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The Malay Manchester Driver Behaviour Questionnaire: A cross-sectional study of geriatric population in Malaysia

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ABSTRACT

Introduction: The Manchester Driver Behaviour Questionnaire (DBQ) can be regarded as one of the well accepted self-report measures of aberrant driver behaviour in more than 20 years. The various factor structures of DBQ had extensively been examined in past studies related to driving behaviour. The objective of this study is to examine the equivalence of the Malay DBQ factor structures in samples of older car drivers and older motorcycle riders in Malaysia.
Methods: Five hundred respondents were recruited for this study. Respondents were current and former car drivers or motorcycle riders, aged 60 years and above, and resided in Malaysia. All car drivers and motorcycle riders responded to the Malay DBQ either using a paper-form or an online platform via Qualtrics.
Results: All four factors in the Malay DBQ were found to be internally consistent for both car drivers sample and motorcycle riders sample. Older motorcycle riders perceived lapse items differently compared to older car drivers.
Conclusions: The four-factor structures of the Malay DBQ were very similar to the original DBQ, but not identical. This study suggested declining cognitive capabilities of older people were likely to be associated with the increasing likelihood of problems with attention.

1. Introduction

There is a growing concern of gradual ageing of the global population. United Nations (2015) projected many developing countries, including Malaysia, to be ageing nations by 2030. This demographic shift has subsequently presented various challenges for the developing nations in providing adequate infrastructure support, medical care and healthcare services as well as safe transportation options especially for older adults.

The narrowing of the life-expectancy gap between men and women raises another challenge (Sundberg et al., 2018). With more older people holding valid driving licenses, the current cohort of older adults have high demands for transportation and it is very likely that at least one partner will remain active driving for a longer period (D'Ambrosio et al., 2008; Curl et al., 2015; Schryer et al.,

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2017; Helman et al., 2017). As a result, we should expect to see more older adults on the road as they will be making more trips and travelling more miles than before (Burkhardt and Mcgavock, 1999). Furthermore, the additional burdens for the ageing population are likely to be contributed by the presence of health and mobility problems in later life (Jacoby et al., 2006; Cutugno, 2011; Shergold et al., 2015).

While travelling by private transportation is important for older adults, the concept of self-regulation and associated support systems have attracted much research and policy attention in recent years (Ang et al., 2019a). In the literature, self-regulatory driving practices among older adults was perceived as multidimensional and complicated concepts. Specifically, both driving situations and level of decision making were closely associated with rates of self-regulation (Molar et al., 2014). Additionally, Ang et al. (2017a) found older car drivers are over-represented in fatal and severe injury crashes. Besides, increasing presence of chronic diseases has significantly restricted older adults to remain safe behind the wheels (Boot et al., 2013; Goins et al., 2014; Hong et al., 2015; Shimada et al., 2016; Dickerson et al., 2017; Kandasamy et al., 2018; Ang et al., 2019b).

Previous research activities have emphasised towards understanding and preventing traffic crashes worldwide, including research relevant to promoting safe driving behaviours and adoption of appropriate driving practices to reduce injury and crash risk. Globally, the DBQ is perceived as one of the most well accepted self-report driving assessment tool (Mattsson, 2012). For example, the DBQ has been adopted in different countries to examine driving behaviours across different age groups, gender, culture, and type of vehicles, as well as in studies examining issues relevant to crash involvement, mental health, novice drivers, bias in survey, and customised education programs for drivers (Harrison, 2009; de Winter and Dodou, 2010; Nordfjærn et al., 2014). The DBQ was also utilised to better understand the aberrant driving behaviours among taxi, bus and company drivers in China (Xie and Parker, 2002), and professional drivers (Sullman et al., 2002).

