

Significant Driving Behaviour Pattern Of Ageing Malaysian Automobile Drivers

Nazlin Hanie Abdullah, Siti Zawiah Md Dawal

Abstract: Driving an automobile is the most convenient transport as many individual faced difficulties when using other transportation options, particularly public transport facilities and even walking. The Malaysian Driver Behaviour Questionnaire (DBQ) was included as a part of questionnaire survey to determine the factors that affect the driving behaviour. A total of 171 participants took part in the study which involved 95 males and 76 females with ages ranging between 50 years and above. Significant driving behaviour was resulted from the factor analysis obtained. It shown that Distraction indicates the first factor which scores 0.836, while Violations ranked the second factor consisted of three violation items with the highest loading of 0.877. The third factor is Errors with the highest loaded item of 0.883. While lapses scores the weakest among others, with 0.846 showing that the drivers have no clear recollection of the road along which they have just been travelling. It can be seen that age shows strongly negatively related with distractions and lapses. On the other hand, it shows a significant relation with violations and errors. This indicates that ageing drivers tend to commit more violations and errors but focus on their driving without being easily distracted and lapsed. The strongest correlation is between violations and driving experience valued 0.675 and most of the factors are correlated with demographic variables. In conclusion, the factors structures of the Malaysian DBQ reflected a typical Malaysian driving behaviour for elderly.

Index Terms: Driving behaviour, distractions, violations, errors, lapses, ageing, elderly.

1 INTRODUCTION

Driving an automobile is the most convenient transport as many individual faced difficulties when using other transportation options, particularly public transport facilities and even walking. Driving is the preferred mode of transportation of seniors, particularly those living in rural and suburban areas, who rely on driving to maintain their independent lifestyle [1]. To most ageing drivers, driving represents not only a mean of transportation, but a sign of freedom, independence and self-reliance, and having some control of their life. Automobile driving is considered as a safety-critical real world example of multitasking that requires tracking locations of surrounding vehicles, judging when it is safe to pass or merge, manoeuvring and navigating, while also obeying traffic regulations and controlling vehicle steering and speed. It can be seen that even though from a driver's perspective, possessing a driver's license and driving a motor vehicle may imply a higher degree of mobility and freedom [2], but somehow, by some means, unlike youngsters, ageing drivers' abilities decline with age, which can reduce driver control over the focus of attention, task alternating, and vehicle control and also increasing the risk of crashes [3]. In the road traffic safety point of view, with the projected in the elderly driving population worldwide, the problem of an increasing number of crashes involving elderly drivers is attracting the attention of many researchers and practitioners [4]. The involvement of ageing drivers in road traffic accidents and injuries is being a public concern worldwide.

Globally, aggression in traffic has caused around 1.2 million victims and this figure is growing constantly [5]. In line with the statement, the road traffic trend in Malaysia is not being exempted as based on data obtained from Malaysian Institute of Road Safety Research (MIROS), the involvement of ageing drivers in traffic accidents in Malaysia is 5625 victims in year 2013 and the figure decreases to 4957 victims in year 2014. However, even though it shows a decreasing trend, the figure is still high and pertinent action should be taken seriously to prevent the ageing drivers from being involved in the traffic accidents. Traffic accidents usually occur with multiple causality but most of the traffic accidents result from driver malfunctioning rather than from a technical failures of the vehicle themselves [6]. It was highlighted in their previous study, when Foon et. al. (2009) found that history of accident involvement, age, driving knowledge, driving attitude, driving confidence and also psychomotor ability are the most important factors that can influence driving practices among older drivers [7]. Although majority of the ageing drivers are good drivers but sometimes a driver's health or physical limitations can affect their safe operation of an automobile [8],[9],[10]. The physical and physiological deterioration, as a part of the ageing process can affect a driver's ability to sense, decide and act as all are critical skills needed for a safe driving. Naturally, as one grows older, the biological abilities such as vision, hearing, cognitive and psychomotor ability are expected to decrease. The degradation of abilities could influence the results of daily activities performance especially while driving. Norazizan et al (2010) mentioned that as one ages, visual procession ability decreases, glare problem increases, and the increasing difficulty to capture the object motion. The coordination and movements of the arms, hand and neck will also become inflexible. With regards to on-road performance, an ageing driver need more information processing time as their cognitive ability is on the decline, as driving relies greatly on physical reaction and cognitive functions. Obviously, limitations faced by those ageing drivers might cause their driving performance differs from young drivers. This was supported by previous studies which also found that age-related decline in vision, cognitive, perceptual, and physical abilities are associated with an increased accident risk [11]. Therefore the aim of this study is to identify

