

Towards Safety Driving: How Neuroticism Affects Malaysian Drivers' Behaviour?

Nur Shazwani Rosli^{1,*}, Jasmani Mohd Yunus², Suhaila Abdul Hanan³

¹School of Technology Management & Logistics
Universiti Utara Malaysia, Malaysia

²School of Business Management
Universiti Utara Malaysia, Malaysia

³School of Technology Management & Logistics
Universiti Utara Malaysia, Malaysia

*Corresponding author's email: wanirose [AT] gmail.com

ABSTRACT-- *The aim of this study is to examine the relationship between neuroticism of Big 5 personality and adverse driving behaviour among motorists in Malaysia. Intercepted drivers were surveyed using self-reported questionnaires, and they were asked their opinions about their driving behaviour as well as their personality traits. A total of 384 completed questionnaires were collected with a response rate of 18.1 per cent. However, only 311 were found useable for the final analysis. Partial Least Squares (PLS) path modelling was used in the data analysis. The finding revealed a significant and positive relationship between neuroticism and adverse driving behaviour.*

Keywords -- Adverse Driving Behaviour, Neuroticism, Road Traffic Accidents, Big Five Personality

1. INTRODUCTION

Road traffic accidents have become a major public health issue in both developed and developing countries and they are one of the leading causes of death globally. The World Health Organization (WHO) estimated that 1.5 million people are killed each year and as many as 50 million more suffered serious injuries [1]. In Malaysia, more than 500,000 road accidents took place in 2016 alone, taking toll of 7152 deaths. The economic consequence due to this disaster, and the total costs associated with these accidents were very high. These road traffic fatalities and injuries could have caused economic losses of up to 5 per cent of the Gross Domestic Product (GDP) [2]. Without effective actions and increased efforts, the number of traffic accidents and fatalities continues to increase, and will become the fifth leading cause of death in the world [1].

Safety driving is one of the policy areas where it has become a priority in many countries in view of the higher accident fatalities due to rapid urbanization and increased motorization levels. Evidences have indicated that human factor plays a key role in most traffic accidents, and the driver attitudes being the main contributor [3]. Attitudes have also been found to be significant predictors of driver behaviour and indirectly to traffic crashes [4, 5, 6]. This calls for greater focus on driver attitudes and behaviour towards traffic safety [7]. Attitudes are defined as tendencies to evaluate an object with some degree of favour or disfavour, expressed in affective, cognitive or behavioural responses [8]. Research has shown that driver attitudes and behaviours can be influenced by personality traits. Personality is specific characteristics of individuals that a person exhibits. It is assumed to be inherent, relatively stable and unchanged throughout a person's life time [9]. The most commonly used personality trait to describe human behaviour is the Big Five personality which comprises of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience [10]. Extraversion is associated with warmth, expressiveness, gregariousness, assertive, and excitement seeking, agreeableness is the tendency to be pro-social, warm, forgiving, and trustfulness, while conscientiousness reflects self-discipline, hardworking, reliable, and perfectionist. Neuroticism is the susceptibility to experience negative emotions and vulnerability, and openness to experience captures a person's intellectual curiosity, originality, creativity, and appreciation of aesthetics and novelty [11].

Big Five Personality has been widely used in past research to predict human behaviour in many issues [12, 13, 14]. It has also been found to predict driving behaviour which in turns predicts traffic accidents [15]. Big Five model was also used to successfully predict aggressive driving behaviour among drivers in Serbia [16] and youths in Romania [17]. However in another study on young and older drivers, although personality appeared to play some role in the prediction of driving performance, it did not emerge as a significant predictor of unsafe driving behaviour [3]. Another study failed to relate Big Five Personality to driving behaviour [18], while another study found that the Big Five Personality dimensions were predictors of accident involvement but the effects were small [19]. Research on individual facet of the Big Five personality has also been conducted. For example, an association was found between risk-taking behaviour to those with high neuroticism [20] while those with low neuroticism was found to be related to an increase in risk taking behaviour [21]. Studies have also concluded that people on high neuroticism are easily distracted, prone to react to stress and therefore contribute positively to adverse driving behaviour [22, 23]. Despite some research in the area, the study on neuroticism among drivers in Malaysia is still relatively unexplored. Moreover empirical research linking neuroticism and driving behaviour has produced mixed or conflicting findings. For these reasons, the aim of this study is to identify the level of neuroticism as well as increase our understanding of the relationship between neuroticism and adverse driving behaviour among drivers in Malaysia.

