CONTROL OVER DRIVING BEHAVIOUR AND ACCIDENT INVOLVEMENT: A CASE AMONG YOUNG DRIVERS IN MALAYSIA

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Resume

Human factors specifically, perceived behavioural control (PBC) is among the accident causation factors leading to risky driving behaviour among young drivers. Therefore, this paper aims to investigate the relationship between PBC and young drivers' risky driving behaviour, PBC and accident involvement as well as the mediating role of risky driving behaviour to mediate the relationship between the PBC and accident involvement. The sample of this study involved active young drivers aged between 18 and 25, possess valid driving license, with at least six months of driving experience and have been involved in a road accident for the past 12 months. Results showed a significant relationship between PBC and young drivers' risky driving behaviour as well as the PBC and accident involvement. Moreover, risky driving behaviour was proved to mediate the relationship between PBC and accident involvement.

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1 Introduction

Over the years, Malaysia has reported a high number of road accidents as well as fatality cases. In 2018 alone, a total of 536,250 accident cases and 6284 fatalities have been reported [1]. This figure exceeded the initial expectation made by the Malaysian government. Reports show that majority of road accidents occurred due to the drivers' and riders' failure to abide by the traffic rules and regulations [2-3]. Violation of traffic law leads to accidents not only in Malaysia but also in other countries around the world. Despite other factors that could contribute toward road accidents like technical factors of road faulty and vehicle faulty as well as the environmental factors of adhering weather, human factors of traffic violation behaviour and risky driving behaviour indeed top the issue factors [4]. Human factors are the most avoidable factors for the road accidents since drivers and riders are highly and solely responsible for their own driving behaviour [3]. Moreover, it has been reported that most road accidents occur due to the drivers' and riders' irresponsible driving behaviour.

Scholars further summarized that to overcome the issue of drivers' and riders' risky driving behaviour and their involvement in road accidents, an independent variable namely perceived behavioural control (PBC) should be used as one of the important elements that need to be considered [5-7]. The PBC believes in on the concept of self-control where drivers and riders can control their own driving behaviour. This means that, any driving decisions made by drivers and riders are solely based on their own discretion without any coercion from other parties. As a result, drivers and riders are basically in total control over the course of driving whether or not to drive dangerously and jeopardize their own life as well as other road users. Given the important role of PBC as one of the key antecedents of risky driving behaviour, this study aimed to investigate the relationship between the drivers' and riders' PBC toward risky driving behaviour and their involvement in a road accident as well as the mediating role of risky driving behaviour to mediate the relationship between the PBC and accident involvement.

1.1 Road accident involvement among young drivers around the world

Road accident involvement among the young and novice drivers has been seen higher compared to other age group drivers. The term "young driver" is being

defined as a driver aged between 18 to 25 years old [8]. In contrast, Cordellieri et al. [9] define "young driver" as a driver aged between 18 to 22 years old, whereas Mohamed and Bromfield [10] describe "young driver" as those aged between 18 to 24 years old. Jamaluddin et al. [11] in their research for the Malaysian Institute of Road Safety and Research (MIROS) highlighted that young driver aged between 15 and 25 are the highly risky accident group in Malaysia. Thus, in this research, the operational definition for the term "young driver" is defined as a driver aged between 18 and 25 years old.

Literature consistently revealed that younger drivers tend to commit more traffic violations including speeding and using mobile phones while driving despite their lack of driving experience [12]. This fact was further supported by other studies, which also highlighted the high traffic violations and accident involvements among the young drivers and riders in Australia and other European countries like the UK, Belgium and Italy [13-14]. In an investigation involving six European countries such as Germany, Finland, Italy, Netherlands, Sweden and the United Kingdom, reported that drivers' misjudgement over the time and distance during the course of driving has been reported as one of the contributors of accident occurrence and involvement among drivers [15].