Previous studies have emphasised the importance to better understand the behaviours of car drivers as well as motorcycle riders, and the impact of these behaviours on road safety. Several attempts were conducted to develop or validate instrument for measuring riding behaviours among motorcycle riders (Cheng and Ng, 2010; Sakashita et al., 2014). There are also studies comparing car drivers and motorcycle riders in terms of their hazardous perceptions, risky behaviours (speeding), and crash involvement. For instance, Banet and Bellet (2008) identified differences between the two populations. While motorcycle riders are supposed to be more aware of the risk as they are very vulnerable to road crashes, results had shown that motorcycle riders perceived driving situations as less critical than car drivers. Unlike car drivers, motorcycle riders were more likely to speed on rural roads in daytime (Broughton et al., 2009). On the other hand, Horswill and Helman (2003) reported that even though motorcycle riders did not differ from car drivers on the risk taking measures, they were better at hazard perception. Similarly, Shahar et al. (2010) found motorcycle riders perceived the scenarios as more dangerous than car drivers. Adding to the literature, not just any motorcycle riders, experienced riders were found to be better at detecting hazards than novice riders, and thus had fewer crashes and adopt appropriate speeds (Hosking et al., 2010; Liu et al., 2009; Shahar et al., 2010). Regardless, these studies have primarily focused on young car drivers and motorcycle riders.

Motorcycle collisions are on the rise and older motorcycle riders represent an increasing proportion of motorcycle riders (Broughton et al., 2009; Symmons and Mulvihill, 2011). While motor vehicle crashes particularly motorcycle-related crashes are disproportionately high in the developing world (Abdul Manan and Varhelyi, 2012; World Health Organization, 2018a, 2018b), there are limited studies available to examine the impact of this behaviour on road safety among older car drivers and motorcycle riders in developing countries than elsewhere (World health Organization, 2004; Ang et al., 2017a). Two recent studies conducted in Malaysia have shown that factors contributing to self-regulatory practices and crash involvement were found to be different for older car drivers and motorcycle riders, including type of aberrant behaviour (Ang et al., 2017b, 2019b). Unintentional lapses predicted crash involvement among older car drivers, whereas intentional aggressive violations predicted crash involvement among older motorcycle riders. Unlike motorcycle riders, conduct of aberrant behaviour was a contributing factor for driving reduction among car drivers. However, the extent to which the differences observed in driving/riding behaviours contributing to the phenomenon observed is still unclear.

Therefore, the present study utilised DBQ 27-item four-factor instrument proposed by Lajunen et al. (2004) and aimed at examining the equivalence of the Malay DBQ factor structures in samples of older car drivers and older motorcycle riders in Malaysia. Additionally, psychometric analysis including reliabilities and exploratory factor analysis were conducted for the older car drivers and motorcycle riders samples.

2. Materials and methods

2.1. Ethical approval

This study was approved by Monash University Human Research Ethics Committee (MUHREC; Project Number: 7444).

2.2. Respondents and procedure

This was a nested study of a larger survey which aimed to explore the driving and riding behaviours among older Malaysian adults (Ang et al., 2019b). For the purpose of this study, older people are men and women above the age of 60 years. This is because the age 60 is likely to be a realistic expression of older age in developing countries and widely used by United Nations for demographic projections to describe older people worldwide (World Health Organization, 2001). Briefly, respondents included in this study were Malaysian citizens, current and former car drivers or motorcycle riders, aged 60 years and above and residing in two states (Selangor and Kedah) located in the western part of Malaysia. These two states were chosen mainly to reflect a more socioeconomically

developed state (Selangor) versus a less developed one (Kedah) (DOSM, 2017). With an approximate of 700,000 of older adults (aged 60 years and above) residing in these two states (DOSM, 2017), using proportional quota sampling based on a fixed ratio of 2 car drivers to 1 motorcycle rider (RTDM, 2016), and at 95% confidence interval, the minimum recommended sample size was 384 (Charan and Biswas, 2013). Assuming a 30% non-response rate, therefore, recruitment targets were set at 333 car drivers and 167 motorcycle riders. For the purpose of the analyses, respondents were categorised either as a motorcycle rider or a car driver based on their responses on the vehicle mostly used for transport.