2. LITERATURE REVIEW

Neuroticism deals with people who are full of anxiety, anger, hostility, depression, self-consciousness, and impulsiveness. People with high neuroticism trait are at a greater risk of traffic accidents because of more distractible during driving. They are easily distracted and preoccupied with anxiety and worries [24]. Mathews, Dorn and Glendon [25] examined the relationship between stress and neuroticism, and found a significant positive relationship which subsequently led to collision involvement. Thorrisen [26] sampled Norwegian drivers to examine the direct and indirect effects of drivers' neuroticism on their aggressive and considerate behaviour. He found that neuroticism was positively correlated with aggressive behaviour and negatively correlated with considerate behaviour. Neuroticism also was not found to predict road safety rules compliance significantly [27] and drivers who were high on driver lapse scored higher on neuroticism [28]. Rahman [29] and Fikri, Ismail and Halim [23] also found that neuroticism contributed positively to the many road accident involvement. Similar findings were reported by Vazquez (2013) and Castanier et al., [20], Dahlen et al, [15], Jovanovic et al., [16], Qu et al., [30], and Anitei et al., [17] who revealed positive correlation between neuroticism and aggressive driving behaviour.

However, Clarke and Robertson [22] observed the conflicting findings in their analysis of neuroticism and collision involvement. Their finding revealed non-significant relationship between neuroticism and collision involvement. Further Harris et al.'s [31] study also revealed that those with higher score on neuroticism were associated with fewer reported traffic accidents and violations. Some researchers also revealed positive but a very weak relationship between neuroticism and aggressive driving [31, 32, 33, 34, 35]. Neuroticism was also found to be associated with decreased likelihood of driving among older adults [36]. Thus the following hypothesis is formulated:

H1: There is significant and positive relationship between neuroticism and adverse driving behaviour among motorists in Malaysia.

3. METHODOLOGY

This study employed a quantitative technique and structured self-report questionnaire was used as a tool to conduct the survey. Self-report questionnaire is often used mode of assessment in research because of the practicality and efficiency in getting data from a large number of respondents [37]. The use of structured self-report questionnaire provides greater uniformity, written tests and scales besides being economically and time efficient [38]. It also allows for anonymity of subjects, which sometimes give respondents more time to read and understand the questions [39]. Structured self-report questionnaire is one of the most widely used methods of data collection in social science research, and is normally used in a study to measure constructs such as attitudes, values, intentions, and preferences [40]. Self-report measures are frequently applied in traffic safety research because they are easily administered and researchers can ask many and detailed questions, leading to comprehensive data sets [41]. Self-report is also very useful and an efficient means for studying aberrant driving behaviour [42].

Driver Behaviour Questionnaire was used to measure aberrant driver behaviours in this study. This DBQ questionnaire includes ten items of violations, seven items of errors, and eight items of lapses [43]. For measuring Neuroticism, an eight item questionnaire of Big 5 Personality was adapted from previous works of McCrae and Costa [44] and Goldberg [45]. These questionnaires were earlier tested and achieved relevant scores for both validity and reliability. Participants were asked to indicate their level of agreement/disagreement based on five point Likert-type

scale, where 1=strongly disagree, 2=disagree, 3=neutral, 4= agree, and 5= strongly agree. The questionnaires were distributed to the motorists using the highways via the intercept survey method. This technique utilised a roadside hand-out method by stopping or selecting participants in strategic survey sites. The researcher explained about the aims of the study and participants were asked to complete and return them anonymously. A total of 348 completed questionnaires were received with a response rate of 18.1 per cent. However, only 311 questionnaires were found useable after deleting 37 cases which were detected as outliers.

