running a red light, and tailgating. Past studies revealed that when someone is angry, the probability of risky driving behaviours such as driving too fast, flashing bright headlights and aggressive verbal or physical behaviours is high (Nesbit et al., 2006; Sullman et al., 2014). Moreover, angry individuals are also more likely to engage in aggressive driving behaviours, which result in more traffic violations and automobile accidents, than drivers with low anger levels (Deffenbacher et al., 2000, 2002).

A meta-analyses study conducted by Bogdan et al. (2016), based on 51 related studies, found that there is a positive relationship between anger and aggressive driving. In terms of gender, men tend to react more angrily and aggressively while driving (especially during traffic jams) than women (Shinar, 1998). Males and females differ in the way they express anger and aggressiveness (Anderson & Bushman, 2002). Females tend to adopt quieter and more covert aggression forms (e.g., swearing and whispered insults), whereas males tend to exhibit more explicit and directly observable aggressive behaviours (e.g., obscene gestures) (Galovski & Blanchard, 2004). However, most researchers revealed that male drivers tend to show more anger (e.g., Gonzalez-Iglesias et al., 2012) and comply less with traffic laws than female drivers (e.g., Akaateba & Amoh-Gyimah, 2013; Sigelman & Sigelman, 1976; Vardaki & Yannis, 2013). Deffenbacher et al. (2002) used the Driving Anger Expression Inventory (DAX) to conduct research in this area and found males to have significantly higher scores than females on two scales, namely those of Personal Physical Aggressive Expression (Deffenbacher et al., 2002) and Use of the Vehicle to Express Anger (Deffenbacher et al., 2004).

However, other past studies showed contradictory findings. For example, with regards to driving anger, female drivers showed more anger than men. (e.g., Brewer, 2000; Sullman et al., 2014). A study conducted by Cordellieri et al. (2016) found that the level of risk perception when driving is the same for males and females or is lower in females than in men. Identical conclusions were drawn by Van Rooy et al. (2006), and Hennessy & Wiesenthal (2001), who identified significant gender differences in extremely violent situations (e.g., road chases and physical confrontation with other drivers). One plausible explanation for these results is that females tend to anticipate the potential risks and future consequences of their actions better than males; therefore, as a self-protective mechanism, they avoid any violent behaviours that may elicit an angry reaction from their opponents (Eagly & Steffen, 1986). Although females may be as angry as males, or even more so, in driving situations, they do not always exhibit aggressive driving behaviour in response. Females are also more likely to drive with children on board, which is a strong incentive to drive more safely and avoid external manifestations of anger (Lonczak et al., 2007). The preceding contradictory studies showed the need to explore and understand more about the difference between male and female drivers in terms of driving anger and violation of traffic laws, aside from examining the effects of driving anger on the violation of traffic laws.

This study examines the driving anger as a predictor of the traffic laws violation. This study needs to be conducted due to the fact that non-compliance with traffic and road safety regulations is the main contributing factor to the rise in the number of fatal road accidents in Sabah, as stated by the Sabah State Police Commissioner, Datuk Omar Mammah. Bad attitudes, such as speeding and having no regard for the safety of other road users, also contributed to increasing road fatalities in Sabah (Dzulkipli, 2019). Besides examining the two (2) factors, we also interested in making a

comparison of driving anger and traffic laws violation across the genders.

3. Study Aims

The aims of this study are as follows:

- i. To examine the driving anger as a predictor on the violation of traffic laws among road users in Kota Kinabalu City, Sabah.
- ii. To examine the differences between male and female drivers in terms of driving anger.
- iii. To examine the differences between male and female drivers in terms of violation of traffic laws.

4. Research Framework

Our study refers to Heinrich's domino theory (Heinrich, 1950), which states that accidents result from a chain of sequential events, metaphorically, like a line of dominoes falling over. Heinrich posits five metaphorically dominoes: social environment and ancestry, fault of person, unsafe act or mechanical or physical hazard (unsafe condition). In this study, driving anger represents the first domino, which may affect the second domino, i.e., traffic road violations. When one of the dominoes falls, it triggers the other factors. We also examine gender, which also represents the first domino and might explain unsafe activities, such as driving anger and traffic road violations.