During the period of July 2016 to June 2018, respondents were recruited in-person and via snowball sampling at senior citizen organisations, community centres, and medical centres. It was voluntary for respondents to join this study. Each respondent must provide his/her consent prior to the commencement of the study.

2.3. Measures

In this study, the aberrant behaviour of both car drivers and motorcycle riders were assessed using the extended 27-item DBQ instrument (Lawton et al., 1997; Parker et al., 1998; Lajunen et al., 2004). This instrument included the aggressive violations, ordinary violations, errors and lapses items. The original extended 27-item DBQ in English was translated into Malay (official language in Malaysia) using a forward-backward translation and tested for its psychometric properties. Ang et al. (2018) has demonstrated the Malay DBQ to be valid and reliable. All the items were deduced to suit both older car drivers and motorcycle riders, and thus, there were no major modification introduced to the existing DBQ items and the translated items in Malay language were critically assessed for linguistic equivalence to ensure the accuracy of message conveyed matching the original items in English language (Ang et al., 2018).

In the present study, all car drivers and motorcycle riders responded to the Malay DBQ using a paper-form or an online platform via Qualtrics. They were subsequently asked to indicate on a six-point Likert scale (0 = never and 5 = nearly all the time) how frequent they performed on each of the 27 driving/riding behaviours based on the vehicle frequently used for transport; either as a car driver or a motorcycle rider. In addition, respondents answered questions about their age, gender, frequency of driving/riding, travel distance, reasons of the trip, number of crashes involved in the previous 5 years.

2.4. Statistical analysis

The internal consistency of the Malay DBQ scale scores was examined by calculating Cronbach's alpha reliability coefficients. A normality test was conducted before running the exploratory factor analysis (EFA). Both the skewness and kurtosis were within the limits. The main goal in EFA was to extract three factors with Oblimin rotation. The Bartlett's test of sphericity (BTS) and the Kaiser-Meyer-Olkin (KMO) test were conducted to determine the reliability of the instrument (Frohlich and Westbrook, 2001; Sahin et al., 2013). Item loadings on factors was significant if they reached the value 0.40 or more (Hair et al., 2010). The equivalence of the Malay DBQ factor structures was assessed first by determining the number of factors present in the older car drivers and older motorcycle riders samples. The existence of the number of factors was decided according to the “eigenvalue greater than one” rule (Thompson and Daniel, 1996) and a scree plot (Cattell, 1966). No issue of missing data was encountered in this study. All statistical analyses were performed using STATA Intercool version 13 (Stata Corp, College Station, TX).

Table 1
Sample characteristics.

Characteristics	Total (n = 500)	Car Drivers (n = 353)	Motorcycle Riders (n = 147)
Age, years			
• Mean (SD)	66.6 (6.3)	66.6 (6.2)	66.5 (6.7)
Gender, n(%)			
• Female	216 (43%)	180 (51%)	36 (24%)
• Male	284 (57%)	173 (49%)	111 (76%)
Frequency of driving/riding, n(%)			
• Every day	209 (42%)	145 (41%)	64 (44%)
• Almost every day	136 (27%)	111 (31%)	25 (17%)
• Occasionally	54 (11%)	45 (13%)	9 (6%)
• Rarely	101 (20%)	52 (15%)	49 (33%)
Distance, n(%)			
• Short	441 (88%)	314 (89%)	127 (86%)
• Long	59 (12%)	39 (11%)	20 (14%)
Top two Reasons of the trips, n(%)			
• Work related matters	129 (26%)	77 (22%)	52 (35%)
• To reach certain destination	53 (11%)	44 (13%)	9 (6%)
Crashes involvement in previous 5 years, n(%)	168 (34%)	92 (26%)	76 (52%)

Table 2a
Pearson correlations between participants' self-reported driving exposure, crashes and Malay DBQ factors for car drivers.

	Age	Gender	Crash Number	Aggressive Violations	Ordinary Violations	Errors	Lapses
Age	–	.06	.15**	-.12*	-.02	.05	.18***
Gender		–	.10	.09	.06	.03	-.03
Crash Number			–	.16**	.15**	.17**	.23***
Aggressive Violations				–	.39***	.26***	.23***
Ordinary Violations					–	.68***	.55***
Errors						–	.67***
Lapses							–

*p < .05, **p < .01, ***p < .001.