4. RESULTS

4.1 Descriptive Analysis

Table 1 presents the mean and standard deviation scores for the participants' neuroticism. Neuroticism personality portrays life as negative and experiences negative feelings associated with perceptions. Neurotic person has the propensity to experience negative outcomes associated with work performance and difficulties with interpersonal relationships. The overall mean for neuroticism in this study was 2.79 (SD=.401) which can be categorized as low. This shows that most of the respondents in this study were less likely to become upset and not emotionally reactive to situations. Low level of neuroticism also indicated them to be calm, emotionally stable, and free from negativistic outlooks. Items with lower scores were 'I am depressed, blue' (M=2.33, SD=.988), 'I am relaxed handle stress well®' (M=2.33, SD=.765), and 'I remain calm in tense situation®' (M=2.50, SD=.826). There was also an item 'I can be moody' that scored 3.46 (SD=.875), which can be considered as 'moderate'.

Table 1: Means of Neuroticism

No.	Statement	Mean	SD
1.	I am depressed, blue	2.33	.988
2.	I am relaxed handle stress well®	2.33	.765
3.	I can be tense	2.96	.960
4.	I worry a lot	2.63	1.045
5.	I am emotionally stable, not easily upset®	3.32	1.003
6.	I can be moody	3.46	.875
7.	I remain calm in tense situation®	2.50	.826
8.	I get nervous easily	2.78	.992

4.2 Inferential Analysis

Partial Least Squares (PLS) path modelling was employed in the data analysis. This technique used a two-step process; i.e. assessment of measurement model and assessment of structural model to report the results. The validity of the measurement model was assessed by testing the convergent validity. The convergent validity exists when the indicators of one construct converge or share a higher proportion of variance. While the loading of 0.70 and above is an ideal indicator, loading value of 0.5 is still regarded as acceptable [46, 47]. Table 2 shows only item loadings of 0.5 and above were considered, while twelve items were deleted due to the lower loadings than the suggested threshold. Composite reliability values (CR) were above 0.70 and the Average Variance Extracted (AVE) values met the minimum criteria of 0.5. This confirms that the measurement model has an adequate level of convergent validity.

Table 2: Measurement Results on Loadings, CR and AVE

Construct	Item	Loading	CR	AVE
Driving Behaviour	DB2	0.669	0.945	0.504
	DB3	0.706		
	DB4	0.654		
	DB5	0.744		
	DB7	0.759		
	DB8	0.753		
	DB10	0.768		
	DB11	0.712		
	DB12	0.724		
	DB13	0.718		
	DB14	0.623		
	DB15	0.687		
	DB16	0.724		
	DB17	0.712		
	DB18	0.660		
	DB19	0.690		
	DB21	0.747		
Neuroticism	NEU1	0.715	0.821	0.535
	NEU2	0.810		
	NEU4	0.651		
	NEU7	0.741		

Path analysis was employed in the assessment of structural model. It was also used to test the hypothesis in this study. Path coefficient signifies the strength of the relationship among the independent and dependent variables. The highest beta (β) value symbolizes the strongest effect of predictor (exogenous) latent variable towards the dependent (endogenous) latent variable. Using a bootstrapping technique with re-sampling of 500, the path estimates and t-statistics were calculated for the hypothesized relationship. Table 3 presents the results of the hypothesis testing. Path coefficient and t-value results show that H1 is supported. This indicates that neuroticism has a significant and positive relationship with adverse driving behaviour.

Table 3: Result of Hypothesis Testing

		Beta (β)	T Value	P Value	Result
H1	NEU \rightarrow DB	0.0966	1.6801	0.0469*	Sig.

*P < 0.05

5. DISCUSSION

As expected the findings from this study found evidence to support an association between neuroticism and adverse driving behaviour. The path coefficient from neuroticism to adverse driving behaviour turned out to be statistically significant ($\beta = 0.0966$, $p < 0.05$). Hypothesis 1 was thus supported that there is positive significant relationship between neuroticism and adverse driving behaviour. This finding is in accordance with Ullerberg and Rundmo [48] and Thorrisen [26] who found significant positive relationship between neuroticism and aggressive driving behaviour. This implies that drivers of high level of neuroticism in this study have less positive attitudes toward driving as well as negative attitudes on traffic safety and these increase their aggressive behaviour. This aggressive behaviour is due to the fact that these drivers are prone to stress and are more frequent to use aggressive approach to others. They are also more stress reactive in traffic situations [49, 22]. In addition, drivers of high neuroticism level are frequently associated with patience, tension, nervousness and irritation which are all linked to aggressive driving behaviour. The finding also concurred with Mathews, Dorn and Glendon [25] who examined the relationship between stress and neuroticism, and found a significant positive relationship which subsequently led to collision involvement, and Thorrisen [22] who examined and found neuroticism negatively correlated with considerate behaviour. This finding also supported findings from those studies by Ucho, Terwase, and Ucho, [27] who found drivers who were high on driver lapse scored higher on neuroticism, Rahman [29] and Fikri, Ismail and Halim [23] who also found that neuroticism contributed positively to the many road accident