In this study, the level of driving anger is the independent variables, and the violation of traffic law stands as the dependent variable. We assume that the participants who have a high level of driving anger were more involved in the violation of traffic laws than those with a low level of anger and that males would show a higher score in driving anger and violation of traffic law than females.

5. Method

5.1. Research Design

We involved drivers who have a valid driver's license, and who frequently use the roads in the area of Kota Kinabalu, Sabah. We targeted the drivers in Kota Kinabalu because we assumed that they spent more time on the road. We based this assumption on Sullman et al. study (2014), which revealed that Malaysian drivers spent the largest proportion of their time driving in the city (42.8%), followed by urban roads (27.0%), motorways (29.6%), and rural country roads (0.6%). The drivers were selected through purposive sampling. Filling in the questionnaire, which consisted of four parts, took almost 20 minutes to complete. We used the survey method to collect and measure our hypotheses.

5.2. Participants

A total of 224 participants took part in this study. Among them, 131 (58.50%) were male drivers and 92 were female drivers (41.10%). The mean age was 34.51 ($SD=10.22$). Each participant met the inclusion criteria (i.e. must have a drivers' license, own a vehicle and hold Malaysian citizenship).

5.3. Procedure

We used different strategies, namely, snowball sampling and advertisements in various agencies, to recruit prospective participants. Several steps were followed during the data collection. First, the researchers introduced themselves to the participants and provided brief information about the study. Second, each participant was given the information statement containing the research background information, such as the procedures, risks and benefits of being involved in the study, the confidentiality of the data and the voluntary nature of participation. Once the participants gave their

indication of wanting to participate in our study, they were given a copy of the questionnaire.

6. Instrument

A set of questionnaires that consisting of three sections was distributed to participants:

6.1. Section A: Demographic Profile

Measures the demographic profile, namely age, gender, educational level, driving experience, involvement in road safety programs and road accidents. There are 16 items in this section.

6.2. Section B: Self-reported Violation of Traffic Laws

The self-reported violation of traffic laws scale designed by Akaateba & Amoh-Gyimah (2013) consists of 10 items that measure the frequency of 10 different types of violations of traffic laws reported by participants. The sample items are as follows; 'using a mobile phone when driving', 'driving under the influence of alcohol' and 'failing to comply with a traffic light signal'. The response rate is from 1 (seldom) to 4 (always).

6.3. Section C: Driving Anger Scale

The driving anger scale (Deffenbacher et al., 1994) in the short form version consists of 14 items. It is a unidimensional scale that measures the participants' level of aggression while on the road. The participants' rate each item based on a five-point Likert-type scale from 1 'not at all angry' to 5 'very much angry'. A study conducted by Edwards et al. (2013) showed that the internal consistency of the driving anger scale (i.e., coefficient alpha) was 0.82. The sample items are as follows; 'someone backs right out in front of you without looking', 'you are stuck in a traffic jam', and 'someone runs at a red light or stop sign'. The driving anger scale is scored by obtaining the mean of the 14 items. Higher scores out of a maximum of five are indicative of higher levels of driving anger.

7. Results

The reliability values for both scales were acceptable: 0.89 for driving anger and 0.88 for the self-reported violation of traffic laws. Table 1 shows the demographic profile of the participants. Data were analysed using the SPSS-version 19 (Statistical Package for Social Sciences). Simple regression analysis and an independent t-test were used to test the research hypotheses.

Table 1: Demographic profile of the participants (N=222)

Variables	Number	Percentage
Gender		
Male	130	58.60
Female	91	41.00
Missing	1	0.50
Involved in accident		
Yes	75	33.78
No	147	66.22
Missing	1	0.50
Traffic penalty		
Yes	37	16.70
No	182	82.00
Missing	2	1.80
Types of accidents		
Hit by another driver's car/motorbike	21	9.50
Hit a car/motorbike	25	11.30
Slipped to the road side	7	3.20
Hit the lamppost	1	0.50
Experienced all of the above	9	4.10

Continued on next page.

