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PSYCHOLOGICAL FACTORS INFLUENCING SPEEDING INTENTIONS OF CAR DRIVERS AND MOTORCYCLE RIDERS IN URBAN ROAD ENVIRONMENTS

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ABSTRACT

The aim of this study was to examine and compare psychological factors influencing car drivers' and motorcycle riders' speeding intentions (IN), using the Theory of Planned Behaviour (TPB). The psychological factors modules included Attitude (AT), Subjective Norm (SN) and Perceived Behavioural Control (PBC). These were employed to explain speeding intentions in urban road environments. A sample of 188 car drivers and 174 motorcycle riders were collected from the two universities within Khon Kaen, Thailand. The Structural Equation Model (SEM) was used to examine and explain speeding intentions. The results indicated that the TPB could explain 33% and 41% of the variance of intentions by car drivers and motorcycle riders, respectively. The most significant psychological factor for car drivers was determined by attitude (AT), while the speeding intention of motorcycle riders was attributed to perceived behavioural control (PBC). The authorities in Khon Kaen Province should determine safety policies that can improve these psychological factors, which could have various effects or outcomes on changing car drivers' and motorcycle riders' speeding intentions. The outcome of this study could help to understand car drivers' and motorcycle riders' speeding intentions in urban road environments and it could be useful for development of safety measures.

Keywords: Attitude; Perceived Behavioural Control; Speeding intention; Structural equation model; Theory of Planned Behaviour

1. INTRODUCTION

Speeding is the main cause of road traffic deaths in all countries. World Health Organization (WHO) rated the speeding enforcement level in Thailand at three out of ten, compared to developed countries at over seven (Elvik et al., 2004; WHO, 2015). The Thailand authorities, especially Khon Kaen authorities are trying to change the speeding behaviour of road users. (e.g., educational campaigns, police surveillance, speed cameras etc.). However, these measures have been limited (Tankasem et al., 2015; Sateinnam et al., 2015). Speeding behaviour is not easy to understand and depends on various factors. It is necessary to carefully determine speed control measures to achieve accident reduction in the control areas. Traffic psychology is a science that explains the in-depth driver behaviour. The Theory of Planned Behaviour (TPB) has been used as a frame of reference to explain human behaviour and is explained using three important psychological factors including: Attitude (AT), Subjective Norm (SN) and Perceived Behavioural Control (PBC) (Ajzen, 1991). The field of traffic psychology is very large and

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many studies concerning speeding intentions have been conducted under the framework of TPB (Gauld et al., 2014; Chen & Chen, 2011; Cristea et al., 2013; Dinh & Kubota, 2013; Elliott, 2010; Leandro, 2012; Elliott et al., 2005; Warner & Åberg, 2006; Warner & Åberg, 2008; Warner et al., 2009). However, previous studies focused on speeding intentions in developed countries. The results may have difference in the significant factor and may vary depending on the area or vehicle type of study, for example, previous studies in Sweden and Turkey found that PBC was most significant factor and highly influential for drivers' speeding intentions (Warner & Åberg, 2008; Warner et al., 2009), but other previous studies in France and Japan found that the most significant factors were AT (Cristea et al., 2013; Dinh & Kubota, 2013). Previous studies of motorcycle riders in Scotland and Taiwan found that AT was most significant factor and highly influential for riders (Elliott, 2010; Elliott et al., 2005). These results could help to understand speed intentions that are important for determining speed control measures or road safety policy. However, there is a lack of studies regarding to speed intentions in developing countries, where culture and preferences for the size of motorcycles are different from previous studies in developed countries. Therefore, the aim of this study was to examine and compare psychological factors influencing the speeding intentions of car drivers and motorcycle riders in developing countries, using TPB.

2. METHODOLOGY

2.1. Questionnaire Survey and Participants

This study developed the psychological questionaires examining the latent variables following the principles of TPB as a frame of reference (Ajzen, 2006; Francis et al., 2004). This study examined only the direct measurements. All questions were measured on a 7-point scale and were related to reasons for driving or riding faster than other road users in urban road environments. Data was collected from a population of students and workers (184 car divers and 174 motorcycle riders) at both Khon Kaen University and the North Eastern University, in Khon Kaen, Thailand.

2.1.1. Attitude towards the behaviour

Attitude (AT) was measured by four items, such as "For me driving/riding fast in urban environments would be ..." (1 = harmful/unpleasant, to 7 = beneficial/pleasant).

2.1.2. Subjective norm

Subjective Norm (SN) was measured using four items, such as "I think people who are important for me (Parent/friend/relative) would … with me to drive/ride fast in urban environments" (1 = strongly disagree/never disapprove, to 7 = strongly agree/always approve).

