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The Association Between Risk-taking Behavior and Helmet Use Among Motorcyclist

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Abstract. The central aim of the research was to examine speeding behavior without helmet wearing among motorcycle riders in Ho Chi Minh City. The research model expanded the Theory of Planned Behavior by both psychological flow theory and sensation-seeking. 268 motorcyclists were involved in the research. A Confirmatory factor analysis and a Structural equation modeling were employed for model specification. The findings indicated a significant effect between predictors and the intention of speeding without helmet wearing. In addition, there was direct relation between intention and actual behavior. Also, sensation-seeking proved to be important in moderating predictors between the low-sensation-seeking motorcyclists and high-sensation-seeking ones. A deeper understanding of why motorcycle riders exceed the speed limit without wearing helmet played key role in changing their behavior.

1. Introduction

Due to the features of low price, high mobility, motorcycle riding has become popular and convenient means of transportation in many countries, including Vietnam. However, the increasing number of motorcycles are expected to lead to an increasing number of motorcycle accident. Various studies have demonstrated that motorcyclists were at higher risk of being killed or injured in a road traffic crash compared with others [1]. To prevent head injury from accidents, wearing a helmet while riding a motorcycle has been regarded as one of the best solutions. [2] confirmed that ‘riders who have accidents while not wearing helmets were more likely to suffer critical head injury or death than were riders wearing helmets’.

Vietnam is a motorcycle-dependent country. Motorcycle-related accidents and deaths account for a substantial proportion of road accidents. In attempts to tackle with traffic accident, several policies and programs have been implemented such as the promulgation of the compulsory helmet legislation in December 2007 and annual national road safety campaigns; however, according to Vietnamese National Traffic Safety Committee, only in 2014, 25,322 traffic accidents related to motorcycles and more than 8,996 road users killed on the were recorded and most of these traffic accident deaths were attributed by risk-taking behaviors, particularly speeding without helmet wearing which accounted for 25%.

Although speeding without helmet wearing is the primary cause of traffic accidents, there have been no more research efforts to gain a better understanding of motorcycle helmet use and their correlation with speeding among citizen. This study aimed to fill this gap by specifically investigating speeding



behavior without helmet wearing among motorcycle riders in Ho Chi Minh City (HCMC), Vietnam. To achieve the central aim of the research, the extended Theory of Planned Behavior proposed by Chen and Chen (2010) were employed as theoretical framework. By doing so, the research expected to better gain insights of motorcyclist's speeding behavior in conjunction with their neglects of helmet use that would help government implement solutions to change motorcyclist's risk behavior. The following section details the study's theoretical frameworks and then its hypothesized model.

1.1 Theory of planned behavior

The Theory of Planned Behavior (TPB) is a robust theory that has been used across multiple contexts to explain a wide range of behaviors [3] [4]. The TPB model assumes that behavior depends on intention, and that intention, in turn, is determined by a person's attitudes, subjective norms, and perceived behavioral control [5] (Figure 1).

