Relationship between Driving Anger, Support for Counter Measure, Situational Factors and Driving Behavior among Drivers in Malaysia

Nor Azimah Chew Abdullah[#1] and Nazlina Zakaria[#2]

[#] *School of Business Management, Universiti Utara Malaysia (UUM), Sintok, Kedah, Malaysia*
[1]norazimah@uum.edu.my
[2]nazlina@uum.edu.my

***Abstract*— This study aims to investigate factors like driving anger, support for counter measures and situational factors affect drivers' driving behavior. One important reason for studying driver's aggression is that it has been cited as a frequent contributing factor in traffic collisions. The sample size was collected using convenience sampling as the actual number of driver who drove to work around all the targeted area cannot be identified by the Road Transport Department. The questionnaires were given to the driver who passed the targeted area during normal day. Further sample was taken from participants from commuting accidents and safety and health seminars. The data analysis was done using statistical analysis from the Statistical Package for Social Science (SPSS) version 20.0. Analysis of data was done using correlation and multiple regressions to test the hypotheses. The results revealed a positive relationship between driving anger, situational factors and driving behavior. Results of regression showed that driving anger, support for counter measure and situational factors influenced driving behavior. Thus, it is suggested for future research to identify more factors that will affect driving behavior. Thus, the study contributes by providing other potentials antecedents for aggressive driving which includes attitudes, styles and habits of driving.**

***Keywords*—** *Driving anger, support for counter measure, situational factors, driving behavior, convenience sampling*

1. Introduction

After independence in 1957, Malaysia has gone through a significant period of economic development and growth in population, economy, industrialization and motorization. The increase in population and motorization has led to a rise in the number of road traffic accidents and injuries. Therefore, road traffic accident and road traffic injuries have become one of the major socio-economic and public health problems in Malaysia [1]. Besides, road traffic injuries are reported to be one of the main sources of fatality and disability in Malaysia.

Statistics from [2] shows the road accidents in Malaysia have been increasing every year. In 1995, a total of 162,491 cases of road accident have been increased to a total of 462, 423 cases in 2012. Increase in road accidents is attributed to rapid growth of population, economic development, and industrialization in the country. The growth of population in Malaysia shows a steady average growth rate of 2% per annum, for example, there was a rise from 20,096,700 million people in 1995 to 29,300,000 million people in 2012 and 31,190,000 million in 2015. Additionally, the total length of road had also increased to accommodate an increase in numbers of vehicles in Malaysia.

The issue of road safety is long seen as a social responsibility of Malaysian Government towards their citizens. Thus, several bodies concerning road safety have been established comprising government departments, private agencies, and voluntary bodies. Later in 1990 the government formed a Cabinet Committee of Road Safety chaired by the former Prime Minister to reduce road accidents by 30 percent by the next year 2000.

A comprehensive National Road Safety Plan was formulated in 1991 with an emphasized on road safety research program, behavioral modification, road engineering and vehicular safety, medical treatment and safety administration. On 15 May 2006, our former Prime Minister launched the Malaysian Road Safety Plan 2006-2010, with 9 strategies and 52 programs to cover all aspects of road safety [3]. However, Malaysia is seen not achieving the goals of Road Safety Plan

2006-2010, where the aims was to reduce road fatality index from 23 per 100,000 populations in 2006, to 10 per 100,000 by the year 2010 [4]. Later, the Road Safety Plan of Malaysia 2011-2020 was introduced. This plan identified 6 approaches to deal with the road safety issues focusing on instilling safety culture among the public.

All Malaysian Department and agencies play their role in order to reduce road accident. Activities such as campaign, workshops, seminars, talks, competitions, quizzes, exhibitions and also punishment have been done in order to gain the drivers awareness towards road safety and the impact of road accidents. But, until today accident still happen day by day and the total number of road accident keep increasing year by year. Preventing accidents from occurring is the most effective means to improve road safety. It is also the most difficult and complex task to accomplish because the causes of traffic accident are also many and complex.

Conceptually, the clearest type of harm in a road accident is fatality. Road accidents also often results in more than one person being injured. The injuries include suffered paralyses, brain damage, amputation and other seriously disabling injuries. [3] stated that our former Prime Minister said that accident can be avoided, reduced and prevented because every death from road accident is a loss to the country's human capital due to the money spent on training the people.