A relevant review of the literature demonstrated that 2681 younger drivers from nine European countries namely Italy, Austria, Bulgaria, Cyprus, Germany, Ireland, Latvia, Lithuania and Poland tend to perceive a higher level of risks associated with driving [9]. Younger drivers are lacking in driving skills since the improvement of the skills eventually increases with age [11]. Similar situation had occurred in Asian countries, particularly Malaysia. Based on a study conducted by MIROS, age was considered one of the significant factors influencing the road accidents in the Klang Valley [11]. The study further highlighted that driver between the age of 15 to 25 years old are highly involved in traffic crashes [11]. It is further highlighted that young driver aged between 16 to 25 years old had caused 46% of fatal and non-fatal accidents in Malaysia [16].

In the road safety study, individual factors play a significant role to explain the occurrence of road accidents. Individual factors are the determinant identified within the individual himself/herself [17]. The factors include human attitude and personal characteristics [17]. To further identify the factors leading to accident involvement, a systematic review was conducted in this study on four academic databases namely Emerald, Scopus, Web of Science and Wiley Online Library. Through the review, an individual factor of perceived behavioural control (PBC) was identified as the possible significant contributor of accident involvement [5-6]. Therefore, this study further investigates the impact of the PBC on young drivers' risky driving behaviour and involvement in road accidents.

2 Literature review

2.1 Perceived behavioural control (PBC) and risky driving behaviour

The PBC applies the self-efficacy concept that explains a person's ability to control his or her own behaviour. PBC can also be interpreted as a belief where an outcome or consequence of the behaviour is influenced by the person himself. To promote the safe driving and reduce road accident statistics, PBC is used as one of the highly applicable indicators. In the concept of road safety, PBC is interpreted as to what extent drivers and riders can control their driving behaviour by not committing any wrongful traffic acts such as speeding, close following, use of mobile phone, dangerous overtaking and driving while intoxicated [5, 6, 18]. Risky driving behaviour is also known as traffic violation behaviour. This risky driving behaviour is considered as the drivers' and riders' intentional failure to abide by the traffic rules and regulations despite having knowledge of the wrongdoing. By breaking the traffic rules and regulations, drivers and riders are jeopardizing not only their life but also lives of other road users. Among the common risky driving behaviours committed by drivers and riders are driving over the speed limit, illegal use of mobile phone while driving, tailgating and running through the red light [5, 19-20]. In some of the serious cases, drivers and riders fail to control their vehicles and cause casualty.

A study conducted in Australia reported that the PBC can influence the drivers' behaviour to text while driving [21]. It was further mentioned that drivers with a high level of PBC were found to not engage with such violation behaviour [21-22]. Similarly, another study conducted in Australia also highlighted the importance of self-control to restraint one's behaviour from illegal use of mobile phones while driving [22]. Furthermore, a study conducted among Spain university students showed that texting while driving is a typical traffic violation committed by the students [12]. Students with good self-control were able to restrain themselves from using mobile phones and kept their full attention on driving.

Besides that, the PBC is also an important element to curb drivers' and riders' speeding behaviour. This has been further confirmed in two studies conducted in France, which highlighted PBC as the significant predictors to explain the risky driving behaviour of speeding [5, 23]. Similar findings have also been reported in two studies conducted in Taiwan which reported that PBC is a significant factor that can influence the drivers' speeding behavior [24-25]. Drivers' PBC increased alongside their driving experience [26]. Years of driving experience increase the drivers' driving skill and knowledge as well as their ability to control the vehicle. It has been reported that older drivers are more likely to engage in speeding compared to young

drivers since they have good ability and skills to control their vehicle and can ensure that they arrive at the destination safely [26].

Moreover, a study by Cristea and Gheorghiu [27] utilizing the sample of cyclists reported that PBC was able to influence the cyclists' riding behaviour. Cyclists with a high level of self-control were found able to stop themselves from running through the red light and switching on the turning signal [27]. Researchers further emphasized that a high level of PBC can increase the use of safety equipment or helmet in Turkey [28]. Such behaviour was found to help avoid the occurrence of severe traffic crashes and protect the riders from fatal accidents. A similar finding has been also reported in a study carried out in Malaysia where the PBC can influence the riders' behaviour to wear safety helmets before starting their journey [29].