2.1.3. Perceived behavioural control

Perceived Behavioural Control (PBC) was measured by three items, such as "How confident are you able to drive/ride at speeds higher than other road users in urban environments" (1 = not very confident, to 7 = very confident), "For me to drive/ride at speeds higher than other road users in urban areas would be …" (1 = very difficult, to 7 = very easy).

2.1.4. Intention

Intention (IN) that refers to speeding faster than other road users, was measured by three items, such as "Would you intend to drive/ride at a higher speed than other road users in urban environments?" (1 = definitely not, to 7 = definitely do), "How often do you think you will drive/ride at speeds higher than other road users in urban environments?" (1 = not at all, to 7 = very much).

2.2. Analysis of Results

The analysis of the results was divided into three parts. The first analyzed the different demographics between the sampling groups, using the independent T-test at the 5% level of

significance. The second analyzed a factor analysis on latent variables (AT, SN, PBC and IN) given by questionnaire. Reliability of the latent variables was analyzed by three indices including: Cronbach's (alpha) (α), Construct Reliability (CR) and Average Variance Extracted (AVE). The relationship between TPB's latent variables (AT, SN & PBC) and IN was examined by a correlation coefficient. All variables were analyzed, based on a hypothetical model, based on TPB, by confirmatory factor analysis (CFA). The final part used the Structural Equation Modeling (SEM) to analyze all variables. Respondent's factors (AT, SN & PBC) were positively related to the behavioural intention of speeding in urban environments. Overall model fit were evaluated against the number of recommended fit statistics and fit indices (Hair Jr et al., 2010).

3. RESULTS

3.1. Demographics and Model Estimation

The data was collected from 188 drivers (male: 56% and female: 44%) and 174 riders (male: 29% and female: 71%) within Khon Kaen City, Thailand. Table 1 shows the differences in demographics between car drivers (PC) and riders (MC). It found that age, car driving or motorcycle riding experience and average daily travel distance between the two groups were considerably different by 5% level of significance. Most demographic values of car drivers were higher than motorcycle riders. All motorcycle riders respondents were between 16-31 years old, while all car drivers' respondents were 18-67 years old. The car drivers had experience of driving vehicles longer than motorcycle riders. Car drivers had driving experience of about 0-50 years, while motorcycle riders have 0-15 years of experience on average. The car drivers drove longer travel distances than motorcycle riders, at a factor of about 4 times. Most of the motorcycle riders used motorcycles over a short distance at about 5-60 km. per day.

Table 1 Differences in demographics of car drivers and motorcycle riders

Demographics	Drivers Mean (SD)	Riders Mean (SD)	*t*
Age (year)	26.43 (8.08)	20.59 (2.05)	9.55*
Driving or riding experience (year)	7.97 (6.35)	5.66 (3.00)	4.37*
Average daily travel distance (km/day)	32.66 (20.67)	8.18 (6.43)	10.32*

t = *t*-value :The results are based on independent-samples t-test,* Significant at 5% level

The results of reliability and validation estimation were presented in Table 2. It shows that all values of reliability and validation followed a good rule of internal consistency and rule of thumb, suggesting adequate convergence.

Table 2 Reliability estimation and construct validation

Factors	Drivers			Riders		
	α	CR	AVE	*α*	CR	AVE
Attitude (AT)	0.78	0.73	0.66	0.72	0.62	0.58
Subjective Norm (SN)	0.77	0.64	0.53	0.71	0.62	0.51
Perceived Behaviour Control (PBC)	0.74	0.62	0.58	0.73	0.61	0.58
Intention (IN)	0.91	0.87	0.75	0.93	0.92	0.82

Remark :*α* = Cronbach's (alpha), CR =Construct Reliability and AVE =Average Variance Extracted

In other words, Cronbach's (alpha) (α), refers to consistent answers from identical group questions (e.g., Items for attitude measure) of the respondents. The values should be at 1.0 or over 0.7 to be acceptable. For construct reliability (CR) and average variance extracted (AVE), the values refer to a representative value of the latent variable or unobserved variable which should be a value over 0.6 and 0.5, respectively. As a result, these values indicate latent variables of car drivers and motorcycle riders, which are good reliable representative values to explain the IN (Intention) model.

Table 3 shows that all latent variables (AT, SN & PBC) had a correlation with the IN variable at 0.1% level of significance. The IN variable of car drivers has the highest correlation coefficient with AT, (0.78) while motorcycle riders' highest correlation was attributed to PBC (0.73). Therefore, the AT value for car drivers and the PBC value for motorcycle riders, could well explain the IN factor, however other variables also could explain IN factor.