Consequently, this study aims to investigate whether factors like driving anger, support for counter measures and situational factors affect drivers' driving behavior on the road. One important reason for studying driver's aggression is that it has been cited as a frequent contributing factor in traffic collisions [5].

2. Literature Review

Aggressive driving behavior is "any behavior intended to physically, emotionally, or psychologically harm another within the driving environment" [6, p.661]. [7, p.17] defined aggression as "behavior that will results in personal harm and physical injury". Personal harm may be physical or emotional such as verbal abuse. According to [8], anger on the road can be observed through aggressive acts like tailgating, hostile gestures, angry epithet, and elevated blood pressure.

Researchers have showed that aggressive driving behavior is a result of anger arising from frustrating situation for example being stuck in traffic jams or following a slow driver [8, 9, 10]. It is postulated that frustrating driving situation would lead to anger which indirectly leads to aggressive driving behavior. [11] showed evidence that individuals whom have high anger would likely demonstrate aggression in their driving. On a similar vein, physical aggression alongside anger has been identified as significant antecedents of aggressive violation of traffic rules [12].

Counter measure is defined as an action that is proposed to stop or prevent something bad or dangerous situations. Law enforcement agencies must establish law enforcement programs that aim at aggressive drivers to make the roads safer. The goal is to increase drivers' awareness of dangerous behaviors on the road and to reduce the number of incidents through education and enforcement. The program must include intense enforcement, a media campaign and education. [13] discovered almost 44% of motorists supported legislation and enforcement measurement to deal with aggressive behavior.

Several studies were conducted to investigate the impact of situational environmental factors on issues regarding what motivates, stimulates or elicits aggressive driving {14, 15, 16, 17, 18, 19, 20, 21, 22] . The findings of the stated studies can be summarized into four main issues namely (1) situations provokes drivers which leads to aggressive behavior; (2) irritation is resulted through congested traffic; (3) constant exposure has a negative impact on drivers; and (4) physical hazards (e.g. noise and heat) and presence of individuals are main reasons behind occurrence of aggressive driving behavior.

[22] reported that a strong association between environmental conditions and manifest driver aggression. He has reported that there is a fairly strong relationship between the duration of the green phase at a crossroads and tendency for drivers to run a red light. Similarly, the relationship is also associated to honking as they feel being delayed by the vehicles when the light turns green. This especially happens with situations where the

red light phase is long or impatient shorter green light phase.

3. Research Methods

3.1 Sample

The target population is all drivers in the Peninsular Malaysia. A sample size of 30 is usually utilize as a cutoff value as the sampling distribution of 30 or more is regard as normally distributed [23]. Thus, sample size was collected using convenience sampling as the actual number of driver who drove to work around all the targeted area cannot be identified by the Road Transport Department. The questionnaires were given to the driver who passed by these areas during normal day. Further sample was taken from participants from commuting accidents and safety and health seminars.

3.2 Theoretical Framework

The conceptual framework for the study is presented in Figure 1. As can be observed, the research focuses on whether factors like driving anger, support for counter measures, and situational factors affect drivers' driving behavior on the road. In this study, dependent variable is driving behavior whereas independent variables are driving anger, support for counter measures and situational factors.

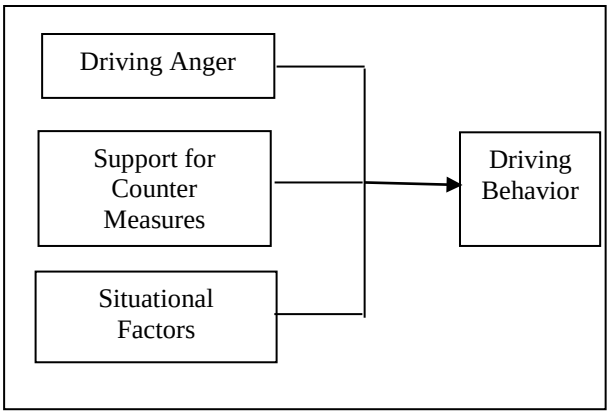

Figure 1. The conceptual framework of this study

3.3 Hypothesis of the Study

From the conceptual framework in Figure 1, the following hypotheses were proposed:

Hypothesis 1:

H1: There is a significance relationship between independent variables (driving anger, support for counter measures and situational factors) and dependent variable (driving behavior).