3. Results

3.1. Demographic and exposure measures

The characteristics of the sample are presented in Table 1. Among the 500 respondents, 71% of them were car drivers (n = 353) while 29% of them were motorcycle riders (n = 147). The average age of car drivers (66.6 years, SD = 6.2 years) and motorcycle riders (66.5, SD = 6.7 years) was about the same. Interestingly, there were 51% (n = 180) female drivers compared to 24% (n = 36) female riders. Most of the respondents drove (41%) and rode (44%) on daily basis mainly for short distance trips. The top two reasons of the daily trips were travelling for work related matters or to reach a destination. Approximately 51% motorcycle riders and 26% car drivers reported crashes involvement in previous 5 years.

The bivariate relationships between respondents' self-reported driving exposure, crashes involvement in previous 5 years and DBQ factors are presented in Table 2a for car drivers and Table 2b for motorcycle riders.

Among car drivers (refer to Table 2a), advancing age was significantly associated with higher number of crashes. Additionally, age was identified as having a significant negative relationship with aggressive violations, and a significant positive relationship with lapses. This shows that as drivers gained more experience, they are less likely to engage in aberrant driving behaviours but likely to make more lapses.

Similar to car drivers, motorcycle riders with advancing age was significantly associated with higher number of crashes (refer to Table 2b). Although age was revealed to be negatively related to aggressive violations and ordinary violation as well as positively associated with error and lapses, none of these relationships was found to be significant.

3.2. Malay driver behaviour questionnaire (DBQ)

All aggressive violations, ordinary violations, errors and lapses items were included in Table 3. Respondents were asked to indicate how often they themselves do each of the violations, errors or lapses when driving a car or riding a motorcycle on a 6-point Likert scale (0 = never and 5 = nearly all the time). Most of the items in lapses scale had average scores higher than 1 for both car drivers and motorcycle riders. Example of lapses recorded high scores, including *Forget where you left your car in a car park (Mean = 1.37, SD = 0.21 for car drivers; Mean = 1.17, SD = 1.28 for motorcycle riders)*; *Intending to drive to destination A, you "wake up" to find yourself on the road to destination B (Mean = 1.07, SD = 1.10 for car drivers; Mean = 1.22, SD = 1.26 for motorcycle riders)*; *Get into the wrong lane approaching a roundabout or a junction (Mean = 1.09, SD = 1.06 for car drivers; Mean = 1.12, SD = 1.20 for motorcycle riders)*. These results indicate lapses are the most common form of aberrant behaviour affecting the older drivers and riders (Table 3). These findings were consisted with Parker et al. (2000).

3.3. Exploratory factor analysis (EFA)

The value of KMO was 0.902 and 0.846 respectively for car drivers and motorcycle riders. In addition, the BTS value was highly significant (χ^2 = 5981.59 with df = 351 and p < .001 for car drivers; χ^2 = 2535.11 with df = 351 and p < .001 for motorcycle

Table 2b
Pearson correlations between participants' self-reported driving exposure, crashes and Malay DBQ factors for motorcycle riders.

	Age	Gender	Crash Number	Aggressive Violations	Ordinary Violations	Errors	Lapses
Age	–	.05	.21*	-.01	-.03	.03	.11
Gender		–	.13	.17*	.18*	-.11	-.06
Crash Number			–	.35***	.29***	.24**	.23**
Aggressive Violations				–	.49***	.36***	.27**
Ordinary Violations					–	.62***	.50***
Errors						–	.66***
Lapses							–

*p < .05, **p < .01, ***p < .001.

Table 3
Means and standard deviations of the Malay DBQ responses.