- Nazlin Hanie Abdullah is currently pursuing Doctor of Philosophy program in mechanical engineering in University of Malaya, Kuala Lumpur, Malaysia. E-mail: nazlinhanie@gmail.com
- Siti Zawiah Md Dawal is currently an Associate Professor in mechanical engineering in University of Malaya, Kuala Lumpur, Malaysia. E-mail: sitizawiahmd@um.edu.my

the significant driving behaviour of the ageing Malaysian automobile drivers by investigating the four factors recognized from the perception and subjective method through Malaysian Driving Behaviour Questionnaire (DBQ).

2 MATERIALS & METHODOLOGY

2.1 Participants

The data was collected from 171 active drivers aged 50 years and above in Selangor and Kuala Lumpur. The Malaysian DBQ were distributed among urban, semi-urban and rural areas, and the participants were representative of the whole geographical area of the country. The selection of the participants were from those who met the following criteria: a) were not reported, or were found to not have cognitive diseases as identified by the oral interview and b) did not have other health problems that could potentially interfere with their ability to drive an automobile. Written informed consent with approval from the Ethics Committee of University of Malaya was obtained from all participants beforehand.

2.2 Measures

2.2.1 Demographic Measure

The first section of the questionnaire consists of demographic questions. Respondents answered questions about their age, gender, and other related individual driving information.

2.2.2 Driving Behaviour Questionnaire (DBQ)

The adaptation of extended Driver Behaviour Questionnaire [12],[13],[14],[15],[16],[17],[18],[19] in the second section of the questionnaire being translated into Malaysian national language. Items of violations, errors and lapses were inquired. In addition, items of distraction elements were embedded in the questionnaire. The items were adapted from National Survey on Distracted Driving Attitudes and Behaviours (2012) which was established by National Highway Traffic Safety Administration of Washington DC [20]. The Malaysian DBQ questionnaire were recorded on a five point Likert scale from Never to Nearly all the time to indicate how often the drivers committed every behaviour in the previous year. The first section of the questionnaire consists of demographic questions. Respondents answered questions about their age, gender, and other related individual driving information.

2.3 Statistical Analysis

The IBM Statistical Package for Social Science (IBM SPSS Statistics for Windows Version 23.0, Armonk, NY: IBM Corp) was used in the following statistical analysis. Data was expressed as means \pm standard deviations (SD) in order to identify the general driving behaviour of the ageing drivers. Next, factor analysis was applied to determine their significant driving behaviour. Pearson's correlation coefficients were used to examine the relationship between the driving behavioural factors and their demographic variables.

3 RESULTS AND DISCUSSION

3.1 Demographic Characteristics of the Ageing Drivers

A total number of 171 respondents participated in this study were among active automobile drivers with age ranging from 50 to 69 years. The average age was 57 years. Table 1 shows the mean and standard deviations of the demographic

variables. This explained that of those drivers, 95 were male drivers (55.6%) and 76 were female drivers (44.4%). Overall, 63.16% of them are still working. Respondents were also being asked about their driving frequency and 53.22% of the drivers reported that they drove everyday. The most frequent driving destination is to the workplace, as reported by 60.23% of the total respondents. This figure is predicted to be rapidly increased in future, due to their active lifestyle and also driving activity. As many of the elderly decided to continue working after their retirement rather than staying at home, the extension of their working tenure requires working elderly to drive to their workplace. However they are also retirees who still prefer to drive as part of their daily routine. This indicates that continuing process of expending in the elderly population results an increasing number of ageing drivers recently. Consequently, the share of the ageing drivers on the road will grow based on the increment of licensing rates among the ageing population [21].

