

# To What Extend Perceived Behavioural Control can Influence Traffic Violation? An Explorative Study

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## Abstract

Road accident is one of the critical global issues nowadays. Drivers' violation over the traffic rules and regulation has been reported to lead the occurrence of road accident worldwide. It further reported that drivers' perceived behavioural control (PBC) could actually avoid the occurrences of such violation behaviour. Therefore, this review paper aimed to study on the relationship between PBC and traffic violation behaviour. This review has been undertaken through four academic databases, namely Scopus, Wiley Online Library, Emerald and Web of Science which originally yielded a total of 3471 findings. After several screenings and reviewing process, only 18 studies that fulfill the eligibility criteria were included in this study. The empirical evidence regarding the relationship between PBC and violation behavior is mixed. The drivers seemed to have intention to control themselves from breaking the law, however, in fact they were actually violating the traffic law. The appropriate countermeasure has been proposed in order to further enhance drivers' PBC in cultivating a safe driving behaviour.

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## I. INTRODUCTION

Road accident has been reported to contribute among the most world death statistics. World Health Organization (WHO) reveals that every day more than 3700 people die and tens of millions of people suffer from injuries or being disable due to road accident worldwide (1). It further reported that young children and older people contribute the most of the road accident statistics as compared to the other group of drivers. Review over literature reported that young drivers within the age of 17 to 25 years old involved in the most

of the accident causation in the western countries (2, 3). Whereas based on the WHO global status report, road accident has been reported to be the leading killer for the road users within the aged of five to 29 years old (4). Road accident happened due to three main factors namely, human factors, technical factors and environmental factors. Literature reported that human factors lead the road accident causation worldwide with approximately 90% as compared to the technical and environmental factors (5, 6). The evidence showed that the occurrence of the

traffic crash is due to the negligence of the drivers themselves, on the contrary they could prevent any road violation and accident from happening. . Studies show that drivers indeed have the ability to control their driving behaviour from violating the traffic rules and regulations in order to avoid any unfortunate incident from happen (7-9). Therefore, it is the aim of this paper to systematically review to what extends drivers' perceived behavioural control (PBC) can influence drivers' traffic violation behaviour.

## II. LITERATURE REVIEW

### A. Traffic Violation Behaviour

Violation behaviour is a person's intentional failure by committing what supposed to be done despite having the knowledge of the wrongdoing. Drivers' violation behaviour over the traffic rules and regulations such as speeding, dangerous overtake, run over red light, use of mobile phone while driving, close following and fail to turn turning indicator are among the most common accident causation factors around the globe (10-15). For Example, one study reported that young drivers who are violating the speed limit law in Saudi Arabia are highly risk toward accident causation (16). It has further been supported in an experimental study by Svenson, Eriksson (17), which reveals that driver who are driving faster than other road users will be having trouble to stop the vehicle on time whenever a sudden incident occur for example in a case of a child running to cross over the road. The similar situation also happened when drivers violating the vehicle safe distance rule. Drivers who are unable to maintain the safe distance and drive closely with the front vehicle would increase the risk of accident causation when the front vehicle suddenly stop the vehicle due to some emergency (18). Apart from that, another

traffic violation behaviour that is commonly committed by drivers is using the mobile phone while driving, especially in the case of sending or replying text (3, 19). This risky behaviour causes distraction to the drivers since they are unable to fix their eyes on the road and subsequently increase the risk of traffic crashes.

### B. *Perceived Behavioural Control (PBC)*

One of the self-efficacy concepts which reflect a person's personality to control own behaviour is called perceived behaviour control (PBC). PBC is one of the original variables under the Theory of Planned Behaviour (TPB) which commonly been used to study on an individual intention toward committing certain behaviour. This concept of PBC believes an outcome of behaviour is control by the person himself. In safe driving, PBC has been linked to what extend drivers are able to control their driving behaviour from not committing any wrongful traffic acts such as speeding, close following, use of mobile phone, dangerous overtake and drive while intoxicated (7-9, 19-21). Drivers who are able to restrain themselves from violating any traffic regulations are able to avoid the occurrence of road accidents (7-9). Therefore, PBC was considered as one of the factors frequently highlighted by scholars in the safe driving course (7, 8, 19, 21).