involvement, and Vazquez [50], Castanier et al., [20], Dahlen et al., [15], Jovanovic et al., [16], Qu et al., [30], and Anitei et al., [17] who all reported positive correlation between neuroticism and aggressive driving behaviour.

6. CONCLUSION

Traffic safety research had focused on the contribution of driver personality traits to safety in driving. However few studies had investigated the effect of Big 5 Personality individually in relation to driving behaviour. This study provided evidence to support the relationship between neuroticism, one of the facets of Big 5 Personality and driving behaviour among motorists in Malaysia. The finding of this study shows that the driver's personality feature can be a potentially indicative of the driving behaviour. The ability to understand and predict features of potential adverse driving in human behaviour is essential to the improvements of road traffic safety. It may also provide useful information for road safety interventions among road users in Malaysia. Traffic safety policy and programs could be enhanced through recognition of the role neuroticism personality trait plays in driving behaviour, and that road safety campaigns should be targeting drivers who are more likely to engage in adverse driving behaviour. Efforts to educate these drivers should emphasize the importance of obeying traffic rules when on the road, and understanding the consequences of their actions on the safety of other road users. These may assist the drivers to reflect their personality and how it influences their driving behaviour. Road accident fatalities and injuries are affecting the social and economic development of the country, and more casualties are expected with the increase in motorization. However, these accidents are predictable and preventable, and continuous efforts to improve traffic safety through education and public campaigns by the relevant authorities should therefore be encouraged.

7. REFERENCES

- [1] WHO, World traffic injuries, World Health Organization, Geneva, 2017.
- [2] WHO, Global status report on road safety 2015, World Health Organization, Geneva, 2015.
- [3] Riendeau, J., The role of personality in predicting unsafe driver behaviour in young and older adults, Unpublished PhD dissertation, Lakehead University, Ontario, Canada, 2012
- [4] Iversen, H.H. and Rundmo, T., Attitudes towards traffic safety, driving behaviour and accident involvement among the Norwegian public, *Ergonomics*, vol. 47, no. 5, pp. 555-572, 2004.
- [5] Iversen, H.H., Risk taking attitudes and risky driving behaviour, *Transportation Research Part F: Traffic Psychology and Behaviour*, vol. 7, no. 3, pp. 135-150, 2004.
- [6] Rakauskas, M.E., Ward, N.J., Gerberich, S.G., and Alexander, B.H., Rural and safety cultures: Human centred interventions toward zero deaths in rural Minnesota, ITS Institute, Minneapolis, MN, 2007.
- [7] Akaateba, M.A. and Amoh-Gyimah, R., Driver attitude towards traffic safety violations and risk taking behaviour in Kumasi: The gender and age dimension, *International Journal for Traffic and Transport Engineering*, vol. 3, no. 4, pp. 479-494, 2013.
- [8] Eagly, A.H. and Chaiken, S., *The psychology of attitudes*, Harcourt Brace & Jovanovich, Fort Worth, TX, 1993.
- [9] Brooks, M.V., Health related hardiness in individuals with chronic illness, *Clinical Nursing Research*, vol. 17, no. 2, pp. 98-117, 2008
- [10] Wang, Z., Does family background impact driving attitudes and risky behaviours? An investigation on Chinese drivers, Unpublished Master thesis, Queensland University of Technology, Australia, 2016.
- [11] McCrae, R.R. and Costa, P.T., *Personality in adulthood: a five factor theory perspective*, Guilford Press, New York, 2003.
- [12] Hussain, S., Abbas, M., Shahzad, K. and Bukhari, S.S., Personality and career choice, *African Journal of Business Management*, vol. 6, no. 6, pp. 2255-2260, 2012.