Table 1 Mean and standard deviations of demographic variables

		Male		Female		
		Age	50-59	60 and above	50-59	60 and above
<i>Highest education level</i>	<i>Secondary school</i>		8	7	6	5
	<i>Certificate</i>		2	8	4	2
	<i>Diploma</i>		11	14	16	2
	<i>Bachelor degree</i>		7	11	6	0
	<i>Master</i>		1	20	8	0
<i>Years of driving experience</i>	<i>PhD</i>		1	2	18	1
	<i>Less than 5</i>		2	0	3	1
	<i>6 to 10</i>		17	18	24	8
	<i>11 to 15</i>		5	0	7	1
	<i>16 to 20</i>		1	8	7	0
<i>Employment</i>	<i>21 and above</i>		8	36	17	8
	<i>Working</i>		29	34	43	2
<i>Driving frequency</i>	<i>Not working</i>		4	28	15	16
	<i>Everyday</i>		24	33	34	0
<i>Driving destination</i>	<i>Not everyday</i>		9	29	24	18
	<i>Workplace</i>		28	34	39	2
	<i>Mosque</i>		3	26	10	7
	<i>To buy groceries</i>		0	0	8	9
	<i>Fetch kids to/from school</i>		1	0	1	0
<i>Vehicle type</i>	<i>Leisure</i>		1	2	0	0
	<i>Compact car</i>		2	0	11	3
	<i>Sedan</i>		21	56	27	12
	<i>MPV</i>		8	6	15	3
	<i>SUV</i>		1	0	5	0
	<i>Pickup truck</i>		1	0	0	0

Accident involvement	Yes	10	11	19	2
	Nearly	12	24	16	5
	No	11	27	23	11

Figure 1 shows that the most common vehicle type driven by the ageing drivers was the 4-door sedan (67.8%) followed by MPV (18.7%), compact car (9.4%), SUV (6%) and pickup truck (3.5%). The observably highest percentage of the 4-door sedan type of vehicle expressed the driving nature, purpose and destination of the ageing drivers. Despite of driving to their workplace, they tend to drive for their personal and family matters such as going to the mosque, buying groceries and fetch their child to/back from school. This shows that they find sedan as the most convenient automobile selection for their family and themselves as well.

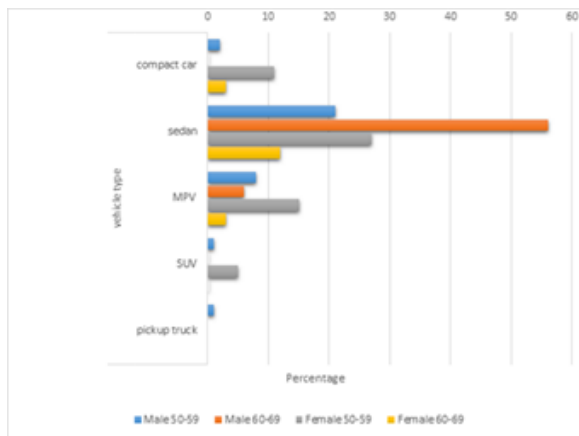


Figure 1 The vehicle type of the participants

Moreover, there is an assumption among the ageing automobile users that all vehicles available in today's marketplace are safe and the vehicle safety had improved drastically in their lifetime. Safety when travelling by automobile was attributed to the availability of vehicle features that have become standard across vehicles, such as seatbelts, power steering and anti-lock brakes [22]. Common automobile themes emphasized the importance of a driver's ability to safely operate the vehicle as the centre of the safety concern. However, previous driving studies involving this ageing drivers have suggested self-reported abilities behind the wheel may not match actual performance, even when functional impairments have clear implications on safety [9], [23],[24],[25],[26].