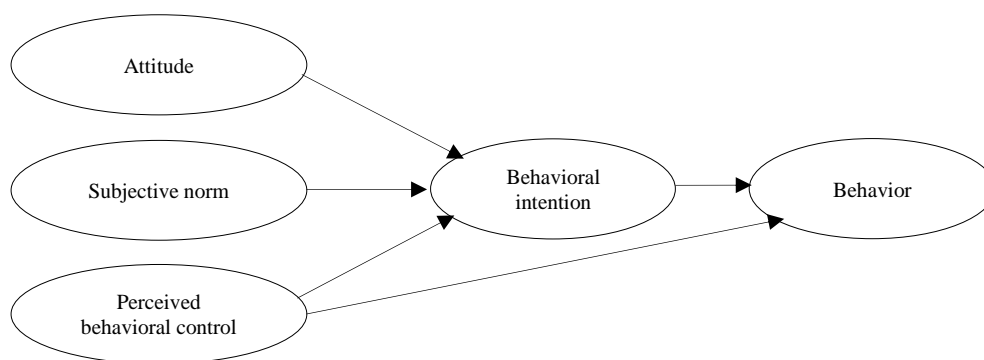


Figure 1. The theory of planned behavior

In this context, ‘attitudes’ refer to an individual’s evaluation of a behavior, which are informed by behavioral beliefs concerning a behavior's outcome and behavioral beliefs pertaining to the experience of a behavior [4]. ‘Subjective norms’ refer to people’s beliefs about how their significant others think they should engage in the behavior [4]. Last, ‘Perceived behavioral control’ refers to a person’s perception of his or her ability and resources to perform a behavior and are reflected in an individual’s control beliefs [5]. The Theory of Planned Behavior (TPB) has been successful applied to predict a variety of behaviors in the field of social science, health, education and transportation. In the field of traffic psychology many previous studies have used the TPB as a frame of reference [1] [6] [7].

1.2 The extended Theory of Planned Behavior

[8] was developed the extended Theory of Planned Behavior on the basic of Theory of Planned Behavior [5] to explore speeding behavior of heavy motorcycle riders by adding the variables of psychological flow theory to explore intrinsic motivations among motorcyclists, and (2) the sensation seeking and riding experiences to investigate differences of groups in the influence of affecting factors on speeding behavior (Figure 2).

Regarding Psychological flow theory, [8] argues that ‘intrinsic motivations instead of extrinsic motivations might better explain and/or predict the related speeding behavior’. Thus, the author took into account ‘perceived enjoyment’ and ‘concentration’ to construct the flow of heavy motorcycle riders. According to [9] (as cited in [8]), ‘Perceived enjoyment is defined as when, under conditions of playfulness, an individual will find an action intrinsically interesting, and thus will engage in it for pleasure and enjoyment rather than extrinsic rewards’, and ‘Concentration is defined as when an individual loses self-consciousness, becomes absorbed in the activity, and is more intensely aware of their mental processes when in a playful state’.

In terms of sensation-seeking and riding experience, both of them were regarded as an important factor influencing rider behavior. In his work, [8] stated that sensation-seeking individual tended to seek

and enjoy high stimulus, exciting, novel and diverse experiences and stimuli. The greater sensation-seeking individual was, the higher possibility he was involved in risky driving behavior. Similarly, an experienced motorcyclist who felt confident in controlling their motorcycle due to past experience would be highly likely to exceed speed limit compared with those had less riding experiences. Hence, [8] did add two dimensions in his model to investigate their moderating role in heavy motorcycle riders' behavior. To examine the moderating effect of sensation-seeking, based on the mean level of sensation-seeking, the sample would be divided into two groups: high and low.

In the context of Vietnam - a motorcycle-dependent country, motorcycle is the major transport mode of citizen for various purposes; therefore, the current study only focused on high-sensation-seeking motorcycle riders and low-sensation-seeking ones. Respondents would be experienced motorcycle riders who have at least 5-year motorcycle driving experience. Novices (less than 5-year motorcycle driving experience) would be excluded in this study.

1.3 Hypothesis

Based on the literature review aforementioned above, the current study proposed a conceptual framework (Figure 2) with the following hypotheses. Specifically:

H1: Perceived enjoyment has a positive effect on attitude toward speeding without helmet wearing.

H2: Perceived enjoyment has a positive effect on intention of speeding without helmet wearing.

H3: Concentration has a positive effect on attitude toward speeding without helmet wearing.

H4: Concentration has a positive effect on intention of speeding without helmet wearing.