Hypothesis 2:

H2: The independent variables (driving anger, support for counter measures and situational factors) will influence the dependent variable (driving behavior).

3.4 Instruments

The survey consists of two sections: demographic and five respective variables included aggressive driving behaviors, driving anger, support for counter measures, and situational factors. The questionnaire was collected on the spot after the respondents finished answering it. Driving behavior consists of 20 items from [24], using 5 Likert-Scale ranging from (1) Never to (5) Nearly all the time. Driving anger consists of 21 items were derived from [25], using 5 Likert-Scale ranging from (1) Not at all angry to (5) Extremely angry. Support for counter measures with 11 items derived from [26], using 5 Likert-Scale ranging from (1) Strongly opposed to (5) Strongly support. Whereas situational factors consists of 15 items were from [25] using 5 Likert-Scale ranging from (1) Strongly disagree to (5) Strongly agree.

3.5 Data Analysis

The data analysis was done using statistical analysis from the Statistical Package for Social Science (SPSS) version 20.0 Analysis of data was done using correlation and multiple regressions to test the hypotheses.

4. Results

4.1 Demographic of Respondents

The frequency analysis was performed on gender, age, ethnic group, education, occupation, work shift and own vehicle. The gender composition shows that 60 percent were male respondents, while 35.3 percent were female. The composition of the highest age group was from 25-29 years which was 25 percent while the lowest was from less than 20 years which was only 0.4 percent. The Malays were ranked as the largest number of respondents at 77 percent, followed by

Chinese 8.6 percent, Indian 8.1 percent and others with 6.3 percent. In relation to the academic background, respondents with a college degree were the most with 49.9 percent. The largest group in occupation was from executive level at 33 percent. Respondents that work in shift hour were only 11.5 percent and most of them were working normal shift with 2.3 percent. The data shows that most of the respondents had their own vehicle which was about 84.6 percent.

4.2 Hypotheses Testing

a) H_1: There is a relationship between driving anger, support for counter measures and situational factors with driving behavior.

A bivariate Pearson's product-moment correlation coefficient was used to evaluate the correlation among the IVs (driving anger, support for counter measures, situational factors) and DVs (driving behavior). From Table 1 clearly indicates a positive correlation between driving anger and driving behavior, where r = 0.458, n = 383, p < 0.01. Thus, alternate hypothesis was accepted. Overall, there was a moderate positive relationship between driving anger and driving behavior (45.8%). It means that increases in driving anger were correlated with increase in driving behavior.

As for support for counter measures, there was no significant relationship between support for counter measures and driving behavior.

For situational factors, it was seen that there was a positive relationship between situational factors and driving behavior, where r = 0.356, n = 383, p < 0.01. Alternate hypothesis was accepted. Overall, there was a low positive relationship between situational factors and driving behavior (35.6%). It means that increases in situational factors were correlated with increase in driving behavior.

Table 1. Correlation between driving anger, support for counter measures, situational factors and driving behavior (n = 383)

Variables	Driving anger	Support for counter measure	Situational factors	Driving behavior
Driving anger	1			
Support for counter measure	.151**	1		
Situational factors	.252**	.226**	1	
Driving behavior	.458**	-.074	.356**	1

**Correlation is significant at the 0.01 level (2 tailed).

b) H_2: Driving anger, support for counter measures and situational factors influence driving behavior.

Multiple regression analysis was used to evaluate the effects of independent variables (driving anger, support for counter measures and situational factors) on dependent variable (driving behavior). As depicted in Table 2, the regression results revealed the R square value of 0.311. This indicates that 31.1% of variance that explained the DV (driving behavior) was accounted for by the IVs (driving anger, support for counter measures and situational factors) where the F value = 56.998 at p< 0.05.