3.2 Driver General Driving Behaviour of the Ageing Malaysian Drivers

The general driving behaviour of the ageing Malaysian drivers were obtained from the scores on the mean of the DBQ items. The entire means and standard deviations were calculated. Of all the items, the three most frequently self-reported occurring behaviour were item c2 "How often do you: Check your rear view mirror before pulling out and U turn etc. (M= 4.63, SD = 0.66), followed by item c1 "How often do you: Check your rear view mirror before pulling out, changing lanes, etc." (M=4.62, SD = 0.67) and item b5 "How often do you: Pull out of a junction so far that the driver with right of way has to stop and let you out." (M= 4.08, SD = 1.08). From the generated results,

it can be seen that errors factor with two items scores obviously higher mean value compared to other items. This indicates that the ageing drivers were alert and often aware to ensure their driving safety by check their rear view mirror especially before lane changing and turning. While lapses scores the least frequently mean value as they conveyed that they are always alert and focused in their driving. Driver behaviour is a very complex matter that is influenced by one's knowledge, abilities and skills on the one hand and personality traits on the other. [27]. In other case, findings by Aberg & Rimmo (1998) stated that automatic behaviour of drivers is overlearned and based on experience acquired over long periods of time. Improvement of automatic behaviour has been found to continue even after years of practice. Therefore, at least some of the slips and lapses could be expected to develop as a result of increasing experience of the driver [28] (Aberg & Rimmö, 1998).

3.3 Significant Driving Behaviour of Ageing Malaysian Drivers

The significant driving behaviour of the ageing drivers were identified from the four factors solution. The responses to the Malaysian DBQ was analysed by using principal components analysis with a varimax rotation, corresponds with the method and results obtained by previous researches (Bener et al., 2013), [17]. A distinction between violations, errors and lapses in the original DBQ was reported by Reason et al. (1990) and the result was later confirmed by Parker et al. (1995). The results obtained confirms the validity of previous studies made by Reason et al. (1990) and Parker et al. (1995) concerning the original DBQ items [13]. However, when new items were added to the original pool of items the factor analysis suggested that four factors rather than three. This is similar to the research conducted by some of the previous researchers with additional driving behaviour factor [28]. Behaviourally, every automobile drivers often engage in driving behaviour that pose a risk to both themselves and also to other road users. While many of these unsafe actions are active, conscious rule violations, others are the result of errors due to inexperience an inattention or unfocused driving. Intentional or not, both rule violations and cognitive deficiencies, judgement or situational awareness can and do contribute to traffic accidents [12]. Consequently, a practicable approach to study human risk behaviour was presented by Reason et al. (1990). Initially, Reason et al. (1990) clarified that the driving behaviour can be categorized and measured in three main types. Errors are defined as mistakes which have potentially dangerous impacts. They involve the failure of a planned action to achieve the desired consequences. Lapses are primarily attentional failures which cause embarrassment but are unlikely to impact directly on safety. While violations are risky driving behaviours which the driver engages in deliberately, and which may have adverse consequences for the driver and the road users [14]. Winter and Dodou (2010) identified almost 200 studies used the DBQ in part or entirely [16]. Technically Table 2 represents the core finding of this study, where the rotated four factor matrix was analyzed. The factor loadings of less than 0.3 were omitted for the sake of clarity. The first factor reflects driving distraction with 3 distraction items loading onto it. Distraction indicates the first factor, with the most highly loaded item is a2 which scores 0.836, described distraction from mobile phone usage in order to make or receive calls, texting and other applications while