Moreover, these values presented a correlation of two latent variables, including independent variables (AT, SN and PBC) and the dependent variable (IN). Table 3 found that results follow the same trend, for example, when the score of AT has low value (0.66), score of IN also has low value (0.75). These values have an effect on future intentions or plans to perform an action. To illustrate this effect it is assumed, when respondents had a negative attitude about speeding behaviour or important persons did not support such behaviour or they perceived this behaviour was difficult to action, the car drivers or motorcycle riders would not drive or ride their vehicles at a high speed when they are in the urban environment in the future.

Table 3 Correlations with speeding intention

Factors	Correlations (r)*	
	Drivers	Riders
Attitude (AT)	0.44	0.52
Subjective Norm (SN)	0.36	0.46
Perceived Behaviour Control (PBC)	0.34	0.58

* All latent variables are significant at 0.1% level of significance

Table 4 Overall model fit and factors influencing with standardized path coefficients

Model fit	Urban Road Environment	
	Drivers	Riders
χ^2	32.638	43.643
Chi-square/df (< 3.0)	1.112	1.505
p –value (> 0.05)	0.239	0.040
GFI (> 0.90)	0.967	0.954
CFI (> 0.90)	0.995	0.982
RMSEA (< 0.08)	0.026	0.054
SRMR (< 0.08)	0.032	0.036
Factors influencing to intention	*Standardized path coefficients*	
AT → IN	0.38**	0.22
SN → IN	0.17	0.25**
PBC → IN	0.11	0.34**

** Significant at 1% level, AT refer to attitude toward speed, SN refer to subjective norm and PBC refer to perceived behavioural control

3.2. Speeding Intention Model

The indexes in SEM and factors influencing the indexes with standardized path coefficients for car drivers and motorcycle riders are presented in Table 4. The most often indicated number of recommended statistics and indices in Table 4 are fitted for the Structural Equation Model (Hair Jr et al., 2010). Therefore, the car drivers' and motorcycle riders' model fits between the theoretical constructs and observation constructs.

The resultant structural models with standardized path coefficients for car drivers and motorcycle riders are displayed in Figures 1 and 2, respectively. Overall model fit for the two models could pass a number of recommended fit indices (except the p–value of motorcycle riders' model).