Further, of the three dimensions (IVs), driving anger (β = 0.414, p < 0.001), support for counter measures (β = -0.204, p < 0.001) and situational factors (β = 0.298, p < 0.001) were significant predictors of driving behavior. Thus, alternative hypothesis was accepted for driving anger, support for counter measures and situational factors.

Variables	Standard Coefficient (Beta)	T	Sig.
Driving anger	0.414	9.348	0.000
Support for counter measure	-0.204	-4.632	0.000
Situational factors	0.298	6.632	0.000

Note: R^2 = 0.311; p value = 0.00; F = 56.998

5. Discussion and Conclusion

The result of this study shows that there was a positive relationship between driving anger and driving behavior. This is consistent with [11], who found higher anger would likely lead to aggression

while driving. Similar pattern is also observed when risky driving was found to be related to driver's anger [27]. Nevertheless, [28] found that the jamming and reports of anger relationship were inexistence. This was further supported by [29], where they found that traffic obstructions were not antecedents to anger provocation among drivers in Britain. [30] Berkowitz (1993) stressed that how driver interpret the situation and the reasons behind it have association with anger in frustrating situations. This study can be supported by [31] study which showed that anger leads to driving behavior.

This study has shown that for support for counter measures, there was no significant relationship between support for counter measure and driving behavior. According to law enforcement officers, drivers are more affected with their prosecuting decision instead of the offence being charged. In addition, [32] feels that changes in the law or penalty would not result in changes in prosecution for aggressive driving. On a similar vein, [33] stressed that publicity campaigns driven to change driver's attitude failed to reduce crash rates. Even though, society supports the power of education in shaping human behavior, [34] suggested that effective counter measures (e.g. enforcement) must have been earlier sanctioned by the society. Having said that, there are evidences that support enforcement would not change human behavior including increasing the severity of punishment.

This study found a positive relationship between situational factors and driving behavior. Thus, aggressive behavior is strongly associated with environmental and situational factors. For example, [35] revealed that time pressures alongside traffic congestion could aggravate aggressive behavior. The aggressive behavior during the morning peak period (6- 9 am) is presumably a reflection of time pressures as several commuters try to reach their offices on time. This is consistent with previous studies like [36] and [37]. They found that drivers tend to be more aggressive in the morning because of time pressures which includes reaching office or school on time. The morning period is the time that majority of people tend to be excessively sleepy due to their sleeping patterns. [38] and [39] indicated that accidents comprising teenage drivers are most likely to result in fatality. Similarly, [40] stressed that aggressive driving behavior also results from situational, vehicle and roadway factors which include young drivers have a high tendency to drive with high speed.

In this study, the results of the regression analysis showed that driving anger, support for counter measures and situational factors influence driving behavior. The results showed that 31.1% of variance that explained the DV (driving behavior) was accounted for by the IVs (driving anger, support for counter measures and situational factors). As such, the findings of the present study is consistent with [41] whom also indicated that studies examining driver anger and aggression is vulnerable to common method variance bias. For example, [11] revealed that individual whom demonstrates high anger would likely incorporate aggression in driving. On a similar vein, evidences show that situational environmental factors is an antecedent to the tendency in motivating, stimulating or eliciting aggressive driving behavior [14, 15, 16, 17, 18, 20, 21, 22]. [42] reported that a strong influences between environmental conditions and manifest driver aggression.

In conclusion, the aim of this study is to investigate various factors that may influence drivers to drive aggressively on the road and also to evaluate any significant relationship between driving behavior and its determinants. It is suggested for future research that the concept of work-related driving aggression be tested among those who are being hurry to accomplish their job for monetary reasons such as cab driver or job imposed time pressure like bus driver or courier. It can be done by comparing the driving- related impatience among workers who drive in non-job pressure and people who don't have to drive to work. Future research is needed to identify more determinants that cause aggressive driving behavior. Such initiative would be very useful to identify and examine other factors namely attitudes, styles, and habits in driving as antecedents to aggressive driving.

Acknowledgments

The authors wish to thank Ministry of Higher Education Malaysia for providing financial assistance to carry out this study and the Research and Innovation Management Centre (RIMC), Universiti Utara Malaysia for providing the research assistance. This article highlights one aspect of the entire research scope.