Nevertheless, it has been reported that PBC does not necessarily avoid motorcyclists' risky driving behaviour. A study conducted in Turkey reported that PBC failed to overcome the motorcyclists' speeding and performing stunt behaviour while riding [28]. A similar finding has also been reported in a study conducted in Thailand which revealed that PBC was unable to restraint university students from breaking the traffic rules and regulations [30]. It has been reported that most university students illegally ran through the red light, especially at the road junction. In addition, a study by Warner and Aberg [31] using the sample of driver test participants reported that participants only portrayed their intention to abide by the speed limit during the initial data collection however, during the driving test, the participants were driving above the speed limit, which contradicts their initial intention. Overall, it can be summarized that there are various results over the effectiveness of the PBC in overcoming the drivers' and riders' risky driving behaviour. Therefore, further study needs to be conducted to confirm the effectiveness of PBC in restraint the drivers and riders from breaking the traffic rules and regulations. Hypothesis developed for this study is:

H1: There is a significant relationship between PBC and risky driving behaviour.

2.2 Perceived behavioural control (PBC) and accident involvement

A road accident is defined as the collision between one or more vehicles on the road causing vehicle damage, injury or even fatality [32]. Meanwhile, accident involvement is defined as the number of road accidents caused by the drivers and riders due to their fault or not [10]. Recently, there is an emerging number of road accidents due to drivers' egotistic acts of using the mobile phone while driving. This selfish act indeed disturbs the drivers' and riders' concentration and consequently increases the risk of an accident [33-34]. Wilson and Stimpson [35] reported that drivers failed to fix their eyes on the road when texting and reading a message. The illegal use of mobile phones has been reported to contribute to approximately 30% of road fatalities in the US [35].

Backer-Grondahl and Sagberg [36] further emphasized that the use of hand-held phones while driving has become a significant contributor to traffic crashes among road accident victims. A similar finding has also been highlighted by Horsman and Conniss [33], who reported the illegal use of hand-held phone as the key attributor in drivers' distraction problems. The urge to answer a call and read messages as soon as they receive it while driving has led to a greater accident risk [37]. Moreover, Bin Islam and Kanitpong [38] reported that the bus driver's loss of control in making the right decision and judgment when a sudden incident happened has resulted in a road accident between a bus and a pickup truck in Thailand. Further analysis revealed that this fatal accident could have been avoided if the bus driver has reduced the speed when driving on the curve upstream. Overall, it was proven that PBC is the key factor in road accident causation and involvement. The clear relationship between these two variables led towards the development of a hypothesis of:

H2: There is a significant relationship between PBC and accident involvement.

2.3 Mediating role of risky driving behaviour to mediate the relationship between perceived behavioural control (PBC) and accident involvement

Several studies have shown that risky driving behaviour occurs due to the drivers' and riders' poor PBC and that this aberrant driving behaviour has significantly led to accidents [5, 27]. Chen and Chen [24] highlighted PBC as the significant factor towards drivers' risky driving behaviour of speeding, which has become the main contributor of road accidents [26]. Similarly, a study by Cristea and Gheorghiu [27] reported that cyclists with poor PBC are more likely to cycle at a high speed although when passing a road junction that requires them to stop. Apart from that, it was also reported that these cyclists failed to stop at the road junction and were more likely to make a sudden left or right turn. This selfish act indeed becomes a major road accident contributor involving cyclists.

In addition, drivers and riders with poor PBC also tend to use their phones while driving regardless of knowing that this action can distract their focus when driving [21-22]. Wilson and Stimpson [35], Muehlegger and Shoag [34] and Horsman and Conniss [33] revealed that drivers and riders who illegally use their phones while driving are indeed more likely to be involved in road accidents. In summary, it has been proven that risky driving behaviour help to explain the effects of the

Figure 1 *Research Framework*

Table 1 *Number of registered vehicles up to year 2019 and number of road accident according to states within the year 2012 to 2019*