driving. However, the least loaded for Factor 1 is item a8 which scores 0.742, revealing that the drivers receive phone calls while driving, by means of hold using their hands. This supports the statement that quantified mobile phone distraction that are known to require cognitive engagement of a driver compare to other distractions that are less cognitive and more physically demanding [29]. Next, respondents ranked violations as the second significant factor consisted of three violation items. The highest loading is 0.877 which is item b1 where the drivers obey the speed limit in a residential area road followed by item b2 with score 0.836, where they sound their horn to indicate annoyance to another road user. This shows that the ageing drivers obey the traffic rules but they tend to commit violations when triggered by external factors such as other annoying other road users. The result was assured by the research conducted by Davey et al (2007) where in their study stated that intentional driving violations have been found to be a significant predictor of involvement in road traffic accidents [17]. Relevant to this finding, recent research indicates that a growing number of drivers are being exposed to aggressive, violent and reckless behaviours on public roads [13],[14],[28]. The following Factor 3 is Errors loaded with two error items. The highest loaded item is c1, indicating drivers check their rear view mirror before pulling out and changing lanes which scores 0.883. Item c2 loaded score is 0.860, showing that the drivers check their rear view mirror before pulling out and U turn. While lapses with two items, d1 and d4 scores the weakest among others. As for d1, the score was 0.846 showing that the drivers have no clear recollection of the road along which they have just been travelling. On the other hand, d4 scored 0.838 presenting that the drivers intending to drive to destination A, "wake up" to find themselves on the road to destination B. This is parallel with the declining cognitive capacities of ageing drivers and the increasing likelihood of problems with attention, as stated in Parker et al. (2000). These are the situations that the ageing drivers are likely to find difficult, as they are required to do several things at the same time. If the cognitive load imposed by demands exceeds the driver's capacity, then it is would be reassuring to think that the least important aspect of the task, in term of safety, should be the one to fail. Respondents reported more lapses than any of the other kinds of bad driving. Moreover they reported more lapses than have other full age-range samples of drivers. This fits in with what is known about the declining cognitive capacities of older people, and the increasing likelihood of problems with attention [13], [30].

Table 2: Factor analysis of Malaysian Driver Behaviour Questionnaire (DBQ)

Items	Factors			
	1 Distractions	2 Violations	3 Errors	4 Lapses
a2 <i>I do not use a mobile phone to make or receive calls, texting and other applications.</i>	0.836			
a4 <i>I do not like to eat and drink while driving.</i>	0.860			
a8 <i>I receive phone calls while driving by: Hold using my hands.</i>	0.742			
b1 <i>How often do you obey the speed limit in a residential area road?</i>		0.877		
b2 <i>How often do you Sound your horn to indicate your annoyance to another road user?</i>		0.836		
b4 <i>How often do you Do not use the left-hand path to overtake slow drivers?</i>		0.753		
c1 <i>How often do you Check your rear view mirror before pulling out, changing lanes, etc.?</i>			0.883	
c2 <i>How often do you Check your rear view mirror before pulling out and U turn etc.?</i>			0.860	
d1 <i>How often do you Realize that you have no clear recollection of the road along which you have just been travelling?</i>				0.846
d4 <i>How often do you Intending to drive to destination A, you "wake up" to find yourself on the road to destination B?</i>				0.838

3.3 The Relationship between the Driving Behavioural Factors and Demographic Variables

A correlation matrix was created to examine the relationships between demographic variables and driving behaviour factors. The Spearman rank correlation coefficient was used for all comparisons. Table 3 shows the relationship between the driving behavioural factors and demographic variables. It can be seen that age shows strongly negatively related with distractions and lapses. On the other hand, it shows a significant relation with violations and errors. This indicates that ageing drivers tend to commit more violations and errors but focus on their driving without being easily distracted and lapsed. In addition, that violations is strongly correlates with driving experience valued 0.675. This is due to their confident level and driving knowledge compared to the drivers with less driving experience.

Table 3: Correlations among Malaysian DBQ Factors and demographic variables

Variables	Distractions	Violations	Errors	Lapses
Distractions	1	0.331**	0.189	0.325**

<i>Violations</i>	0.331**	1	0.158	0.311**
<i>Errors</i>	0.189	0.158	1	0.397**
<i>Lapses</i>	0.325**	0.311**	0.397**	1
<i>Age</i>	-0.246**	0.325**	0.291**	-0.067
<i>Gender</i>	0.221**	-0.126	-0.232**	0.120
<i>Education level</i>	0.290**	0.303**	-0.011	0.092
<i>Driving experience</i>	0.203	0.675**	0.081	0.274**
<i>Employment</i>	-0.050	-0.117	0.162	0.139
<i>Driving frequency</i>	-0.116	-0.360**	0.016	-0.154
<i>Destination</i>	-0.065	-0.130	0.014	0.145
<i>Vehicle type</i>	0.038	-0.125	-0.220**	-0.066
<i>Accident involvement</i>	-0.244**	-0.197**	0.087	-0.187

Besides, Reason et al. (1990) stated that elderly drivers commit less violation than younger drivers and elderly drivers' group seems to be homogeneous regarding this behaviour [18]. Additionally in other research, analysis of age and gender showed that violations declined with age while errors did not, and men reported more violations than women. There was also a tendency for women to make more harmless lapses than men do [28].