Table 1 – Continued from previous page.

Variables	Number	Percentage
Types of accidents		
Other types of accident	12	5.40
Never been involved in a road accident	147	66.20
Academic Level		
Degree	47	21.20
Diploma	76	34.20
Secondary school (1-5)	84	37.80
Primary school	8	3.60
No education	3	1.40

Table 2 shows the statistical results (means and standard deviations) for the 10 items on the self-reported violation of traffic laws scale. The total mean for the overall violation of traffic law was 1.42. The three most frequently violated traffic laws reported by the respondents were exceeding the speed limit, using mobile phones, and failing to wear the seat belt and not stopping at the pedestrian crossing when pedestrians are waiting to cross obtained the lowest mean (1.20). The other types of traffic law violations are shown in Table 2.

Table 2: Mean and standard deviation of each component of the violation of traffic laws.

Statement:	Mean (SD)	Rank
To what extent do these traffic violations apply to you		
Overtaking when prohibited	1.29 (0.58)	7
Using a mobile phone when driving	1.56 (0.76)	2
Failing to comply with a traffic light signal	1.42 (0.72)	4
Failing to wear a seat belt	1.55 (0.84)	3
Getting off the road to bypass a traffic jam	1.40 (0.65)	6
Driving too close to the car in front	1.34 (0.65)	5
Not stopping at a pedestrian crossing when pedestrians are waiting to cross	1.20 (0.55)	8
Driving under the influence of alcohol	1.29 (0.69)	7
Stopping at undesignated areas to pick passengers	1.28 (0.63)	8
Exceeding the speed limit	1.84 (0.87)	1
Total mean	1.42	

Our study found that the level of driving anger contributed to 3% of the variance in the violation of traffic laws ($\beta=0.19$, $t_{(189)}=2.57$, $p=0.00$). From the results, we can conclude that a higher score for driving anger is related to traffic laws violation.

Table 3: A simple regression analysis of the effects of driving anger on the violation of traffic laws.

Predictor	Violation of traffic law		
	R ²	β	Sig
Driving anger	0.03	0.19	0.01

The study showed a significant difference between males and females in driving anger. The female drivers showed a higher level of driving anger than the male drivers ($t=-3.26$, $p<0.05$, 95%, CI (-7.21; 1.84). In contrast, the males showed a higher rate of violation of traffic laws than females. The results, however, were considered to be marginal (could go either way) ($t=-3.26$, $p<0.05$, 95%, CI (0.17; 4.68). In other words, under certain conditions, females might show higher levels of the violation of traffic laws.

Table 4: The analysis of independent t-test to examine the difference between male and female drivers regarding driving anger and the violation of traffic laws.

Predictor					
Gender	N	Mean (SD)	t value	Sig	Cohen's d
Driving anger					
Males	127	33.85 (10.60)	-3.26	0.00	0.45
Females	90	38.38 (9.33)			
Violation of traffic law					
Males	107	25.78 (9.34)	2.00	0.046	0.30
Females	80	23.35 (6.27)			

8. Discussion

8.1. Relationship between Driving Anger and the Violation of Traffic Law

Our study revealed that drivers who showed a higher level of driving anger are more likely to be involved in the violation of traffic laws, such as exceeding the speed limit, driving too close to the car in front of them, overtaking when it is prohibited to do so and failing to comply with traffic light signals. These results may be due to these drivers forgetting about their safety and being more influenced by their state of mind when they feel angry. According to Stendl & Kirby (2016), anger is a quick, powerful, and reactive emotion that tends to make people lose control. Anger is even more dangerous when people are behind the wheel. Past studies (e.g., Nesbit et al., 2006; Sullman et al., 2014) found that driving anger is one type of anger that represents a significant and dangerous phenomenon that commonly occurs in society. When an individual is angry, the probability of exhibiting risky driving behaviour, such as driving too fast, flashing bright headlights, and aggressive verbal or physical behaviours, is high (Nesbit et al., 2006; Sullman et al., 2014). Our study found that the most frequently violated traffic law reported by the participants was exceeding the speed limit. A study conducted by the Crash Reconstruction Unit of the MIROS revealed that speeding is one of the main causes of road accidents (JKJR, 2014). Driving anger caused by exceeding the speeding limit may cause problems for drivers.