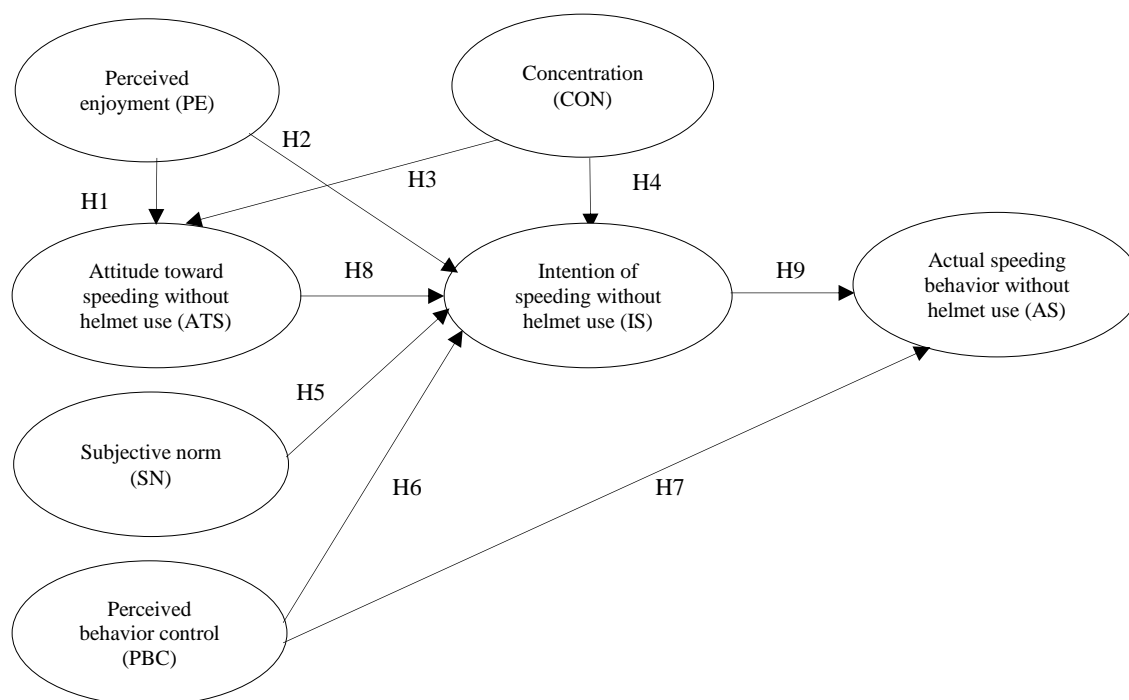


Figure 2. Conceptual framework

H5: Subjective norm has a negative effect on intention of speeding without helmet wearing.

H6: Perceived behavioral control has a positive effect on intention of speeding without helmet wearing.

H7: Perceived behavioral control has a positive effect on actual speeding behavior without helmet wearing.

H8: Attitude has a positive effect on intention of speeding without helmet wearing.

H9: Intention of speeding without helmet wearing has a positive effect on actual speeding behavior without helmet wearing.

2. Method

2.1 Data collection

The population of this study was selected at HCMC. The survey was conducted from June 2017-July 2017. Thirty minutes face-to-face interview were applied for data collection. The author visited the gas stations, shopping malls, super markets, bookshops and entertainment places to conduct interview. Pilot study were carried out to make sure that the measuring instrument represented the goal of the study. Total 300 respondents randomly selected were involved in this survey. The final sample size for the study was 268, whereas 32 observations (of the 300 collected) dropped due to incomplete informations.

There were 63.1% male and 36.9% female respondents. Riders aged 22–35 (66.3%) and 36–53 (33.7%) accounted for the majority of the sample. 14% of respondents had less than 5 year's experience, followed by 52.4% with 5-10 years' and 43.6% with more than 10 years' experience.

2.2 Measures

The dependent variable in the study was motorcycle rider's actual speeding behavior without helmet wearing. The predictors were perceived enjoyment, concentration, attitude toward speeding without helmet wearing, perceived behavioral control, subjective norms, and intention of speeding without helmet wearing. The dependent variable and predictors mentioned below were designed on the basic of literature review and items adapted from [8]. The variables measured with multiple items were examined with Cronbach's alpha reliability for internal consistency:

Actual speeding behavior was measured by asking rider about the frequency they speeded without wearing helmet during the six months before the interview. *Actual speeding behavior* was measured on a 5-rating scale ranging from 1 (very infrequent) to 5 (very frequent). The single item stated that "Within the past six months, how frequently did you exceed the speed limit when riding a heavy motorcycle?" ($M=3.8$, $SD=1.3$).