4 CONCLUSION

The four factor structure has been reported to be the most appropriate method in distinguishing between the driving behavioural types. It can be concluded that different groups of drivers are likely to show different needs in term of traffic safety improvements. The finding obtained in this study shows that the driving distraction acknowledged the first factor while the rest three factors were explicitly violations, errors and lapses. The age shows strongly negatively related with distractions and lapses. On the other hand, it shows a significant relation with violations and errors. This indicates that ageing drivers tend to commit more violations and errors but focus on their driving without being easily distracted and lapsed. The strongest correlation is between violations and driving experience valued 0.675 and most of the factors are correlated with demographic variables. In conclusion, the factors structures of the Malaysian DBQ were very similar, but not identical with previous researches conducted worldwide. These results indicate that this tool can be used and the scale scores compared with confidence with other countries.

5 ACKNOWLEDGMENT

This work is financially supported by the University of Malaya under the University Malaya Research Grant (Project title: Driving Behaviour and Reaction Rate of Ageing Malaysian Automobile Drivers.), Postgraduate Research Grant (PPP) grant no.: PG131-2015B. Ethical approval for the study was obtained from the University of Malaya Medical Centre Ethics Committee.

6 REFERENCE

- [1] Turcotte, M., 2012. "Profile of seniors' transportation habits. Canadian Social Trends." Component of Statistics Canada Catalogue no. 11-008-X. Statistics Canada, Canada.
- [2] Alvarez, F. J., & Fierro, I. (2008). "Older drivers, medical condition, medical impairment and crash risk." *Accident Analysis and Prevention*, 40(1), 55–60.
- [3] Thompson, K. R., Johnson, A. M., Emerson, J. L., Dawson, J. D., Boer, E. R., & Rizzo, M. (2012). "Distracted driving in elderly and middle-aged drivers." *Accident Analysis and Prevention*, 45, 711–717
- [4] Nakagawa, Y., Park, K., & Kumagai, Y. (2013). "Elderly drivers' everyday behavior as a predictor of crash involvement - Questionnaire responses by drivers' family members." *Accident Analysis and Prevention*, 50, 397–404
- [5] Shams, M., & Rahimi-Movaghar, V., "(2009): Risky Driving Behaviors in Tehran, Iran," *Traffic Injury Prevention*, 10(1), 91-94
- [6] Lee, S., & Jeong, B. Y. (2015). "Comparisons of Traffic Collisions between Expressways and Rural Roads in Truck Drivers." *Safety and Health at Work*, 7(1), 38–42
- [7] Foon, Y. S., Chan, B., & Fah, Y. (2009). "Driving Practices of Older Malaysian Drivers: The Influence of Knowledge, Attitude and Confidence", 12(1), 65–75.
- [8] Karthaus, M., & Falkenstein, M. (2016). "Functional Changes and Driving Performance in Older Drivers: Assessment and Interventions." *Geriatrics*, 1(2), 12.
- [9] Wood, J. M., Lacherez, P. F., & Anstey, K. J. (2013). "Not all older adults have insight into their driving abilities: Evidence from an on-road assessment and implications for policy." *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*, 68(5), 559–566
- [10] Uno, H., & Hiramatsu, K. (2001). "Collision avoidance capabilities of older drivers and improvement by warning presentations", *Conference on the Enhanced Safety*, (1), 1–7.
- [11] Norazizan, S., Abdul, S., Corresponding, R., & Yin-fah, B. C. (2010). "Environmental Barriers and Correlations of Self-Rated Driving Confidence among Older Malaysian Drivers," 6(7), 18–28.
- [12] Cordazzo, S. T. D., Scialfa, C. T., Bubric, K., & Ross, R. J. (2014). "The Driver Behaviour Questionnaire: a North American analysis", *Journal of Safety Research*, 50, 99–107
- [13] Parker, D., McDonald, L., Rabbitt, P., & Sutcliffe, P. (2000). "Elderly drivers and their accidents: the Aging Driver Questionnaire", *Accident Analysis & Prevention*, 32(6), 751–759
- [14] Lajunen, T., Parker, D., & Summala, H. (2004). "The Manchester Driver Behaviour Questionnaire: a cross-cultural study", *Accident Analysis & Prevention*, 36(2), 231–238
- [15] Ozkan, T., Lajunen, T., & Summala, H. (2006). "Driver Behaviour Questionnaire: a follow-up study", *Accident; Analysis and Prevention*, 38(2), 386–95
- [16] De Winter, J. C. F., & Dodou, D. (2010). "The driver behaviour questionnaire as a predictor of accidents: A meta-analysis", *Journal of Safety Research*, 41(6), 66–86
- [17] Davey, J., Freeman, J., & Wishart, D. (2004). "Peer Reviewed Paper A Study Predicting Self-Reported Crashes Among Fleet Drivers", 1–11.
- [18] Obriot-Claudiel, F., & Gabaude, C. (2004). "The Driver Behaviour Questionnaire: A French study applied to elderly drivers", *Third International Conference on Traffic & Transport Psychology*
- [19] Harrison, W. A. (2009). "Psychometric and Rasch Analysis Of The Driver Behaviour Questionnaire (DBQ): Implications For Its Use As An Evaluation Tool With Novice Drivers", 1–16.