Another concept from Social Psychology that may help us to understand the reasons why drivers who are angry tend to violate traffic laws is deindividuation (Sutton & Douglas, 2013). Deindividuation is the reduction of self-consciousness due to anonymity provided by a group or the inability to be individually identified (Festinger et al., 1952). Deindividuation may create a lack of one's awareness and responsibility for one's actions. For example, people on the road are surrounded by another group of drivers. They are largely anonymous and physically cut out from other drivers. The anonymity gives drivers the perception that they will not be recognised and, therefore, will not be punished as a consequence of their aggressive behaviour. In their experimental study, Ellison-Potter et al. (2001) revealed that drivers drive more aggressively when they are anonymous and exposed to aggressive stimuli than when they are in an identifiable condition. This fact can increase aggressive behaviours (Herrero-Fernández, 2011). Although the driving simulator was not used on an actual road, the results can help to understand why angry drivers may cause trouble and put themselves at risk. In actual conditions, the behaviour may also bring harm to other road users.

Parkinson's study (2001) found that anger could intensify when the driver could not communicate their frustration and anger to the other drivers who caused their anger. The way people express or deal with their anger is also important. Two people may be equally angered by the same situation, but express that anger in dramatically different ways. One driver may scream at the driver, give the offending driver the finger and drive menacingly up on the other

driver's bumper, precipitating a high-speed chase in which the drivers run each other off the highway. The other angry driver may mumble something to him/herself and continue to drive safely with no negative outcomes, saving the momentary negative affect and arousal (Parkinson, 2001). The particular form of expression and the intensity of anger may play an important role in the safety, health and wellbeing on the road of drivers and in those of the others who ride or share the road with them (Deffenbacher et al., 2002). The form of anger expression was not examined in this study. However, in the present study, the participants reported their anger based on 14 imagined road specific-situations that would provoke participants to become angry.

According to other studies, males and females express driving anger in different ways; for example, males are more prone to adopting disadaptive expressions of anger (e.g., physical aggression) than females. Deffenbacher et al. (2002) found that men and women do not differ in verbal expression of anger while driving but that men exhibit considerable differences in physical, personal, and aggressive expressions, displaced aggression, and the total aggression index, where they invariably scored higher than women. An identical trend was revealed in another study by the same authors (Deffenbacher et al., 2004).

8.2. Females Exhibited More Driving Anger than Males

Our research finding is consistent with Sullman et al.'s (2014) study, which reported that female drivers exhibit more anger than males. Similarly, Brewers's study (2000) found that women exhibited more impatience, frustration, and anger than men on the roads. This finding may be due to the fact that females show great concern about their road safety and are easily distracted when they experience or observe other drivers who are discourteous and who displayed inappropriate driving behaviours, for example, when confronted with other drivers who drive slow in the fast lane or move slowly when the traffic light changes from red to green. According to Cordellieri et al. (2016), females are more concerned about the risk of a road accident than males. This finding may be one of the reasons why female drivers show more anger when they are behind the wheel and experience provocative road-specific situations.

Driving anger based on driving-specific situations may bring potential harm to female drivers, particularly if they cannot manage their anger well. The participants who reported anger, drove faster and exceeded the speed limit more often than those who did not report anger. Individuals who reported high levels of anger were more likely to be outwardly aggressive while driving than they were in non-driving situations (Mesken et al., 2007). By contrast, the study by Gonzalez-Iglesias et al. (2012) found that males were angrier than females with regard to police presence and traffic obstructions, which is inconsistent with our findings. Driving anger itself could be used to identify at-risk drivers. Some drivers may not perceive themselves as easily angered until they are in the middle of a provocative situation (Edwards et al., 2013). A study conducted by Bogdan et al. (2016) suggested that gender is one of the moderators that can moderate the relationship between anger and aggressive driving, as well as age and region. However, Zhang et al.'s study (2018) found opposite findings in that Chinese male drivers reported significantly more 'hostile gesture' anger than female drivers. This might be affected by other external factors, such as the types and level of anger.