Attitude was assessed through items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) that asked the motorcyclist's position on speeding without helmet wearing (e.g. To exceed the speed limit when riding without helmet wearing (a) I would feel enjoyable, (b) I would feel comfortable, (c) I would feel acceptable) (Cronbach's $\alpha = .65$).

Subjective norm was measured with items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) (e.g. (a) Most people who are important to me think that I should not speed without helmet wearing, (b) Most people who are important to me do not support me speeding without helmet wearing, (c) Most people who are important to me will not speed without helmet wearing) (Cronbach's $\alpha = .64$).

Perceived behavioral control was measured with items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) (e.g. (a) When speeding without helmet wearing, I believe my driving skills can meet the challenge, (b) When speeding without helmet wearing, I feel in total control of what I am doing, (c) When speeding without helmet wearing, I am capable of manipulating the vehicle without thinking how to do it) (Cronbach's $\alpha = .72$).

Intention was measured by items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) (e.g. (a) When riding without helmet wearing, I am likely to speed, (b) When riding without helmet wearing, I intend to speed, if possible, (c) When riding without helmet wearing, I will try to speed) (Cronbach's $\alpha = .77$).

Concentration was measured by items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) (e.g. (a) During speeding without helmet wearing, I concentrate fully on the activity, (b) During speeding without helmet wearing, I am usually absorbed intensely in the activity, (c) During speeding, I am deeply engrossed in the activity) (Cronbach's $\alpha = .68$).

Perceived enjoyment was measured with items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) (e.g. (a) I find riding heavy motorcycles to be enjoyable, (b) I have fun riding a heavy motorcycle, (b) The process of riding a heavy motorcycle is pleasant) (Cronbach's $\alpha = .86$).

Sensation seeking (SS) was assessed through items rated on a 4-point scale ranging from 1 (Totally disagree) to 4 (Totally agree) (e.g. (a) I would like to try bungee jumping, (b) I would love to have new and exciting experiences, even if they are illegal). (Cronbach's $\alpha = .65$).

2.3 Data analysis

A Confirmatory factor analysis (CFA) and a Structural equation modeling (SEM) were employed in this study. CFA was used to confirm the relationship between the latent factors (e.g. psychological flow variables, TPB variables, intention) and their observed indicators (e.g. the measurement items). SEM was utilized to test the hypothesized relationships between the predictors and behavioral intention, actual behavior. Goodness-of-fit index (GFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) were used to examine SEM. For assessing goodness of fit, the author did follow the criteria proposed by [10] that values of GFI and CFI of 0.9 or above, RMSEA of 0.05 or less confirm a good fit between the model and the data.

3. Model Specification

3.1 Confirmatory factor analysis

CFA was employed in this stage to verify the factor structure. Table 1 present the results of CFA for the whole sample.

Table 1. Goodness of fit index

Model	χ^2	df	RMSEA	CFI	GFI	NFI
CFA	640.24	186 (p<.001)	.09	.959	.81	.96

3.2 Model Specification

After fitting the model, we utilized structural equation modeling to test the hypothesized model for the whole sample (n=268). The proposed model indicated a reasonably good fit (Table 2).

Table 2. Goodness of fit index

Model 1	χ^2	df	RMSEA	CFI	GFI	NFI
SEM	329.22	190 (P<.001)	.09	.960	.80	.95

As mentioned above, the current research focused on high-sensation-seeking groups and low-sensation-seeking groups. To examine the moderating effect of sensation-seeking, the sample was divided into two groups based on the mean level of sensation-seeking: high and low. Therefore, Model 2 and Model 3 were performed to examine the moderating effect of sensation-seeking (Table 3).