Items		Car Drivers (n = 353)		Motorcycle Riders (n = 147)	
		Mean	SD	Mean	SD
Aggressive Violations					
Q1	Sound your horn to indicate your annoyance to another road user.	1.05	1.07	1.22	1.28
Q2	Become angered by another driver and give chase with the intention of giving him/her a piece of your mind.	0.65	0.98	0.86	1.13
Q3	Become angered by a certain type of a driver and indicate your hostility by whatever means you can.	0.78	1.02	0.87	1.19
Ordinary Violations					
Q4	Overtake a slower driver on the inside.	1.05	1.15	1.22	1.23
Q5	Drive so close to the car in front that it would be difficult to stop in an emergency	0.64	0.89	0.90	1.07
Q6	Cross a junction knowing that the traffic lights have already turned yellow or red.	0.98	1.09	0.93	1.20
Q7	Disregard the speed limit on a residential road.	0.91	1.05	1.03	1.39
Q8	Disregard the speed limit on a highway.	0.93	1.08	1.16	1.33
Q9	Pull out of a junction so far that the driver with right of way has to stop and let you out.	0.67	0.87	0.71	0.96
Q10	Stay in a highway lane that you know will be closed ahead until the last minute before forcing your way into the other lane.	0.70	0.91	0.75	0.91
Q11	Race away from traffic lights with the intention of beating the driver next to you.	0.64	0.95	0.74	1.22
Errors					
Q12	Underestimate the speed of an oncoming vehicle when overtaking.	0.68	0.90	0.71	0.97
Q13	Fail to check your rear-view mirror before pulling out, changing lanes, etc.	0.72	0.93	0.76	0.98
Q14	Attempt to overtake someone that you had not noticed to be signalling a right turn.	0.68	0.92	0.92	1.07
Q15	Fail to notice that pedestrians are crossing when turning into a side street from a main road.	0.57	0.80	0.52	0.95
Q16	On turning left nearly hit a cyclist who has come up on your inside.	0.61	0.86	0.46	0.83
Q17	Queuing to turn left onto the main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front.	0.58	0.82	0.68	1.00
Q18	Miss “Give way” signs and narrowly avoid colliding with traffic having right of way.	0.70	0.86	0.75	0.94
Q19	Brake too quickly on a slippery road or steer the wrong way in a skid.	0.51	0.77	037	0.76
Lapses					
Q20	Forget where you left your car in a car park.	1.37	0.21	1.17	1.28
Q21	Switch on one thing, such as the headlights, when you meant to switch on something else, such as wipers.	0.99	1.05	1.03	1.10
Q22	Intending to drive to destination A, you “wake up” to find yourself on the road to destination B.	1.07	1.10	1.22	1.26
Q23	Get into the wrong lane approaching a roundabout or a junction.	1.09	1.06	1.12	1.20
Q24	Misread the signs and exit from a roundabout on the wrong road.	1.01	1.01	1.02	1.12
Q25	Attempt to drive away from traffic lights in third gear.	0.65	0.92	0.74	1.08
Q26	Realise that you have no clear recollection of the road along which you have just 0.55 been travelling.	0.86	1.05	1.05	1.20
Q27	Hit something that you had not previously seen when reversing.	0.72	0.90	0.54	0.96

riders). Based on recommendation from Frohlich and Westbrook (2001) and Sahin et al. (2013), we can argue that the factor analysis is reliable. The “eigenvalue greater than one” rule, scree plot suggested the presence of four factors for car drivers sample and motorcycle riders sample (Table 4).

Oblique rotation was applied due to high inter-correlations of factors in the car drivers sample (range: 0.23–0.68) and motorcycle riders sample (range: 0.27–0.66). Oblimin rotated factors matrices for both samples are presented in Table 4. Four-factors accounted for 62.1% of variance in the car drivers sample and 39.4% in the motorcycle riders sample. Table 4 shows in both samples, aggressive violation items had the highest factor loadings in the same factor. The factor loadings for the ordinary violation items were relatively high in the same factor. In the motorcycle riders sample, two error items, *1) Fail to notice that pedestrians are crossing when turning into a side street from a main road*; and *2) On turning left nearly hit a cyclist who has come up on your inside*, had relatively high factor loadings on the lapses factor.