Studies reported that PBC can actually influence the drivers' behaviour to use a mobile phone while driving (3, 19). Meanwhile, Cristea, Paran (22) and Eyssartier, Meineri (7) confirmed that PBC is one of the significant predictors to explain the traffic violation behaviour of speeding in France. These studies summarized that drivers with high level of PBC was found to not engage in such violation behaviour. This indicates that self-control is one of the important attributes to

constraint drivers from committing risky and dangerous acts while driving. Drivers with good self-control can also reduce traffic crash risk as they are more reasonable in making decision when encountering different situations. In another study by Cestac, Paran (23) revealed that PBC increased alongside with the driving experience. This suggests that older drivers are more likely to engage in speeding while driving compared to the younger drivers since they are able to control themselves while driving and to ensure that they can arrive at the destination safely even though they are speeding. Years of driving experiences increase the older drivers' driving skill and knowledge. As a result, they are more likely to portray safe driving compared to the younger drivers even they are actually committing traffic violations.

Another study by Ambak, Ismail (24) reported that PBC can help to influence the riders' behaviour to wear safety helmet before starting their journey. The study further emphasized that the element of self-control is an important antecedence that needs to be cultivated in every rider in Malaysia since helmet violation behaviour is one of the common mistakes usually ignored by most riders and has increased the rate of crash fatality in the country (25, 26). Moreover, a study by Prat, Gras (2) reported that PBC was discovered able to control the drivers' traffic violation behaviour of texting while driving (3, 19). Similarly, another study conducted among Spain university students reported that students with a good self-control were able to restrain themselves from using a mobile phone and keep their full attention on driving. In overall, it can be summarized that PBC indeed plays a significant role in cultivating safe driving.

### III. METHODOLOGY

A systematic literature review has been undertaken toward four academic databases, namely Scopus, Wiley Online Library, Emerald and Web of Science. Several keywords such as "perceived behavioural control", "Planned Behavioural Theory", "violation driving behaviour" and "traffic violation" have been used together with the application of Boolean operators like "OR" and "AND" during the search process. The researcher did not apply any restriction toward the search timespan and languages. Upon the completion of the search process, all the findings retrieved from each of the academic databases were exported into the EndNote X7 (reference software database). Next, the researcher screened the titles of each finding to ensure only the related title that fulfilled the inclusion and exclusion criteria were included in the study. Subsequently, the researcher read the abstract of the remaining titles and again withdraws any records that unrelated to the requirement criteria. Finally, the researcher retrieved the full text of the remaining abstracts through the EndNote X7 database and manually searches any full text that unable to be retrieved by the reference database. Once all the full texts have been retrieved, the researchers read each of the full text and again excludes any full text that unrelated to the inclusion and exclusion criteria. The inclusion and exclusion criteria are:

Inclusion criteria:-

1. Type of study: Cross – sectional studies
2. Participant: All types of respondents who either have been involved in the road accident or not or engaged with drivers who commit traffic violations
3. Outcomes: studies that investigate the relationship between PBC and traffic violation behaviour by using the application of TPB.

Exclusion criteria:-

1. Type of study: review papers, meta – analysis studies, students’ thesis and dissertation
2. Research focus: studies that do not use TPB

#### IV. RESULT AND DISCUSSION

##### A. Search Results

A total of 3471 findings have been yielded from four academic databases during the first screening and reviewing process (Scopus: 325, Willey Online Library 480, Emerald: 743 and Web of Science: 1896). Secondly, the researchers deletes a total of 751 duplicate findings Thirdly, the researchers screens the title of the remaining 2720 records and deletes a total of 2299 unrelated titles which do not fulfill the inclusion criteria. Next, the researcher read the abstracts of the remaining 421 records and withdraws a total of 309 unrelated abstracts. Moreover, the researchers retrieved the full texts of the remaining 112 related abstracts, read each of the full texts and match it with the requirement criteria. Finally, only 18 studies that fulfill all the criteria have been selected to be included in this review study. Figure 1 shows the PRISMA flow diagram of the search strategy.