Table 3. Estimated results of the models

Path	Model 2 (n=116) (low SS)	Model 3 (n=152) (high SS)
PE → ATS	.27	.32
PE → IS	.33	.40
CON → ATS	.10	.13
CON → IS	.50	.37
SN → IS	-.04	-.16
PBC → IS	-.10	.08
PBC → AS	-.05	.04
ATS → IS	.30	.13
SBI → AS	.59	.55

Path	Model 2 (n=116) (low SS)	Model 3 (n=152) (high SS)
Goodness of fit index	$\chi^2 = 386.42$, df=192(p<.001) RMSEA=.08 CFI=.970 GFI=.70 NFI=.95	$\chi^2 = 395.64$, df=192(p<.001) RMSEA=.09 CFI=.980 GFI=.81 NFI=.90

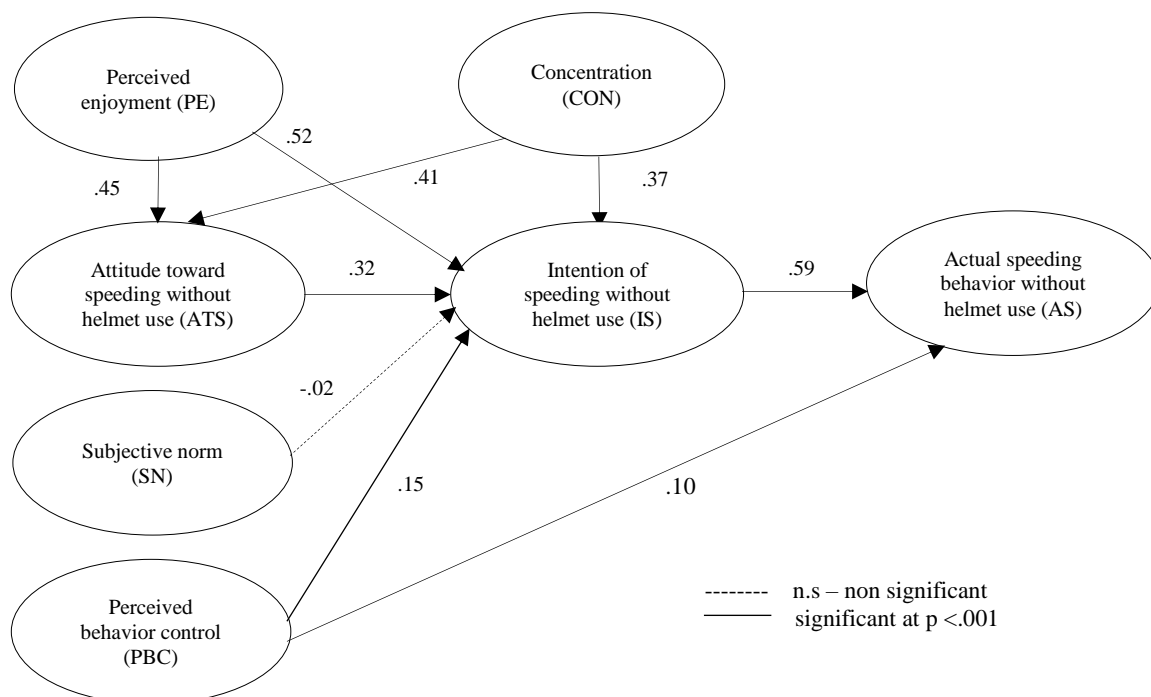


Figure 3. Structural equation model for whole sample

4. Discussion

Eight out of nine hypotheses in Model 1 were found to be supported. Regarding TPB variables, attitude had a positive effect on intention of speeding without helmet wearing. This finding suggested that to exceed the speed limit when riding without helmet wearing, motorcyclist rider would feel enjoyable, comfortable, and acceptable. In support of Hypothesis 5, the findings revealed a negative effect of subjective norm on intention of speeding without helmet wearing. The finding showed that the advice from people who are important to rider did not affect the intention of speeding among motorcycle riders. The effects perceived behavioral control on intention of speeding without helmet wearing was significant. This finding was proved to be consistent with those of previous studies that perceived behavioral control had generally been a significant correlate of behavioral intention. In this research, it was highly likely that when speeding without helmet wearing, respondent believed their driving skills that could meet the challenge, or when speeding without helmet wearing, they felt in total control of what they were doing. With respect to psychological flow variables, perceived enjoyment and concentration were significant predictors of intention of speeding without helmet wearing. During speeding without helmet wearing, respondent seemed to be absorbed intensely and deeply engrossed in

the activity. Also, they found riding heavy motorcycles enjoyable and even more pleasant. The psychological flow variables did demonstrate their direct and indirect effects on intention of speeding without helmet wearing and motorcyclists' actual speeding behavior. The outcome supported previous researches that intrinsic motivations (perceived enjoyment and cognitive concentration) instead of extrinsic motivations confirmed better explanation of speeding behavior with/without helmet use among motorcycle riders. In terms of the correlate between intention and actual behavior, there was significantly direct relation between intention of speeding without helmet wearing and actual speeding behavior without helmet wearing. It revealed that when riding without helmet wearing, motorcyclist was likely to/intend to/and try to speed, if possible.