In the car drivers sample, only five out of eight lapse items retained. Three items, *1) Attempt to drive away from traffic lights in third gear; 2) Realise that you have no clear recollection of the road along which you have just been travelling;* and *3) Hit something that you had not previously seen when reversing*, had relatively high factor loadings on the ordinary violation factor. On the other hand, only one *(Hit something that you had not previously seen when reversing.*) out of eight lapse items retained for motorcycle riders. The remaining seven lapse items have an error flavour. This suggested there might be ambiguity in differentiating the terminology of errors and lapses particularly for the older motorcycle riders.

3.4. Reliability analysis

Table 5 presents the Cronbach's alpha reliability coefficients for aggressive violations, ordinary violations, errors and lapses items. In both samples, aggressive violations scale seemed to be the most internally consistent ($\alpha = 0.92$ for car drivers, $\alpha = 0.91$ for motorcycle riders), whereas the lapses scale had the lowest alpha value for car drivers ($\alpha = 0.86$) and errors scale for motorcycle riders ($\alpha = 0.83$). All these values were higher than the DBQ scale scores reported for the British, Finnish and Dutch studies (Lajunen et al., 2004).

Table 4
Results of the exploratory factor analysis with oblimin rotations.

Items		Factor 1		Factor 2		Factor 3		Factor 4	
		Drivers	Riders	Drivers	Riders	Drivers	Riders	Drivers	Riders
Aggressive Violations									
Q1	Sound your horn to indicate your annoyance to another road user.	0.76	0.74						
Q2	Become angered by another driver and give chase with the intention of giving him/her a piece of your mind.	0.87	0.92						
Q3	Become angered by a certain type of a driver and indicate your hostility by whatever means you can.	0.88	0.79						
Ordinary Violations									
Q4	Overtake a slower driver on the inside.			0.40	0.39				
Q5	Drive so close to the car in front that it would be difficult to stop in an emergency			0.54	0.32				
Q6	Cross a junction knowing that the traffic lights have already turned yellow or red.			0.51	0.68				
Q7	Disregard the speed limit on a residential road.			0.69	0.76				
Q8	Disregard the speed limit on a highway.			0.73	0.82				
Q9	Pull out of a junction so far that the driver with right of way has to stop and let you out.			0.73	0.59				
Q10	Stay in a highway lane that you know will be closed ahead until the last minute before forcing your way into the other lane.			0.70	0.46				
Q11	Race away from traffic lights with the intention of beating the driver next to you.			0.72	0.85				
Errors									
Q12	Underestimate the speed of an oncoming vehicle when overtaking.					0.63	0.63		
Q13	Fail to check your rear-view mirror before pulling out, changing lanes, etc.					0.65	0.53		
Q14	Attempt to overtake someone that you had not noticed to be signalling a right turn.					0.76	0.42		
Q15	Fail to notice that pedestrians are crossing when turning into a side street from a main road.					0.77			0.73
Q16	On turning left nearly hit a cyclist who has come up on your inside.					0.68			0.71
Q17	Queuing to turn left onto the main road, you pay such close attention to the main stream of traffic that you nearly hit the car in front.					0.74	0.53		
Q18	Miss “Give way” signs and narrowly avoid colliding with traffic having right of way.					0.57	0.55		
Q19	Brake too quickly on a slippery road or steer the wrong way in a skid.					0.53			0.46
Lapses									
Q20	Forget where you left your car in a car park.						0.62	0.48	
Q21	Switch on one thing, such as the headlights, when you meant to switch on something else, such as wipers.						0.68	0.56	
Q22	Intending to drive to destination A, you “wake up” to find yourself on the road to destination B.						0.69	0.62	
Q23	Get into the wrong lane approaching a roundabout or a junction.						0.78	0.68	
Q24	Misread the signs and exit from a roundabout on the wrong road.						0.70	0.67	
Q25	Attempt to drive away from traffic lights in third gear.			0.65	0.75				
Q26	Realise that you have no clear recollection of the road along which you have just been travelling.			0.50			0.62		
Q27	Hit something that you had not previously seen when reversing.			0.63					0.66
Eigenvalues		9.70	8.72	2.28	2.62	1.62	1.83	1.06	1.33

Table 5
Cronbach's Alpha reliability coefficients of the Malay DBQ scales for car drivers and motorcycle riders.