- [20] Research Note Young Drivers Report the Highest Level of Phone Involvement in Crash or Near-Crash Incidences. (2012), (April), 1–5.
- [21] H.A Nazlin, M.D. Siti Zawiah, “The cross cultural study on driving behaviour of Malaysian ageing automobile drivers”, *Malaysian Journal of Public Health Medicine* 16 (Supplement 2), 121-127
- [22] Robertson, R.D., Vanlaar W., Marcoux, K.D., McAteer, H.J., 2012. “Vehicle safety features: knowledge, perceptions, and driving habits”, Ottawa, Ontario: Traffic Injury Research
- [23] Freund, B., Colgrove, L.A., Burke, B.L., McLeod, R., 2005. “Self-rated driving performance among elderly drivers referred for driving evaluation”, *Accident Analysis and Prevention*, 37, 613-618.
- [24] Marottoli, R.A., Richardson, E.D., 1998. “Confidence in, and self-rating of, driving ability among older drivers”, *Accident Analysis and Prevention*, 30(3), 331-336.
- [25] Musselwhite, C.B., Haddad, H., 2007. “Prolonging the safe driving of older people through technology. Centre for Transport & Society,” University of the West of England, Bristol.
- [26] Stalvey, B.T., Owsley, C., 2000. “Self-perceptions and current practices of high-risk older drivers: implications for driver safety interventions”, *J Health Psychol* 5(4), 441-456.
- [27] Matus Sucha & Lenka Sramkova & Ralf Risser, “The Manchester driver behaviour questionnaire: self-reports of aberrant behaviour among Czech drivers”, *Eur. Transp. Res. Rev.* (2014) 6:493–502, DOI 10.1007/s12544-014-0147-z
- [28] Aberg, L., & Rimmö, P. A. (1998). “Dimensions of aberrant driver behaviour”, *Ergonomics*, 41(1), 39–56.
- [29] Md. Mazharul Haque, Simon Washington, “A parametric duration model of the reaction times of drivers distracted by mobile phone conversations”, *Accident Analysis and Prevention* 62 (2014) 42– 53.
- [30] Bener, A., Verjee, M., Dafeeah, E. E., Yousafzai, M. T., Mari, S., Hassib, A., Lajunen, T. (2013). “A cross “ethnic” comparison of the Driver Behaviour Questionnaire [DBQ] in an economically fast developing country”, *Global Journal of Health Science*, 5(August 2015), 165–175