States	No. of registered vehicles up to 2019	No. of road accident							
		2012	2013	2014	2015	2016	2017	2018	2019
Perlis	116,231	1,881	1,895	1,888	1,861	2,062	1,925	2,093	2,098
Kedah	1,380,952	19,935	20,228	20,159	22,016	23,200	23,262	23,239	24,867
Penang	2,673,907	37,851	39,408	38,747	39,856	42,244	43,007	45,734	47,198
Perak	2,274,725	34,714	39,361	35,131	36,736	38,531	38,587	38,278	39,720
Selangor	2,931,203	129,106	135,024	137,809	140,957	151,253	154,958	163,078	168,222
Kuala Lumpur	6,441,342	61,872	64,527	63,535	64,664	68,866	72,940	72,284	73,771
Negeri Sembilan	970,371	22,146	23,066	23,748	22,939	24,428	24,941	25,123	25,838
Malacca	864,194	15,195	16,083	16,375	17,069	18,601	18,771	19,120	19,593
Johor	3,638,857	62,316	64,600	64,473	67,112	73,116	76,121	78,812	82,502
Pahang	1,066,464	20,554	20,130	19,071	19,635	20,465	20,813	20,641	21,196
Terengganu	641,736	10,861	9,748	10,326	10,381	10,793	10,713	10,607	11,355
Kelantan	905,024	9,968	10,996	9,383	9,960	10,544	10,786	10,983	11,295
Sabah	1,238,538	17,446	18,700	17,693	17,290	17,298	17,244	18,006	18,520
Sarawak	1,804,251	18,578	17,438	17,858	19,130	20,065	19,807	20,600	21,341

relationship between the independent variable of PBC and the dependent variable of accident involvement. The hypothesis that has been developed by this study is:

H3: Risky driving behaviour mediate the relationship between the PBC and accident involvement.

Figure 1 shows the research framework that been investigated in this study. PBC is the independent variable, risky driving behaviour is the mediator and finally, accident involvement is the dependent variable.

2.4 Underpinning theory: attribution theory

Attribution Theory is used to explain the purpose or motive of human behaviour. Two factors that lead towards individual behaviour, namely internal attribution and external attribution. Internal attribution, also known as dispositional attribution, is a factor within the individual himself/herself that causes the person to act in a certain manner. An example of internal attribution is personality and attitude. Meanwhile, the external attribution, also known as situational attribution, is the outside factor that causes a person to act accordingly. An example of external attribution is the surrounding situation and the influence of other people.

For this study, the internal attribution was used to underpin the relationship between the PBC and the young drivers' and riders' risky driving behaviour, as well as their accident involvement. The young drivers' and riders' ability to control their driving decision is something within themselves. They have the power to avoid risky driving behaviour such as driving above the permitted speed, overtaking at the double lines, running through the red light, as well as illegal use of mobile phones to type and read text while driving.

Drivers and riders who make the right driving decision and comply with the traffic rules and regulations would be subsequently able to avoid being involved in road accidents. For example, driving while using mobile phones will distract the drivers' or riders' attention. Thus, drivers and riders must be able to restraint themselves from reading and replying to the text message once they received it. This is because the text message they received may involve some emotional or personal feeling that would distract their attention. Moreover, there is also an example where the drivers or riders feel the urge to read or reply to the text message as soon as they received it however, their mobile phones are not within the possible place to reach, such as in the backpack or at the back of their trousers. The drivers' or

riders' first action to reach for their mobile phones has already distracted the course of driving.

3 Methodology

This study was carried out using the quantitative research design through the deductive approach. The minimum sample size for this study was determined using the G*Power calculation with the anticipated effect size of 0.15, the desired alpha level at 0.05 and the desired statistical power of 0.80. As a result, the minimum sample size of this study became 98 samples. This study is a cross -sectional study conducted using 193 young drivers and riders. This study employed the purposive sampling method. Young drivers and riders are defined as those from within the age 18 to 25 years. Other criteria for sample selection in this study were that they must possess a valid driving license, with at least six months of driving experience, actively drive for the past six months (must drive at least 3-4 times a week) and be involved in any road accident for the past 12 months in either Selangor, Johor, or Kuala Lumpur. Data released by the Malaysian Ministry of Transportation reported that these three states recorded the highest number of accidents for the past eight consecutive years. Table 1 shows the number of registered vehicles up to year 2019 and number of road accidents according to states within the year 2012 to 2019 (the latest data that has been published by the Ministry of Transportation Malaysia).