8.3. Males Showed a Higher Violation of Traffic Laws than Females

Our study revealed that male drivers reported a greater number of fines and accidents and were more prone to violating traffic regulations than female drivers (Gonzalez-Iglesias et al., 2012). Vardaki & Yannis (2013) found that female drivers have stronger views in support of traffic violation countermeasures and compliance with traffic rules than males. Moreover, male drivers reported a lower level of normative motivation to comply with traffic laws and

a higher commission of traffic violations than female drivers (Yagil, 1998). This finding is in accordance with Sigelman and Sigelman's study (1976), which revealed that women drivers over 30 were more compliant with traffic regulations (i.e., right turns on the red light) under four conditions; when driving alone, behind a violating model, in the presence of a uniformed authority figure, and the presence of both violating model and a uniformed authority figure.

Akaateba & Amoh-Gyimah (2013) showed that males have a higher tendency to not comply with traffic laws than females in Ghana. Whereas females are trained and brought up to be obedient, submissive, passive, and risk-averse, males are raised to be independent, take risks, speak out, and challenge the status quo. Males tend to be over-confident of their driving ability as opposed to females; as a result, they tend to comply selectively with traffic laws, thus increasing their frequency of violating them. Females appear to sharply reduce their driving speed in their 20s, and then maintain this reduced speed as their age increases. However, males do not appear to reduce their "normal" driving speed until their 30s, but rather choose higher speeds than age-equivalent females (Lancaster & Ward, 2002). Male drivers in Turkey are involved in fatal accidents more often than females, as is the case worldwide (Yilmaz & Celik, 2006). Generally, males are involved in road accidents and violate traffic regulations more often than women. These differences persist even after correcting the results for annual mileage. Moreover, males express driving anger in a more aggressive way than females, and the specific situations that elicit an angry response difference between the two genders. The driving anger variables significantly contribute to explaining the self-reported driving violations and their theoretical and treatment implications.

9. Limitations

This study measured two types of driving conditions, i.e. driving anger and violation of traffic laws. One of the limitations in this study is the use of self-reported driver attitudes to traffic violations. The validity of self-reports by drivers is unknown and this uncertainty can affect the results of the study. Some drivers may choose to present themselves as drivers who frequently commit traffic violations, others may have the tendency to impress by giving ideal self-descriptions to make the best possible impression, and some may simply regard such information as sensitive and choose not to respond to socially undesirable attitudes (Akaateba & Amoh-Gyimah, 2013). In this study, we did not ask for the participants' names, and all the participants were informed that their data would be kept anonymous and confidential. Therefore, we believe that a completely anonymous response may increase the number of honest answers as stated by Muhlenfeld (2005).

10. Conclusions and Implications

Human factors play an important role in road accidents. Road traffic accidents cause numerous deaths and injuries throughout the world. We expect the research findings to increase awareness (e.g., attitudes) and knowledge (e.g., personality) about the effects of driving anger on the violation of traffic laws. People should control their anger as it is an emotional state characterised by feelings of the annoyance of variable intensities, depending largely on the inference the subjects make about the intentionality of another. Furthermore, the outcome of our study can be used as a guideline for implementing road safety programmes and campaigns that focus on anger and its' effect on road safety. Besides, there is a need to organise anger management for drivers in dealing with their negative emotions and teach new strategies to avoid aggressive driving that may lead to road rage. Management and training programmes targeted at each gender should be included in the driving process.