- [13] Golestan, S., Hamsan, H.H. and Abdullah, H., The moderating effect of self-efficacy on the relationship between personality traits and cigarette smoking behaviour among adolescents in Kerman, Iran, *Asian Culture and History*, vol. 7, no.1, pp. 187-198, 2015.
- [14] Wang, Y., Yao, L., Liu, L., Yang, X., Wu, H., Wang, J. and Wang, L., The mediating role of self-efficacy in the relationship between big five personality and depressive symptoms among Chinese unemployed population; a cross sectional study, *BMC Psychiatry*, vol. 14, pp. 61-70, 2014.
- [15] Dahlen, E.R., Edwards, B.D., Tubre, T., Zyphur, M.J. and Warren, C.R., Taking a look behind the wheel: an investigation into the personality predictors of aggressive driving, *Accident Analysis and Prevention*, vol. 45, pp. 1-9, 2012.
- [16] Jovanovic, D., Lipovac, K., Stanojevic, P. and Stanojevic, D., The effects of personality traits on driving-related anger and aggressive behaviour in traffic among Serbian drivers, *Transportation Research Part F: Traffic Psychology and Behaviour*, vol. 14, no.1, pp. 43-53, 2011.
- [17] Anitei, M., Chraif, M., Burtaverde, V., and Mihaila, T., The Big Five personality facts in the prediction of aggressive driving behaviour among Romanian youngsters, *International Journal of traffic and Transportation Psychology*, vol. 2, no.1, pp. 7-20, 2014.
- [18] Garrity, R.D. and Demick, J., Relations among personality traits, mood states and driving behaviours, *Journal of Adult Development*, vol. 8, pp.109-118, 2001.
- [19] Wahlberg, A., Barraclough, P. and Freeman, J., Personality vs traffic accidents: Meta-analysis of real method effects, *Transportation Research Part F*, 2016, [Doi.org/10.1016/j.trf.2016.10.009](https://doi.org/10.1016/j.trf.2016.10.009).
- [20] Castanier, C., Le Scanff, C. and Woodman, T., Beyond sensation seeking: affect regulation as a framework for predicting risk taking behaviour in high risk sport, *J Sport Exercise Psychology*, vol. 32, no.5, pp. 731-738, 2010.
- [21] Vollrath, M., Knoch, D., and Cassano, L., Personality, risk behaviour and perceived susceptibility to health risks, *European Journal of Personality*, vol.13, no.1, pp. 39-50, 1990.
- [22] Clarke, S. and Robertson, I.T., A meta-analytic review of the big five personality factors and accident involvement in occupational and non-occupational settings, *Journal of Occupational and Organizational Psychology*, vol. 78, pp. 355- 376, 2005.
- [23] Fikri, Ismail, R. and Halim, F.W., The model of personality and driver behaviour as mediator on road accident involvement among bus drivers in Riau Province Indonesia, *International Journal of Psychology and Behavioural Sciences*, vol. 5, no.4, pp.148-153, 2015
- [24] Hansen, C.P., A causal model of the relationship among accidents biodata, personality and cognitive factors, *Journal of Applied Psychology*, vol. 74, no.1, pp. 81-90, 1989.
- [25] Mathews, G., Dorn, L. and Glendon, I., Personality correlates of driver stress, *Personality and Individual Differences*, vol. 12, no. 6, pp. 535-549, 1991.
- [26] Thorrisen, M.M., The role of extraversion and neuroticism in drivers' behaviour toward bicyclists, Unpublished Master thesis, University of Oslo, Norway, 2013.
- [27] Ucho, A., Terwase, J.M. and Ucho, A.A., Influence of Big five personality traits and locus of control on road safety rules compliance among motorcycle riders in North Central Nigeria, *Asia Pacific Journal of Education, Arts and Sciences*, vol. 3, no.1, pp. 1-9, 2016
- [28] Stephens, V., Self-reported risky driving behaviour and the Big five personality traits, University of Worcester, UK, 2011.
- [29] Rahman, N.A., Dangerous driving behaviour from Big five personality, *Jurnal Online Psikologi*, vol. 2, no. 2, 2014.