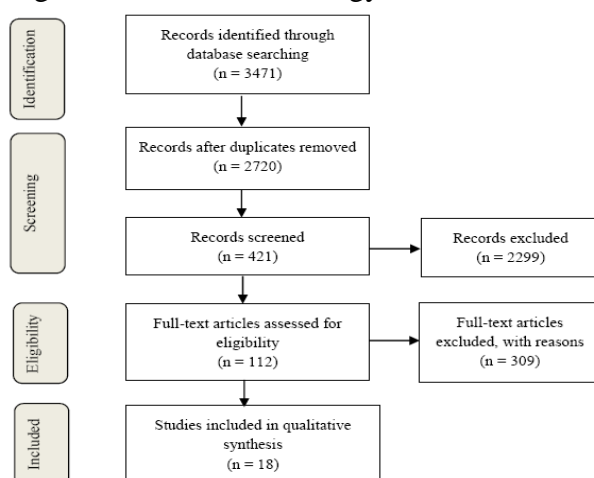


Figure 1: PRISMA diagram of search strategy

##### B. Research Setting

All included studies were undertaken in 11 countries from all around the world with most of the studies (n = 3) were conducted in Australia and France, followed by two studies conducted in Sweden, Taiwan and United Kingdom. Finally the remaining studies were conducted in Malaysia, Kampala (Uganda), Turkey, Spain, Thailand and China. Detail information on the research setting can be found in Table 2.

##### C. Research Participant

From 18 included studies, three studies use the research participant of motorcyclists, university students and general drivers (the authors did not mention the detail of the drivers). Two studies use the research participant of test drivers and young drivers. Whereas, the remaining studies use the research participants of sport and touring riders, high school students, truck drivers, traffic offenders and adult e – bike users. Detail information on the research participants can be found in Table 2.

##### D. Research Outcome

Majority of the included studies (n = 6) investigate the outcome of traffic violation behaviour of speeding, followed by three studies investigate the outcome of traffic violation behaviour of mobile phone usage while driving (either to read text, send text or received call). Meanwhile the remaining studies investigate the outcome of traffic violation behaviour of helmet and safety equipment usage, adherence and compliance toward traffic rules and regulation, performing stunts behaviour while riding, runs over the red light, traffic offender driving behaviour (driving license have been revoked for lifetime) and finally the passengers intention to speak up to driver who engage in a risky driving behaviour. Detail information on the research outcomes can be found in Table 2.

### ***Relationship between PBC and Traffic Violation Behaviour***

Out of 18 included studies, majority of the studies investigate on the relationship between PBC and speeding behaviour. The first study is conducted by Åberg and Wallén Warner (27) among 175 test drivers in Sweden. The results showed that there are a significant relationship between PBC and self – reported speeding behaviour ( $r = - 0.44$ ;  $p < 0.01$ ) as well as PBC and actual speeding behaviour ( $r = - 0.28$ ;  $p < 0.01$ ). Secondly, is a study conducted by Cestac, Paran (23) which investigate the impact of PBC on speeding intention among the 3002 France drivers. The result also reported a positive significant relationship ( $r = 0.40$ ;  $p < 0.01$ ). Thirdly, a study by Elliott, Armitage (28) among 150 respondents in the United Kingdom showed a significant relationship between PBC and speeding behaviour in two different driveways which are the urban distribution roads and village through – roads [speeding behaviour intention  $r = 0.52$ ;  $p < 0.001$ ; actual speeding behaviour  $r = 0.68$ ;  $p < 0.001$ ] as well as rural single carriageways and motorway roads [speeding behaviour intention  $r = 0.34$ ;  $p < 0.001$ ; actual speeding behaviour  $r = 0.63$ ;  $p < 0.001$ ] Next, a study by Eyssartier, Meineri (7) investigate on the speeding intention among 256 sports and touring riders in France also reported a positive significant relationship ( $r = 0.23$ ;  $p < 0.01$ ). Similarly with the other studies, study by Warner and Åberg (29) also reported the significant relationship between PBC and Swedish test drivers participants' self – reported behavior (Path coefficient: 0.27), however the relationship with the actual speeding behaviour is unsupported. Moreover, study by Chen and Chen (30) also reveals the insignificant relationship between PBC and speeding intention involving 350 motorcyclists in Taiwan, which suggest that the motorcyclists

believe they are unable to control their speeding behaviour.