In the future, it may be interesting if this study can be further extended by examining the expression of anger between males and females while on the road. Some female drivers may be using

suppression techniques or displacing their anger as opposed to outwardly expressing it in comparison with male drivers. In plans, relevant authorities should include the psychological test in the driver's license exam to evaluate any potential aggressive drivers as suggested by Saucan et al. (2011), and provide knowledge in handling anger while driving in their driving program or campaign.

Acknowledgements

We would like to thank the Sabah Skills Training Centre and our enumerators for assisting us in the data collection. We are also grateful to all the participants who contributed their data to this study. We appreciate your kind assistance and support.

References

- Akaateba, M.A., & Amoh-Gyimah, R. (2013). Driver attitude towards traffic safety violations and risk-taking behaviour in Kumasi: The gender and age dimension. *International Journal for Traffic and Transport Engineering*, 3(4), 479 – 494. DOI: [http://dx.doi.org/10.7708/ijtte.2013.3\(4\).10](http://dx.doi.org/10.7708/ijtte.2013.3(4).10)
- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, 53, 27 – 51.
- Bekibele, C. O., Fawole, O. I., Bamgboye, A. E., Adekunle, L. V., Ajav, R., & Baiyerojo, A. M. (2007). Risk factors for road traffic accidents among drivers of public institutions in Ibadan, Nigeria. *African Journal of Health Sciences*, 14(3 – 4), 137 – 142.
- Bogdan, S. R., Mairean, C., & Havarneanu, C. (2016). A meta-analysis of the association between anger and aggressive driving. *Transportation Research*, 350 – 364. DOI.org/10.1016/j.trf.2016.05.009
- Borneo Post (January 13, 2019). *Ideas to ease mounting traffic congestion*. Retrieved from <https://www.pressreader.com/malaysia/the-borneo-post-sabah/20190113/281874414564861>
- Borneo Post (April 8, 2016). *Road accidents up 13.63% in Sabah*. Retrieved from <http://www.theborneopost.com/2016/04/08/road-accidents-up-13-63-in-sabah/>
- Brewer, A. (2000). Road rage: What, who, when, where and how? *Transport Reviews*, 20, 49 – 64.
- Cordellieri, P., Baralla, F., Ferlazzo, F., Sgalla, R., Piccardi, L., & Giannini, A. M. (2016). Gender effects in young road users on road safety attitudes, behaviours and risk perception. *Front Psychology*, 7, 1412, DOI:10.3389/fpsyg.2016.01412
- Deery, H. A. (1999). Hazard and risk perception among young novice drivers. *Journal of Safety Research*, 30(4), 225 – 236. [https://doi.org/10.1016/S0022-4375\(99\)00018-3](https://doi.org/10.1016/S0022-4375(99)00018-3)
- Deffenbacher, J. L., Oetting, E. R., & Lynch, R. S. (1994). Development of a driving anger scale. *Psychological Reports*, 74, 83 – 91.
- Deffenbacher, J. L., Huff, M. M., Lynch, R., Oetting, E., & Salvatore, N. (2000). Characteristics and treatment of high-anger drivers. *Journal of Counselling Psychology*, 47, 5 – 17, DOI:10.1037/0022-0167.47.1.5
- Deffenbacher, R. S., Lynch, E. R., Oetting, & R. C. Swaim. (2002). The driving anger expression inventory: A measure of how people express their anger on the road. *Behaviour Research and Therapy*, 40(6), 717 – 737.
- Deffenbacher, J. L., White, G. S., & Lynch, R. S. (2004). Evaluation of two new scales assessing driving anger: The driving anger expression inventory and the driver's angry thoughts questionnaire. *Journal of Psychopathology and Behavioural Assessment*, 26, 87 – 99.
- Edwards, B. D., Warren, C. R., Tubré, T. C., Zyphur, M. J., & Hoffner-Prillaman, R. (2013). The validity of narcissism and driving anger in predicting aggressive driving in a sample of young drivers. *Human Performance*, 26, 191 – 210. DOI: 10.1080/08959285.2013.795961
- Eagly, A. H., & Steffen, V. J. (1986). Gender and aggressive behaviour: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, 100, 309 – 330.
- Ellison-Potter, P., Bell, P., & Deffenbacher, J. (2001). The effects of trait driving anger, anonymity and aggressive stimuli on aggressive driving behavior. *Journal of Applied Social Psychology*, 31(2), 431 – 443.
- Festinger, L., Pepitone, A., & T. Newcomb, T. (1952). Some consequences of de-individuality in a group. *The Journal of Abnormal and Social Psychology*, 47(2S), 382.
- Heinrich, H. (1950). *Industrial accident prevention: A scientific approach*. New York: McGraw Hill.
- Galovski, T. E., & Blanchard, E. B. (2004). Road rage: A domain for psychological intervention? *Aggression and Violent Behaviour*, 9, 105 – 127.