- [30] Qu, W., Ge, Y., Xiong, Y., Carciofo, R., Zhao, W. and Zhang, K., Dangerous driving in a Chinese sample: Associations with morningness-eveningness preference and personality, *PloS One*, 10, e0116717, 2015.
- [31] Harris, P.B., Houston, J.M., Vazquez, J.A., Smither, J.A. and Harms, A., The proposal and aggressive driving inventory: a self-report measure of safe and unsafe driving behaviours, Rollins College, Florida, 2014.
- [32] Taubman-Ben-Ari, O. and Yehiel, D., Driving styles and their associations with personality and motivation, *Accident Analysis and Prevention*, vol. 45, pp. 416-422, 2012.
- [33] Iancu, A.E., Hoge, A. and Olteanu, A.F., The association between personality and aggressive driving: A meta-analysis, *Romanian Journal of Applied Psychology*, vol. 18, no. 2, pp. 24-32, 2016.
- [34] Benfield, J.A., Szlemko, W.J. and Bell, P.A., Driver personality and anthropomorphic attributions of vehicle personality relate to reported aggressive driving tendencies, *Personality and Individual Differences*, vol. 42, no. 2, pp. 247-258, 2007.
- [35] Britt, T.W. and Garrity, M.J., Attributions and personality as predictors of the road rage response, *British Journal of Social Psychology*, vol. 45, pp. 127-147, 2006.
- [36] Gadbois, E.A. and Dugan, E., The Big 5 personality factors as predictors of driving status in older adults, *Journal of Aging and Health*, vol. 27, no.1, pp. 54-74, 2015.
- [37] Robins, R.W., Tracy, J.L. and Sherman, J.W., *Handbook of research methods in personality psychology*, Guildford Press, London, 2007.
- [38] Sekaran, U., *Research methods for business: a skill building approach*, John Wiley, New Delhi, 2006.
- [39] Cozby, P., *Methods in behavioural research*, Mayfield Publishing, California, 1989.
- [40] Kraut, A.I., *Getting action from organizational surveys: New concepts, methods and applications*, Jossey-Bass, San Francisco, CA, 2006.
- [41] Martinussen, L.M., *Facilitating improved road safety based on increased knowledge about driving behaviour and profiling sub-groups of drivers*, Unpublished PhD thesis, Technical University of Denmark, 2013.
- [42] Varmazyar, S., Mortazavi, S.B., Hajizadeh, E. and Arghami, S., The relationship between aberrant behaviour and self-reported accidents involvement amongst professional bus drivers in the public transportation company, *Health Scope*, vol. 2, no.2, pp.110-115, 2013.
- [43] Reason, J., Manstead, A., Stradling, S., Baxter, J.S. and Campbell, K., Errors and violations on the roads: A real distinction?, *Ergonomics*, vol. 33, no. 10/11, pp. 1315-1332, 1990.
- [44] McCrae, R.R. and Costa, P.T., *Personality in adulthood*, Guildford, New York, 1990.
- [45] Goldberg, L.R., The structure of phenotypic personality traits, *American Psychologist*, vol. 48, pp. 26-34, 1993.
- [46] Hair, J.F., Hult, G., Ringle, C.M. and Sarstedt, M., *A primer on partial least squares SEM*, Sage, Singapore, 2014.
- [47] Chin, W.W., *How to write up and report PLS analyses*, Texas: Springer, Texas, 2010.
- [48] Ulleberg, P. and Rundmo, T., Personality, attitudes and risk perceptions as predictors of risky driving behaviour among young drivers, *Safety Science*, vol. 41, no. 5, pp. 427-443, 2003.
- [49] Galovski, T. and Blanchard, E.B., Psychological characteristics of aggressive drivers with or without intermittent explosive disorder, *Behaviour Research and Therapy*, vol. 40, no.10, pp. 1157-1168, 2002.
- [50] Vazquez, J.A., *Personality factors, age and aggressive driving: A validation using a driving simulator*, Unpublished PhD dissertation, University of Central Florida, Orlando, Florida, 2013.