Subsequently, all studies that investigate on the relationship between PBC and the usage of mobile phone while driving reported significant findings. Gauld, Lewis (3) and Prat, Gras (2) undertaken their studies toward 171 young drivers in Australia [Intention to text while driving  $r = 0.75$ ;  $p < 0.001$ ; Subsequent texting behaviour  $r = 0.59$ ;  $p < 0.001$ ] and 1082 university students in Spain Australia [Intention to read text while driving  $r = 0.632$ ;  $p < 0.01$ ; Normal read text behaviour while driving  $r = 0.45$ ;  $p < 0.01$ ; Intention to send text while driving  $r = 0.583$ ;  $p < 0.01$ ; Normal send text behaviour while driving  $r = 0.287$ ;  $p < 0.01$ ] reported the significant relationship respectively. Meanwhile, a study by Nemme and White (19) only reported the significant relationship between PBC and sending text while driving (reported behaviour) among the 169 university students in Australia, whereas the relationship between PBC and the other violation behaviour of intention to send text and read text while driving as well as the read text while driving (reported behaviour) are insignificant. Next, two studies by Yang, Liu (31) and Satiennam, Satiennam (32) reported the significant relationship between PBC and intention to run over the red light involving the 160 adult e-bike users in China and 246 university students in Thailand [ $r = 0.26$ ;  $p < 0.01$ ;  $r = 0.15$ ;  $p < 0.01$ ] respectively. However, the relationship between PBC and run over the red light (reported behaviour) by Satiennam, Satiennam (32) is reported to be insignificant.

Studies by Mawanga and Ntayi (33) and Poulter, Chapman (34) investigate the relationship between PBC and the compliance and adherence toward the traffic rules among the 370 drivers in Kampala ( $r = 0.355$ ;  $p < 0.01$ ) and 232 truck drivers in United Kingdom [Adherence with traffic law intention, path



coefficient = 0.17; Adherence with traffic law behaviour, path coefficient = 0.15; Compliance with traffic law intention, path coefficient = 0.33; Compliance with traffic law behaviour, path coefficient = 0.43] reported a significant findings. Meanwhile, Ambak, Ismail (24) reported the significant relationship between PBC and helmet usage intention and proper helmet usage behaviour involving 533 motorcyclists in Malaysia [ $r = 0.16$ ;  $p < 0.01$ ;  $r = 0.221$ ;  $p < 0.01$ ]. Unlike study by Ambak, Ismail (24), Özkan, Lajunen (35) only reported a significant finding between PBC and behaviour to wear safety equipment of wearing riding boots (Path coefficient: 0.17) among the 451 motorcyclists in Turkey, but the other violation behaviour such as speeding and performing stunt behaviour while riding are unsupported. Next, Cristea, Paran (22) undertake their study among 1192 young drivers in France reported the significant relationship between PBC and traffic compliance behaviour [ $r = -0.16$ ;  $p < 0.05$ ], speeding behaviour (91 km/h and 110 km/h) [ $r = 0.37$ ;  $p < 0.05$ ] and speeding behaviour (over 110 km/h) [ $r = 0.43$ ;  $p < 0.05$ ]. Moreover, study by Kennedy, Cullen (36) reported the significant relationship between PBC and the 268 high school students' intention to speak up to the drivers engaging in a risky driving through the use of mobile phone while driving [Intervention group  $r = 0.60$ ;  $p < 0.001$ ; Control group  $r = 0.58$ ;  $p < 0.001$ ]. Finally, Tseng, Chang (37) also reported the significant relationship between PBC and driving behaviour of the lifetime driving license revoked Taiwanese offenders ( $r = 0.61$ ;  $p < 0.01$ ) respectively. Detail information on the research result can be found in Table 2.