- Gonzalez-Iglesias, B., Gomez-Fraguela, X.A., & Luengo-Martin, M. A. (2012). Driving anger and traffic violations: Gender differences. *Transportation Research Part F: Traffic Psychology and Behaviour*, 15(4), 404 – 412. DOI: 10.1016/j.trf.2012.03.002
- Heinrich, H. W. (1950). *Industrial accident prevention: A scientific approach*. New York: McGraw Hill.
- Herrero-Fernández, D. (2011). Psychometric adaptation of the driving anger expression inventory in a Spanish sample: Differences by age and gender. *Transportation Research Part F: Traffic Psychology and Behaviour*, 14, 324 – 329.
- Hojjati-Emami, K., Dhillon, B., & Jenab, K. (2012). Reliability prediction for the vehicles equipped with advance driver assistance system (ADAS) and passive safety systems (PSS). *International Journal of Industrial Engineering Computations*, 3(5), 731 – 742.
- Iversen, H., Rundmo, T., & Klempe, H. (2005). Risk attitudes and behaviour among Norwegian Adolescents: The effects of behaviour modification programme and a traffic safety campaign. *European Psychologists*, 10, 25 – 38. DOI 10.1027.1016-9040.10.1.25
- JKJR (2014). *Road safety plan of Malaysia 2014 – 2020*. Putrajaya: Jabatan Keselamatan Jalan Raya (JKJR).
- Lancaster, R., & Ward, R. (2002). *The contribution of individual factors to driving behaviour: Implications for managing work-related road safety*. Research Report 020, Norwich.
- Lim, A. K. (2007). *Hubungan sikap pengguna dengan keterlibatan dalam kemalangan jalan raya, kajian kes di Melaka* (Master's thesis). Universiti Sains Malaysia (USM).
- Lonczak, H. S., Neighbors, C., & Donovan, D. M. (2007). Predicting risky and angry driving as a function of gender. *Accident Analysis and Prevention*, 39, 536 – 545.
- Lum, M. (2019). *We have the third-highest death rate from road accidents*. Retrieved from <https://www.star2.com/health/2019/05/14/we-have-the-third-highest-death-rate-from-road-accidents/#dU2s8276mUt13oFB.99>
- Mesken, J., Hagenzieker, M. P., Rothengatter, T., & De Waard, D. (2007). Frequency, determinants, and consequences of different drivers' emotions: An on-the-road study using self-reports, (observed) behaviour, and physiology. *Transportation Research Part F: Traffic Psychology and Behaviour*, 10(6), 458 – 475.
- Miguel-Tobal, J. J., Casado, M. I., Cano-Vindel, A., & Spielberger, C. D. (2001). *Inventario de expresión de la ira estado-rasgo (STAXI-2)*. Madrid: TEA Ediciones.
- Morpi, M. (2015). *World Bank report highlights worsening KK traffic woes*. The Borneo Post. Retrieved from <http://www.theborneopost.com/2015/07/world-bank-report-highlights-worsening-kk-traffic-woes>
- Muhlenfeld, H. U. (2005). Differences between “talking about” and “admitting” sensitive behaviour in anonymous and non-anonymous web-based interviews. *Computers in Human Behaviour*, 21, 993 – 1003.
- Nesbit, S. M., Conger, J. C., & Conger, A. J. (2006). A quantitative review of the relationship between anger and aggressive driving. *Aggression and Violent Behaviour*, 12, 156 – 176.
- Parkinson, B. (2001). Anger on and off the road. *British Journal of Psychology*, 92, 507 – 526.
- Qu, W., Dai, M., Zhao, W., Zhang, K., & Ge, Y. (2016). Expressing anger is more dangerous than feeling angry when driving. *PLoS ONE*, 11(6), e0156948. DOI: 10.1371/journal.pone.0156948
- Rohayu, S., Sharifah Allyana, S. M. R., Jamilah, M. M., & Wong, S.V. (2012). *Predicting Malaysian road fatalities for year 2020*. MRR 06/2012. Kuala Lumpur: Malaysian Institute of Road Safety Research.
- Shinar, D. (1998). Aggressive driving: The contribution of the drivers and the situation. *Transportation Research Part F: Traffic Psychology and Behaviour*, 1, 137 – 159.
- Sigelman, C. K., & Sigelman, L. (1976). Authority and conformity: Violation of traffic regulation. *The Journal of Social Psychology*, 100, 35 – 43.
- Steindl, S., & Kirby, J. (17 December 2016). *The dangerous of getting angry while driving*. Sunshine Coast Daily. Retrieved from <https://www.sunshinecoastdaily.com.au/news/the-dangers-of-getting-angry-while-driving/3123482/>
- Sutton, R., & Douglas, K. (2013). *Social psychology*. UK: Palgrave Mac Millan.
- Sullman, M. J. M., Stephens, A. N., & Yong, M. (2014). Driving anger in Malaysia. *Accident Analysis and Prevention*, 71, 1 – 9.
- Saucan, D., Micle, M., Popa, C., & Oancea, G. (2011). Violence and aggressiveness in traffic. *Social and Behavioural Sciences*, 33, 343 – 347.