References

[1] C.K. How, A.M.S. Hamouda, M.M. Hamdan and R.R.S. Umar, "The crashing behaviour of motorcycle basket under impact loading", Journal of Materials Processing Technology, vol. 132, no. 1-8, 2003.

[2] Malaysian Institute of Road Safety Research (n.d.). General road accident data in Malaysia. Available: http://www.miros.gov.my/web/guest/road

[3] Bernama , "Abdullah launches five-year road safety plan", *General*, 2006, May 15.

[4] The Star Online (2011). Safety goals not match. Available: http://www.thestar.com.my/general/safety.htm

[5] E.M. Grey, T.J. Triggs and N.L. Haworth, "Driver aggression: The role of personality, social characteristics, risk and motivation", Australian Transport Safety Bureau - CR-81, 1989.

[6] D.A. Hennesey and D.L. Wiesenthal, "The relationship between traffic congestion, driver stress and direct versus indirect coping behaviors", Ergonomics, vol. 40, no. 3, pp. 348-361, 1997.

[7] A. Bandura, *Psychological Mechanisms of Aggression*, In R. G. Geen and E. Donnerstein (Eds.), Aggression: Theoretical and empirical reviews (pp. 1-40), New York: Academic Press, 1983.

[8] J. L. Deffenbacher, R. S. Lynch, E. R. Oetting, and D.M. Yingling, "Further evidence of reliability and validity for the driving anger expression inventory", Psychological Reports, vol. 89, pp. 535-540, 2001.

[9] J. L. Deffenbacher, "Driving anger: Correlates of a test of state trait theory", Personality and Individual Difference, vol. 31, pp. 1321-1331, 2001.

[10] J. L. Deffenbacher, "Anger, aggression and risky behavior: A comparison of high and low anger drivers", Behavior Research and Therapy, vol. 41,pp. 701-708, 2003.

[11] R. Lawton and A. Nutter, "A comparison of reported levels and expression of anger in everyday and driving situations", The British Journal of Psychology, vol. 93, no. 3, pp. 40-423, 2002.

[12] Y. King and D. Parker, "Driving violations, aggression and perceived consensus", European Review of Applied Psychology, vol. 58, pp. 43−49, 2008.

[13] A. Sukhai, M. Seedat, E. Jordaan and M. Noah, (n.d.). Aggressive road behaviors in South Africa. Available: http://www.mrc.ac.za/policybriefs/roadrage.pdf

[14] K.B. Anderson, C.A. Anderson, K.E. Dill and W.E. Deuser, "The interactive relations between trait hostility, pain, and aggressive thoughts", Aggressive Behavior, vol. 24, pp. 161-171, 1998.

[15] A. Ellison-Porter, J.M. Govern, L.P. Herbert and M. H. Figler, "Anonymity and aggressive driving behavior: A field study", Journal of Social Behavior and Personality, vol. 10, no. 1, pp. 265-272, 2001.

[16] D. A. Hennessy and D. L. Wiesenthal, "Further validation of the driving vengeance questionnaire", Violence and Victims, vol. 16, pp. 565-573, 2001.

[17] D.T. Kenrick and B. Krahe, *The Psychology of Aggression*. Taylor & Francis, Philadelphia, PA, 2001.

[18] T. Lajunen, D. Parker and H. Summala, "Does traffic congestion increase driver aggression?" Transportation Research Part F, vol. 2, pp. 225-236, 1999.

[19] S. W. MacFarlane, "Ambient temperature and horn honking: A field study of the heat/aggression relationship". Environment and Behavior, vol. 18, pp. 179-181, 1986.

[20] A.R. McGarva and M. Steiner, M. "Provoked driver aggression and status: A field study", Transportation Research Part F, vol. 3, no. 3, pp. 167-179, 2000.

[21] D. Parker, T. Lajunen and H. Summala, "Anger and aggression among drivers in three European countries", Accident Analysis and Prevention, vol. 34, pp. 229-235, 2002.

[22] D. Shinar, "Aggressive driving: The contribution of the drivers and the situation", Transportation Research Part F, vol. 1, no. 2, pp. 137-160, doi: 10.1016/S1369-8478(99)00002-9, 1998.