### *Summary of the Review*

In overall, majority of the studies reported a significant relationship between PBC and

traffic violation behaviour which suggest that drivers have the ability to control their own behaviour by restraining themselves from breaking the traffic rules and regulations. on the contrary, several studies reported contradict finding whereby the results showed that the violation behavior committed by the drivers is beyond or out of their control. These insignificant findings are mostly reported when the drivers committing the actual traffic violation behaviour, whereas the drivers' intention to control themselves from committing traffic violations is remain significant. In another word, it can be summarized that drivers did believe that they are able to control their driving behaviour especially their intention toward restraining themselves from violating traffic rules and regulation, however, in an actual situation they failed to control themselves and break the traffic rules and regulations which is contradict from their initial intention. Referring back to the TPB which mainly been used by the scholars to explain the individual's intention to commit certain behaviour, is reporting similar findings as reported by the researcher (29, 32). Although PBC can significantly predict the drivers' intention to control themselves from committing traffic violation behaviour, but such situation not necessarily could lead toward the occurrence of actual behaviour. These contradict findings indeed enriched the body of knowledge and require further confirmation from other research setting, participants and research design. Apart from that, it can also be identified that most of the studies are conducted within the Western and European countries, whereas very limited number of research has been conducted in the Asian and Middle East countries which similarly suggesting for more studies to be conducted to further confirm the existence results. In overall, it can be summarized that

PBC is one of the significant variables that can help drivers and other road users to avoid themselves from violating the traffic rules and regulations. Drivers with high level of PBC have a clear judgement on what ought to be done and what not suppose to be done, which subsequently help them to control themselves from committing the traffic violation behaviour and further prevent any unwanted incident.

## V. CONCLUSION

From the overall review, it can be concluded that the review over the relationship between PBC and traffic violation behaviour indicated a mix findings as some of the studies reported a significant results meanwhile some of them reported to be insignificant. Despite of the mix findings, PBC is indeed one of the key variables that can restrain drivers from breaking the traffic rules and regulation. PBC is an individual trait that mainly depends on the individual himself. Therefore, drivers need to have a good self-judgment in order to control themselves from committing a wrongful act which not only could harm themselves but also the other road users. Based on this review, it also can be summarized that, speeding is the most common traffic violation behaviour followed by the illegal use of mobile phone while driving either to read text, send text or even received a phone call. This violation behaviour commonly been committed by the young drivers or the university students, which suggest that young drivers having some difficulty to restraint themselves from answering the phone call as well as reading and replying the text while driving even knowing such behaviour could distract their driving attention and increase the accident risk. Therefore, to overcome this issue, road safety education program and awareness campaign are among the most appropriate countermeasure which can be used to cultivate

the road safety compliance behaviour and safe driving. World Health Organization (WHO) through the road traffic injury training manual also reported that road safety education and training are the key solution in overcoming the drivers' traffic violation behaviour (38). Thus, government and other related parties like NGO, police, road transport department, universities and school need to focus more on the educational approach in order to create awareness toward road safety and expose the road users with the consequences of their traffic violation behaviour through the lost of loved one, property damage, permanent disability and even their own death. When the right propensity of fear is being exposed to the road users, this will subsequently change their perception toward safe driving and they will eventually start to control themselves to abide with the traffic rules and regulation which indirectly can reduce the accident risk.