All the items in the modified questionnaire measured each of the risky driving behaviour: (1) speeding, (2) close following, (3) use of mobile phone while driving or riding, (4) failure to switch on the turning signal, (5) run through the red light and (6) dangerous overtake. These are among the common risky driving behaviour committed by the drivers and riders within the context of Malaysia setting as discussed in studies by Abdul Manan [39] and Abdul Manan and Várhelyi [40], as well as Harith and Mahmud [41].

Questionnaire items for the PBC were adapted from several scholars namely Gauld et al. [21], Eyssartier et al. [5] and Prat et al. [12]. A study by Prat et al. [12] reported reliability of 0.87, whereas a study by Eyssartier et al. [5] reported reliability of 0.77. The researchers used the five - point trueness - based Likert scale, which ranged from "*Strongly disagree* (1); *Disagree* (2); *Neutral* (3); *Agree* (4); to *Strongly Agree* (5)". All the modified questionnaire items used in this study were categorized as negative items. Six PBC questionnaire items used to collect the data are: -

i) For me, I have complete control over whether or not I would drive above the speed limit.
ii) For me, I can take the risk to follow the car closely.
iii) For me, I am confident to use a mobile phone while driving.
iv) For me, I am confident to change the lane without switching on the turning indicator.
v) For me, if I wanted to, I can run through the red light.
vi) For me, I am confident to overtake other cars.

Meanwhile, questionnaire items for the risky driving behaviour were adapted from Castanier et al. [42] and Chung and Wong [43]. All the adapted questionnaire items reported reliability of more than 0.70 (6). The researchers used the five - point frequency - based Likert scale, which ranged from "*Never* (1); *A few times* (2); *Frequently* (3); *Often* (4); to *Very Often* (5)". Six questionnaire items for the variable of risky driving behaviour used to collect the data were: -

Please indicate how often you have carried out each of the behaviour during the past 12 months:

i) Excessive speeding
ii) Following car too closely
iii) Using a phone while driving
iv) Not switching on the turning signal
v) Run through the red light
vi) Dangerous overtake

Finally, questionnaire items for accident involvement were adapted from Mohamed and Bromfield [10] with a reliability of 0.75. The researchers used the combination of five - point frequency - based Likert scale, which ranged from "*Never* (1); *Only once* (2); *Twice* (3); *Three times* (4); to *More than three times* (5)" and the five - point trueness - based Likert scale, which ranges from "*Strongly disagree* (1); *Disagree* (2); *Neutral* (3); *Agree* (4); to *Strongly Agree* (5)". Five questionnaire items for the variable of accident involvement used to collect the data were: -

i) Estimation of accident involvement for the past 12 months *(five - point frequency - based Likert scale)*
ii) Most of the accidents happened because of my own fault *(five - point trueness - based Likert scale)*
iii) Estimation of accident involvement happened because of my own fault *(five - point frequency - based Likert scale)*
iv) Most of the accidents happened because of other road users' fault *(five - point trueness - based Likert scale)*
v) Estimation of accident involvement happened because of other road users' fault *(five - point frequency - based Likert scale)*

4 Results

From the overall 300 questionnaires distributed, a total of 145 questionnaires were returned, representing 48% of the response rate. For the online questionnaire, a total of 53 questionnaires were retrieved and four questionnaires with more than 20% missing data were excluded. As a result, the total number of usable questionnaires for this study became 193. Table 2 shows the summary of distributed and returned questionnaires.

Table 2 *Summary of distributed and returned questionnaires*

Questionnaire Returned (paper)	Incomplete and Excluded (paper)	Total Usable Questionnaire
145	1	144
Online Questionnaire	Incomplete and Excluded (online)	Total Usable Questionnaire
53	4	49
Grand Total	193	