- Thien, C. Y. (2007). *A study on the public transportation issues in Kota Kinabalu City* (Unpublished Master's thesis). Kota Kinabalu: Universiti Malaysia Sabah.
- Van Rooy, D. L., Rotton, J., & Burns, T. M. (2006). Convergent, discriminant, and predictive validity of aggressive driving inventories: They drive as they live. *Aggressive Behaviour*, 32, 89 – 98.
- Vardaki, S., & Yannis, G. (2013). Investigating the self-reported behaviour of drivers and their attitudes to traffic violations. *Journal of Safety Research*, 46, 1 – 11. DOI: <http://dx.DOI.org/10.1016/j.jsr.2013.03.001>
- Wong, D. (June 8, 2015). *70% of Malaysian road crashers due to drivers' attitudes*. Retrieved from <http://www.therakyatpost.com/news/2015/06/08/studies-show-70-of-road-crashes-due-to-drivers-attitudes/>
- World Health Organization (2009). *Global status report on road safety*. Switzerland: WHO Press.
- Yasak, Y., & Esiyok, B. (2009). Anger amongst Turkish drivers: Driving anger scale and its adapted long and short version. *Safety Science*, 47, 138 – 144.
- Yagil, D. (1998). Gender and age-related differences in attitudes toward traffic laws and traffic violations. *Transportation Research Part F: Traffic Psychology and Behaviour*, 1(2), 123 – 135. DOI: [http://dx.DOI.org/10.1016/S1369-8478\(98\)00010-2](http://dx.DOI.org/10.1016/S1369-8478(98)00010-2)
- Yilmaz, V., & Celik, H. E. (2006). Risky driving attitudes and self-reported traffic violations among Turkish drivers: The case of Eskisehir. *Dogus Universities*, 7(1), 127 – 138.
- Zhang, T., Chan, A. H. S., Li, S., Zhang, W., & Qu, X. (2018). Driving anger and its relationship with aggressive driving among Chinese drivers. *Transportation Research*, 496 – 507. DOI.org/10.1016/j.trf.2018.05.011