Scale (items)	Car Drivers (n = 353)	Motorcycle Riders (n = 147)
Aggressive violations (three items)	0.92	0.91
Ordinary violations (eight items)	0.87	0.88
Errors (eight items)	0.88	0.81
Lapses (eight items)	0.86	0.83

4. Discussion

Globally several self-reported assessment tool have been used to study the aberrant driving behaviour of individuals, including the Manchester DBQ. The original version, which comprises of 50 items referring to drivers' aberrations, has been translated into other languages such as Chinese, Dutch, Finnish, Greek, Swedish and Turkish. Although the factor structures of the DBQ in these studies were very similar, there has been suggestion that these structures need to be customised to reflect the cultural differences in each country (Lajunen et al., 2004).

In this study, the aggressive violation items had the highest factor loadings, followed by the ordinary violation items. These findings suggested the aggressive violation items and ordinary violation items were clearly differentiated, similar to the original British DBQ. One possible reason for this similarity could be due to the transportation infrastructure and regulation between these two countries as Malaysia has been one of the British-ruled territories before 1957.

Among car drivers sample, results suggest respondents fared poorly in the lapse items. Three out of the eight lapse items were found to have ordinary violations flavour. These items were: *1) Attempt to drive away from traffic lights in third gear; 2) Realise that you have no clear recollection of the road along which you have just been travelling;* and *3) Hit something that you had not previously seen when reversing.* On the other hand, only one (*Hit something that you had not previously seen when reversing*) out of the eight lapse items was retained for motorcycle riders sample. These results suggested older motorcycle riders perceived the lapse items differently than older car drivers. Overall, lapse items, defined as the result of lack of concentration or attention (Parker et al., 1995), seem to be problematic for older drivers and riders in the present study. This outcome was consistent with declining cognitive capabilities of older people, and the increasing likelihood of problems with attention (Holland, 1998).

The alpha reliability coefficients showed the aggressive violations, ordinary violations, errors and lapses in the Malay DBQ were internally consistent. All these values were well above the DBQ scale scores reported for the British, Finnish and Dutch studies (Lajunen et al., 2004). Overall, all four factors in the Malay DBQ were found to be internally consistent, as well as items pertaining to the aggressive and ordinary violations had the top two highest factor loadings. Unfortunately, older car drivers and motorcycle riders perceived error and lapse items differently. Lack of qualitative component in the present study restricted the in-depth investigation of the difference in perceptions. Therefore, future studies include more representative older car drivers and motorcycle riders from more states in Malaysia are warranted to better understand the difference in perceptions. Implication of this study may result in a reliable Malay DBQ that could be used to assess the aberrant driver behaviour among older car drivers and motorcycle riders in Malaysia.

There were limitations present in this study. Firstly, the respondents were recruited via advertisement mainly from two states in Malaysia, which likely to introduce the possibility of sampling bias. Presumably, respondents participated to this study were more interested in their driving or riding behaviour. Secondly, self-report data was commonly criticised to be reporting bias or recall bias, which could potentially affect the accuracy of reporting. Thirdly, although motorcycle riders of size 147 might be underpower to do a factor analysis, it took approximately 2 years to recruit such group of older motorcycle riders for this study.

5. Conclusions

In conclusion, the four-factor structures of the Malay DBQ were very similar to the original DBQ, but not identical. Older motorcycle riders perceived lapse items differently compared to older car drivers. Although these findings suggested declining cognitive capabilities of older people are likely to be associated with the increasing likelihood of problems with attention, it was not clear why the difference in perceptions existed between older car drivers and motorcycle riders. Therefore, future studies are needed to better understand whether there is any driving culture difference between older car drivers and motorcycle riders.

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