Table 3 *Demographic Information*

Personal Characteristics (n = 193)	Frequency	Percentage (%)
Respondent age		
18 - 19 years old	41	21.2
20 - 21 years old	89	46.1
22 - 23 years old	33	17.1
24 - 25 years old	30	15.5
Gender		
Male	99	51.3
Female	94	48.7
Marital status		
Married	17	8.8
Single	176	91.2
States of accident		
Kuala Lumpur	65	33.7
Selangor	62	32.1
Johor	66	34.2
Employment status		
Full time employee	21	10.9
Part time employee	2	1.0
Student	168	87.0
Unemployed	2	1.0
Driving frequency per week		
3 - 4 times	87	45.1
5 - 6 times	31	16.0
Everyday	75	38.9
Driving experience		
6 months - 1 year	51	26.4
1 - 2 years	45	23.3
2 - 3 years	29	15.0
More than 3 years	68	35.2
Mode of transport		
Car	104	53.9
Motorcycle	86	44.6
Bicycle	3	1.5
Location of accident		
Straight and flat road	56	29.0
Curve and steep road	53	27.5
Road junction	74	38.3
Ring road	10	5.2
Weather condition during accident		
Sunny	93	48.2
Rainy	79	40.9
Windy	21	10.9

Table 4 *Results of direct relationship between variables*

Hypothesis	Relationship	Std. Beta	t-value	P Value	Decision
H1	PBC → Risky Driving Behaviour	0.201	3.728	0.00	Supported
H2	PBC → Accident Involvement	0.039	2.103	0.01	Supported

Table 5 *Result of indirect relationship between variables*

Hypothesis	Relationship	Std. Beta	t-value	P Value	Decision
H3	PBC → Risky Driving Behaviour → Accident Involvement	0.039	1.948	0.05	Supported

Table 3 shows the respondents' demographic information. The majority of respondents (n = 89) were aged between 20 - 21 years old, followed by 21.2% within the age of 18 to 19 years old, 17.7% within the age of 22 to 23 years old and finally 15.5% within the age of 24 to 25 years old. Next, about 51.3% of the respondents were male, whereas, the remaining 48.7% were female. For the employment status, most of the respondents were students (n = 168). The remaining were full time employees (n = 21), part-time employees (n = 2) and only two unemployed respondents. Moreover, 87 respondents were reported to drive at least 3 - 4 times a week, followed by 75 respondents driving daily and 31 respondents driving 5 to 6 times per week. The majority of the respondents (n = 68) have more than three years of driving experience followed by 51 respondents with six months to one year of driving experience.

Meanwhile, the statistics of road accidents distribution, based on states, was almost similar with 65 accidents occurring in Kuala Lumpur, 62 accidents occurring in Selangor and 66 accidents occurring in Johor. Subsequently, most of the respondents (n = 104) drove a car when the accident occurred, followed by 86 respondents who rode a motorcycle and only three respondents who rode a bicycle when the accident happened. For the location of the accident, the majority of the accidents occurred at the road junction (n = 74), followed by straight and flat road (n = 56), curve and steep road (n = 53) as well as ring road (n = 10). Finally, in terms of the weather condition during the accident, about 93 cases were reported to have occurred during the sunny weather followed by 79 accident cases that happened during the rainy condition and finally, only 21 accident cases were reported to have occurred during the windy weather.

Harman's Single - Factor test result reported that the data set did not suffer from the common method bias issue as the variance explained by the single factor was only 23.7%, which is lesser than the cut-off point of 50% [44]. The results of Average Variance Extracted (AVE) and Composite Reliability (CR) were also greater than the cut-off point of 0.5 and 0.7 respectively. Meanwhile, the result of Fornell and Larcker's criterion reported that the average variance of own constructs was larger than the other constructs, which confirmed the discriminant validity. The model also did not suffer from multi-collinearity problems since the inner Variance Inflation Factor (VIF) values for the exogenous variables were less than 5.0 [45].

Three hypotheses were developed to measure the relationship between the *(1)* PBC and risky driving behaviour, *(2)* PBC and accident involvement and *(3)* the mediating role of risky driving behaviour to mediate the relationship between the PBC and accident involvement. Table 4 shows the results of the two direct relationships between the PBC and risky driving behaviour as well as PBC and accident involvement. The t-value of the relationship between the PBC and risky driving behaviour was ≥ 1.28 and significant at level of significance 0.10, ($\beta = 0.201$, $p < 0.10$). Meanwhile, the t-value of the relationship between PBC and accident involvement was ≥ 1.28 and significant at level of significance 0.10, ($\beta = 0.039$, $p < 0.10$). Therefore, it can be summarized that the first and second hypotheses are supported.