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**Table 2**

Detail information of search result

No.	Study	Country	Participant	Behavioural outcome	Result
1	Åberg and Wallén Warner (27)	Sweden	175 test drivers participant	a) Self – reported speeding b) Actual speeding behaviour	a) $r = -0.44; p < .01$ b) $r = -0.28; p < .01$
2	Ambak et al (24)	Malaysia	533 motorcyclists	a) Intention to use helmet	a) $r = 0.16; p < .01$

3	Cestac et al (23)	France	3002 drivers	b) Proper helmet usage behaviour	b) $r = 0.221$ ; $p < .01$
4	Chen and Chen (30)	Taiwan	350 motorcyclists	Speeding behaviour intention	$r = 0.40$ ; $p < .01$
5	Cristea et al (22)	France	1192 young drivers	Speeding behaviour intention	Not significant
6	Elliott et al (28)	United Kingdom	150 drivers	a) Traffic compliance behaviour	a) $r = -0.16$ ; $p < .05$
				b) Speeding behaviour (91 km/h and 110 km/h)	b) $r = 0.37$ ; $p < .05$
				c) Speeding behaviour (over 110 km/h)	c) $r = 0.43$ ; $p < .05$
				Urban distributor roads & village through-roads	Urban distributor roads & village through-roads
				a) Speeding behaviour intention	a) $r = 0.52$ ; $p < .001$
				b) Actual speeding behaviour	b) $r = 0.68$ ; $p < .001$
				Rural single carriageways & motorway	Rural single carriageways & motorway
				a) Speeding behaviour intention	a) $r = 0.34$ ; $p < .01$
				b) Actual speeding behaviour	b) $r = 0.63$ ; $p < .001$
7	Eyssartier et al (7)	France	256 sport and tour riders	Speeding behaviour intention	$r = 0.23$ ; $p < .01$
8	Gauld et al (3)	Australia	171 young drivers	a) Texting while driving intention	a) $r = 0.75$ ; $p < .001$
9	Kennedy et al (36)	Australia	268 high school students	b) Subsequently behaviour	b) $r = 0.59$ ; $p < .001$
				Intention to speak up to driver engaging in a risky driving behaviour (talking on phone while driving)	a) $r = 0.60$ ; $p < .001$
10	Mawanga and Ntayi (33)	Kampala	370 drivers	a) Intervention group (exposed with school – based road safety program)	b) $r = 0.58$ ; $p < .001$
				b) Control group (yet to be exposed)	
11	Nemme and White (19)	Australia	169 university students	Compliance toward traffic rules:- Use of mirrors, overtaking conditions, speed limits, etc.	$r = 0.355$ ; $p < .01$
12	Özkan et al (35)	Turkey	451 motorcyclists	a) Sending text while driving intention	a) Not significant
				b) Sending text while driving reported behaviour	b) $r = -0.20$ ; $p < .05$
				c) Reading text while driving intention	c) Not significant
				d) Reading text while driving reported behaviour	d) Not significant
13	Poulter et al (34)	United Kingdom	232 truck drivers	a) Use of safety equipment behavior ( riding boats)	a) Path coefficient : 0.17
				b) Speeding behaviour	b) Not significant
				c) Stunt behaviour	c) Not significant
				a) Adherence with road traffic laws intention	a) Path coefficient : 0.32
14	Prat et al (2)	Spain	1082 university students	b) Adherence with road traffic laws behaviour	b) Path coefficient : 0.15
				c) Intention to comply with road traffic regulations	c) Path coefficient : 0.33
				d) Compliance with road traffic regulations behaviour	d) Path coefficient : 0.43
				a) Intention to read text while driving	a) $r = 0.632$ ; $p < .01$
15	Satiennam et al (32)	Thailand	246 university students	b) Normal texting behaviour (read text)	b) $r = 0.45$ ; $p < .01$
				c) Intention to send text while driving	c) $r = 0.583$ ; $p < .01$
				d) Normal texting behaviour (send text)	d) $r = 0.287$ ; $p < .01$
				a) Run over red light intention	a) $r = 0.15$ ; $p < .05$
16	Tseng et al (37)	Taiwan	544 traffic offenders	b) Run over red light reported behaviour	b) Not significant
17	Warner and Åberg (29)	Sweden	112 test drivers participant	Driving behaviour of revoked offenders	$r = 0.61$ ; $p < .01$
18	Yang et al (31)	China	160 adult e-bike users	a) Self – reported speeding	a) Path coefficient : 0.27
				b) Actual speeding behaviour	b) Not significant
				Run over red light intention	$r = 0.26$ ; $p < .01$