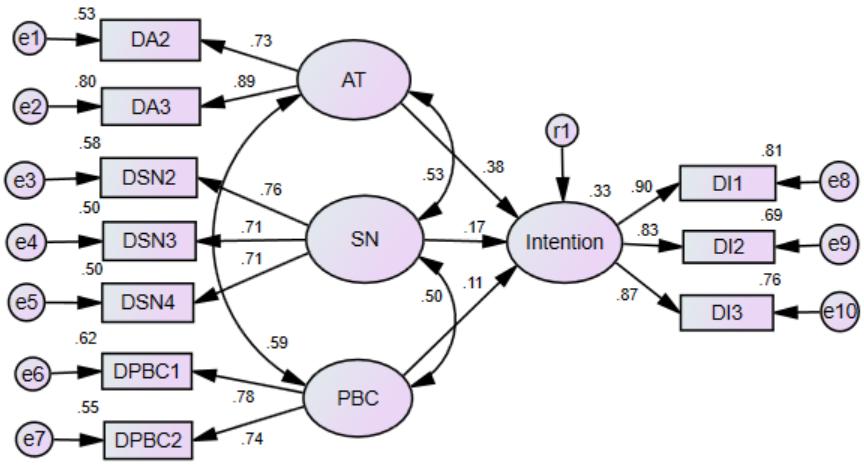

Figure 1 Structural model with standardized car drivers

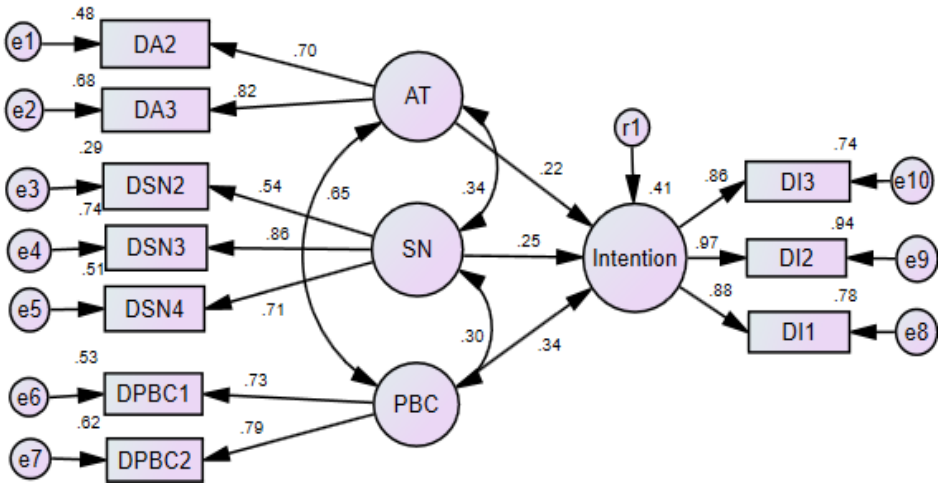

Figure 2 Structural model with standardized motorcycle riders

These models could explain 33% and 41% of variance for speeding intentions of car drivers and motorcycle riders, respectively. The car drivers' model found that Attitude (AT) was the most significant and highly influential factor related to speeding intention in urban road environments, while SN and PBC were significant factors for the motorcycle riders' model, especially in the case of the PBC, which was the highest factor influencing the speeding intentions of motorcycle riders.

4. DISCUSSION

The influencing factors have different influences related to speeding intentions (IN) under similar the framework. It was found that Attitude (AT) was the most significant factor for car drivers, while SN and PBC were significant factors, especially for PBC, which was the highest factor influencing speeding intention for motorcycle riders. The results were consistent with the findings of previous studies on speeding intentions in which the most significant factor of intention (IN) was Attitude (AT) (Cristea et al., 2013; Dinh & Kubota, 2013) for car drivers. The previous study could explain 37% and 47% of variance for speeding intention, while this study also showed PBC was most significant and highly influential factor which could explain 33%. However, there were some studies that found PBC was the highest influencing factor that could explain 70% and 85% of variance of speeding intention for the car driver's model (Warner & Åberg, 2008; Warner et al., 2009). Other previous studies found that Attitude (AT) was the most significant factor and could explain 42% and 44 % of variance of speeding intention (IN) for motorcycle riders (Chen & Chen, 2011; Elliott, 2010), while in this riders' model, PBC was significant. Speeding intention (IN) was also the highest influencing factor, which could explain 44% of variance for speeding intention. Different and suitable speed control measures are required to control car drivers and motorcycle riders in a particular country. This result could help to understand speed behaviour that is important for determining speed control measures and road safety policy in urban road environments of Thailand and other Southeast Asian countries.

5. CONCLUSION

The aim of this study was to examine and compare psychological factors influencing the speeding intentions of car drivers and motorcycle riders in urban road environments under the framework of TPB. These results, confirm the hypothesis that the psychological factors of TPB (Attitude (AT), Subjective Norm (SN) and Perceived Behaviour Control (PBC)) can explain behaviour Intention (IN), as stated by the TPB. According to the TPB, the actual behaviour would be adapted by changing their intentions (Ajzen, 1991). The result, showed different psychological factors influencing the relationship between car drivers and riders, and found that Attitude (AT) was the most significant factor for drivers, while SN and PBC were significant factors for motorcycle riders, especially for PBC, which was the highest factor placing an influence on speeding intention in the model. The difference and suitable speed control measures are required to control car drivers and motorcycle riders in a particular country. Therefore, the findings suggest that changing the attitude of car drivers about "Driving fast in urban environments would be normal and acceptable" should be a part of any future safety policies. For example, enhancing speeding knowledge, explaining the danger of driving at high speed, using appropriate speeds, the necessity of setting speed limits, and considering the safety of vulnerable users in the urban environment all require a change in Attitude (AT). While, on the other hand, the suggestion that changing the subjective norm and perceived behavioural control of motorcycle riders about "Influencing people or social pressure". This suggestion is key to being in tune with subjective norms. These findings suggest that changing the social attitude for motorcycle riders about riding fast in the urban environment is dependent on changing the perception of socially unacceptable conduct. For example, important people (Parents/friends) should explain the dangers and effects of speeding behaviour to their close relatives and friends. This is another way that perceived behaviour control for motorcycle riders may have an effect to "Control speed of riders in urban environment". These findings suggest that changing speed control measures in urban road environments is dependent on perceived behaviour control. For example, speed enforcement, police surveillance, and changing the physical conditions of the roads for reducing or controlling speed can be considered for Khon

Kaen authorities in Thailand for designing speed control intervention measures. Therefore, it should be taken into account both physical and personal behaviour control factors to determine appropriate policies for improvement of speeding problems in urban road environment.

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