The findings of the moderating effect investigation of sensation-seeking between low-sensation-seeking and high-sensation-seeking group showed that there was a significant difference in the sensation-seeking level among the groups and the whole sample. The outcomes presented in Table 3 showed that the relationship between predictors was in line with Model 1, while it was inconsistent for low-sensation-seeking group. Regarding low-sensation-seeking motorcyclists, there was a positive effect of subjective norm on speeding without helmet wearing among them. In other words, the intention and actual behavior of low-sensation-seeking motorcyclists was highly likely to change owing to the advice or recommendation from people who were important to them (e.g. family, spouse, close friends). In addition, although perceived behavioral control (e.g. belief in skills that could meet the challenge, or in capability of manipulating the vehicle without thinking how to do it) seemed to motivate high-sensation-seeking group to be involved in speeding without helmet wearing, the same could not be said with low-sensation-seeking group.

5. Conclusion

In the context of speeding without helmet wearing among motorcycle rider, this study tested the mechanisms through which TPB variables, psychological flow variables and sensation seeking had a significant effect on intention of speeding without helmet wearing. The analysis revealed that (1) perceived enjoyment and concentration had a positive effect on attitude, (2) attitude, perceived behavioral control, perceived enjoyment and concentration were significant predictors of intention of speeding without helmet wearing, (3) subjective norm proved to have a negative effect on intention of speeding without helmet wearing, (4) there was significantly direct relation between intention of speeding without helmet wearing and actual speeding behavior without helmet wearing. Moreover, the findings indicated that sensation-seeking played important role in clarify the differences among the low-sensation-seeking and high-sensation-seeking group and the whole sample. The finding spurred implication for policy-makers to propose solutions on reduction of speeding without helmet wearing. Specifically, road safety interventions, driver education and training programs, or social campaigns should be designed aiming at (1) both motorcyclist and their close people, (2) perceived behavioral control characteristics to discourage them from the involvement of speeding without helmet, (3) highlighting the benefits of helmet wearing such as health protection, aesthetic values, fashion.

6. Limitation of the study

The current research possesses some limitations. Firstly, the survey data are limited, the data was collected in downtown and urban areas in HCMC while respondent living in suburban areas was not included in the sample. Secondly, the coefficients for the paths in question are very small leading to a less robust research finding. Additionally, the research did not consider the young generation aging from 18-21 although this group have tendency to involve in speeding without wearing helmet. Additionally, groups with different social and demographic characteristics like education background, occupation, income levels were not investigated in the study. In fact, group differences in speeding behavior without helmet wearing with respect to these characteristics are believed to be evident, but unfortunately are not investigated in this study due to data unavailability.

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