The mediating role of risky driving behaviour was analysed using the Preacher and Hayes Method. The mediating analysis was analysed through the indirect effect or also known as "bootstrapping the indirect effect". Table 5 shows the result of bootstrapping analysis on the indirect relationship on the mediating role of risky driving behaviour to mediate the relationship between the PBC and accident involvement. From the tabulated result, it can be identified that the indirect effect of PBC → Risky Driving Behaviour → Accident Involvement was significant ($\beta = 0.039$, t - value of 1.948). The 90% Boot CI Bias Corrected for the significant indirect effects was [LL = 0.013, UL = 0.074]. Therefore, it can be summarized that the third hypothesis is supported.

5 Discussion and conclusion

The result of this study demonstrated that the young drivers' and riders' PBC significantly influenced their risky driving behaviour of speeding, tailgating, use of mobile phone while driving, failure to switch on the turning signal, running through the red light

and dangerous overtake. Based on the finding, it can be identified that the young drivers and riders who can control themselves to follow the traffic rules and regulations would subsequently avoid committing the risky driving behaviour. Apart from that, PBC was also proved to act as a vital variable in the young drivers' and riders' involvement in road accidents. Various studies from Western and European countries, like Australia and France, confirmed the significant relationship between PBC and the drivers' risky driving behaviour [21-22, 27]. It was further reported that drivers with a high level of PBC can restrain themselves from violating the traffic rules including illegal use of mobile phones while driving and speeding.

Meanwhile, studies conducted in Taiwan reported similar findings where the PBC was proven as one of the influential antecedences toward the drivers' speeding behaviour [24-25]. Besides, in Malaysia, PBC is considered an important element in cultivating the culture of wearing a helmet and reducing the drivers' violation of speeding [46-47]. As a result, it was shown that the young drivers' and riders' poor PBC has significantly caused them to commit risky driving behaviour and become involved in road accidents. Based on the demographic information, it was demonstrated that the majority of the respondents were students who still are pursuing their tertiary education. They are the future human capital with bright opportunities awaiting them. The consequences of being involved in a road accident would cause a loss not only to the country but also to the individual himself/herself. Therefore, these young drivers and riders need to put greater attention to their safety while driving.

Apart from that, past literature revealed that 10 % of road accidents occurred due to technical and environmental factors [48-49]. Based on the data gathered from demographic information, it was identified that more than half (51.8 %) of the accidents occurred during rainy and windy weather. Besides the human factors, this variable should be investigated in future research. This is because the young drivers and riders have limited driving experiences and vehicle handling skills which would cause them difficulty in controlling their vehicles, especially during the bad weather. The probability of skidding and lapsing occurring during the adverse weather was very high thus, drivers with limited driving skills and experience would most probably become panic and anxious. As a result, their poor emotion and lack of self-control to handle such situations would eventually cause them to be involved in road accidents.

Moreover, another aspect that needs to be emphasized to avoid the occurrence of road accidents is through the regular vehicles' technical inspections. A recent study conducted in 10 EU states summarized the requirement for regular technical inspection with the vehicles age [50]. As noted, the older the age of a vehicle, the higher the tendency for the vehicle faulty. Thus, through a regular inspection, the probability of vehicle faulty that could lead toward the occurrence of road accidents can further be minimized.

Another reason that can be investigated in future studies, related to the occurrence of road accidents, is the technical factor in terms of road condition [4]. Data gathered from the questionnaires distributed to the respondents revealed that 38.3 % of the accident occurred at the road junction, 27.5 % occurred at the curvy and steep road and 5.2 % occurred at the ring road. Accidents at road junctions can occur either due to the drivers' carelessness, negligence towards traffic rules and regulations like running through the red light or the conditions of the road itself. Not all the road junctions have installed a traffic light to control the traffic. The existence of a traffic light at road junctions would help the drivers to take turn to cross over the road, which subsequently helps to minimise the occurrence of road accidents. Besides that, several accidents have been reported on curvy and steep roads. Driving on these roads requires good vehicle handling skills, which is one of the young drivers' disadvantages. A study by Jamaluddin et al. [11] further emphasised that the empowerment of driving skills goes along with driving experience. The more experience the drivers have, the more vehicle handling skills they will possess, which can be subsequently used to avoid road accidents regardless of the location or type of the road.