[23] B. Dawson and R.G. Trapp, *Basic & Clinical Biostatistics* (4th ed.). Lange Medical Books/McGraw-Hill, New York

[24] S. G. Stradling and M. L. Meadows, (2000). "Highway code and aggressive violations in UK drivers", 2000, Conference on Aggressive Driving Issues. Available: http://www.aggressive.drivers.com/papers/stradling-meadows/stradling-meadows.pdf

[25] T. Lajunen and D. Parker, "Are aggressive people aggressive drivers? A study of the relationship between self-reported general aggressiveness, driver anger and aggressive driving", Accident Analysis and Prevention, vol. 33, pp. 243–255, 2001.

[26] D.J. Beirness, H.M. Simpson, D.R. Mayhew and A. Pak, "The road safety monitor, aggressive driving", Traffic Injury Research Foundation, Ottawa, 2002.

[27] H. Iversen and T. Rundmo, "Personality, risky driving and accident involvement among Norwegian drivers", Personality and Individual Differences, vol. 8, no. 33, pp. 1251–1263, 2002.

[28] G. Underwood, P. Chapman, S. Wright and D. Crundall, "Anger while driving",

Transportation Research Part F, 2, vol. 55–68, 1999.

[29] T. Lajunen, D. Parker, D. and S. G. Stradling, "Dimensions of driver anger, aggressive and highway code violations and their mediation by safety orientation in UK drivers", Transportation Research Part F, vol. 1, pp. 107-121, 1998.

[30] L. Berkowitz, "Pain and aggression: Findings and implications", Motivation and Emotion, vol. 17, pp. 277–293, 1993.

[31] J. L Deffenbacher, M. E. Huff, R. S Lynch, E. R. Oetting and N. F. Salva- tore, "Characteristics and treatment of high anger drivers", Journal of Counseling Psychology, vol. 47, pp. 5-17, 2000, doi:10.1037/0022-0167.47.1.5.

[32] Keith, "The status of court-based aggressive driving programs in Virginia: A report to the Virginia Department of motor vehicles", National Center for State Courts, Williamsburg, V.A., 2003.

[33] G.J.S. Wilde, "Verbal ratings of estimated danger by drivers and passengers as a function of driving experience," Report prepared for the road and motor vehicle traffic safety division, Ministry of Transport, Ottawa, Canada, 1971.

[34] M. Henderson, "Human factors in traffic safetv: A reaDDraisa1 [Report NO. 1/71]," Roseberry, New South Wales: Traffic Accident Research Unit, Department of Motor Transport, 1971.

[35] D. Shinar and R. Compton, "Aggressive driving: An observational study of driver, vehicle, and situational variables", Accident Analysis and Prevention, vol. 36, pp. 429-437, 2004.

[36] A.R. Wolfson and M.A. Carskadon, "Understanding adolescents' sleep patterns and school performance: A critical appraisal", Sleep Medicine Review, vol. 7, no. 6, pp. 491-506, 2003.

[37] R.P. Millman, "Excessive sleepiness in adolescents and young adults: Causes, consequences, and treatment strategies", Pediatrics, vol. 115, no. 6, pp. 1774-1786, 2005.

[38] L.H. Chen, S.P. Baker, E.R. Braver and G. Li, "Carrying passengers as a risk factor for crashes fatal to 16 - and 17-year-old drivers", Journal of the American Medical Association, vol. 283, no. 12, pp. 1578-1582, 2000.

[39] A.F. Williams, "Teenage drivers: Patterns of risk", Journal of Safety Research, vol. 34, no. 1, pp. 5-15, 2003.

[40] M. Rajesh, S. Anurag, C. Anoop and M. Sudipto, "Effect of muscle contraction in high speed car pedestrian impact–simulations for walking posture", IRCOBI Conference Proceedings International Research Council on the Biomechanics of Injury. York, 237-250, 2009.

[41] S. M. Nesbit, J. C. Conger and A. J. Conger, "A quantitative review of the relationship between anger and aggressive driving", Aggression and Violent Behaviour, vol. 12, no. 802, pp. 156–176, 2007.

[42] D. Shinar, "Aggression and frustration in driving: Situational variables and individual differences", Risk-taking Behavior and Traffic Symposium, 1999.