This study has several limitations. Firstly, this study was conducted using the purposive sampling method, which included several criteria such as age limitation, driving frequency, driving experience and the respondents must be involved in at least one road accident. As a result, the findings of this research cannot be generalized to all drivers and riders in Malaysia. Apart from that, this study only covered the states of Selangor, Kuala Lumpur and Johor, which further limited the generalization of findings, where the results were only applicable to these three states. Overall, it can be summarized that the PBC is indeed an important individual trait that will help young drivers and riders, who are mostly university students in Malaysia, to restraint themselves from breaking the traffic rules and regulations. Therefore, young drivers and riders must develop good self-control. This inner strength requires high perseverance as they are fighting with themselves to follow the traffic rules and regulations. When the young drivers and riders can strengthen their self-control, they would not be easily influenced by other road users or even peer passengers who encourage them to drive aberrantly, run through the red light and even overtake at the double line.

Moreover, other related parties like NGOs, Police and the Ministry of Transportation also need to play an active role to increase the drivers' and riders' awareness towards the road safety. When handling young drivers, different approaches are needed to address this issue compared to those of older drivers. World Health Organization (WHO) reported that the road safety

education and training are among the best intervention plans that can help to curb the drivers' and riders' risky driving behaviour and subsequently reduce the number of road accidents.

MIROS chairman, Tan Sri Lee Lam Thye highlighted that imposing higher fines by the authorities is no longer the significant solution to reduce the number of road accidents in Malaysia [51]. Malaysian citizens are seen unaffected by the traffic compound and summonses issued by the authorities [51]. For example, the use of automated enforcement system (AES) cameras installed throughout the Malaysian highway. AES is one of the self-regulated methods used by the authority to control the drivers and riders speeding violations. It is shown that drivers would tend to decrease their vehicle speed only at certain locations where the cameras are installed, while at other locations, they would still drive above the permitted speed limit. This is because the drivers know exactly where these cameras are installed. The notification on the location of AES cameras is publicised through the media of television, newspaper, radio and other social media including Facebook and Twitter before it is enforced. As a result, another approach should be emphasized by the government to curb this issue as soon as possible.

To achieve that, it is recommended for the Malaysian government to put more initiative on delivering the road safety message to the public especially the young drivers and riders through the communication campaign of meaningful and significant slogans such as "*Value Your life*", and "*Better safe than sorry*". This younger generation is prone to social media platforms like Facebook, Tiktok and Instagram. Thus, the government should aim to deliver road safety awareness through these platforms to ensure such a message can be delivered successfully. Since the majority of the respondents are still pursuing their tertiary education, related authorities, like the Road Safety Department, police and MIROS, can focus on conducting the road safety campaign at the public and private universities in Malaysia.

Moreover, another important aspect that needs to be emphasized is to include the right propensity of fear into the road safety message such as the use of real accident pictures and the true story of the accident victims. More road safety campaign needs to be organized with enhanced content accordingly to increase the level of fear among the drivers and riders. When the right propensity of fear is delivered to the road users through the road safety campaign, education and training, the drivers and riders would be able to perceive the message correctly and subsequently increase their self-control to abide by the traffic rules and regulations. "An ounce of precaution is better than a pound of cure", thus, we should avoid such incidents from happening rather than dealing with their consequences.

In addition, the road safety education delivered during the driving schools' training should be revised and the study plan also should be added with a more comprehensive road safety knowledge. A study conducted in the Slovak Republic further summarized that the inspection conducted by the Slovak Republic Ministry of Transport and Construction reported high incidents of fraud involving the driving participants to which the driving licenses were issued although they did not even complete the training in driving schools [52]. This illegal act caused a significant impact on the government, the other road users and the drivers themselves. Those drivers are not competent enough to drive on roads. Thus, such incident needs to be avoided for the better road safety condition in the future.

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