Factors Influencing Unawareness Riding Behavior of Adolescent Motorcyclists in Mahasarakham Province, North Eastern Region, Thailand

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Abstract

Adolescent related motorcycle accident is a majority problem for Thailand and other developing countries. The investigations worldwide indicated to their unawareness riding behavior, and what were factors as predictors to this behavior under an explanation by the construction of theory of planned behavior and its extensions. A cross-sectional analytic surveyed of 791 younger motorcyclists, and age 15-24 years-old in Mahasarakham province, Thailand. Data collected by 2 versions of self administered questionnaires in August to December 2009. Frequency, percentage, means, and standard deviations were used for descriptive statistics, and analyzed statistics by ANOVA, Pearson product moment correlation coefficients and a stepwise multiple regressions. Results, The significantly correlated factors were included to predicting model. The best model could predict behavior for 58.3-64.1% (R^2 = 0.59, 95% CI=0.583-0.641). The best predictors were perceived behavioral control and accounted for 66.6% of variance (B=0.397(95% CI= 0.36-0.43), β= 0.19, p< 0.05)50.7% of variance and past behavior by accounted for 3% of variance (B=.414 (95% CI= 0.31-0.52), β= 0.236, p < 0.05). Not enough supported data to explain intention which could be predicted unawareness riding behavior. Control belief and perceived power are predicted perceived behavioral control toward unawareness riding behavior by accounted for 88-91% (R^2=0.90, 95% CI =0.88-0.91). In summary for solving adolescent motorcyclist accident, various interventions could implement by translation through perceived behavioral control, and habit or past behavior; unclear for intention.

Keywords: Unawareness motorcycle riding behavior

1. Introduction

Motorcycle accident is a common problem for Thailand and other all developing countries. It has risen following the convenient and population demand on road traffic transport. It is prominently in Asian developing countries by the lower of population incomes, and then motorcycle is appropriated vehicle choice for them. In 1960 to 1990, numbers of motorcycle in Asian developing countries has raised about 15% to 18%, and continually. For example, in 2001 numbers of motorcycle in Cambodia was raised up to 75% of all registered vehicles; compared to Vietnam which grew about 29%, Loa PDR grew about 79%,

Taiwan grew about 69%, and Malaysia about 51%[1]. These situations related to 44% of road traffic accident and occurring in this region[2]. Thailand is a country in South-East Asia region; road traffic accident is the third in lead causes of death in Thais population, so each year for 13,000 Thais were died, and nearly 90,000 were injured and related road traffic accident. The situations related to motorcycle accident for 73% to 82% of cases[3-5]. Causes related to road traffic accidents in Thailand were unclear. The summary reports of Road traffic police investigated and indicated to speeding for 17.3%, suddenly cutting front of other vehicles for 12.9%, and related to drunken riding for 7.7%. The most impacted group related adolescences. 38.9% to 47.9%; cases occurred in ages 15 to 29 years-old, and labor group for 37.9% [5]. In summary, Adolescent is presented to prominent group of motorcycle accident because of they are novice riders, immature, and usually face to lack of riding abilities, poor identify and anticipate to hazardous events on road riding environments. Sometime, they imperfect to vehicle control skills; especially, lacked safety riding skills, deficit on riding attentions, or willingness to risky performing, and sensitively by peer influencing[6]. These are initially reasons for adolescent related motorcycle accident. Moreover, motorcycle riding usually uses multiple tasks and more experienced which would develop followed riding times and practices. Safety motorcycle riding depends on higher–order of perceptual and cognitive riding skills and required from rider interaction with the riding environments. These reasons supported by MAIDS's report, and indicated causes of motorcycle crashes are related to human error for 37.4%, riders' perception failure for 31.9%, decision failure for 35.7%, reaction failure for 14.8%, and related to failure in road traffic scan and detections for 27.7%[7]. The findings related to previous investigation in Thailand by Kasantikul (2001)[8] and found 48.8% of cases had no braking before crashing, cases broke alone for 22.8%, only swerved for 14.6%, and in the both of braked and swerved for 11.2%. The results summarized the half of cases could not detect precipitate events before crashing, and related to unawareness riding behavior. These results related to finding from qualitative exploring types of risky riding behaviors of adolescent motorcyclists in Mahasarakham province, Thailand. Many of participants are mentioned to be not being awareness on road through motorcycling periods, and as the main cause related to motorcycle crashes by in-depth interviewing injured cases [9]. Additional supported by study in Australia which found rider awareness is the main of six keys that aspect to risky riding behavior[10]. Then unawareness riding behavior seems to be a prominent cause of motorcycle accident in adolescents.

Awareness riding behavior means as human perceptual abilities by using focal visions to alerts and detects to hazardous situations on road riding environments. Consequently, the brain mechanisms will run on to comprehensive and hazardous events responding. Focal and ambient visions are main and important types of visual perception in human's cognitive processes. Focal vision corresponds with mind attention and served to functional perception in situation awareness processes, and most important to safety driving or riding[11]. Normally, motorcycle riding should be used and more demanding for multiple tasks, and corresponds with awareness and attention behavior while riding; such as, an attention to perceive and capture route located, to find the shape of road ahead, perceives situation nearby traffic, traffic signs and light signals, maintain vehicle for safety position, perceive hazardous scenes and searching abilities to find how are changing on road scenes. Then except the basic vehicle control skills, the important tasks for safety riding are indicated to situation awareness and riding attention[12], and if adolescent can combine important multiple riding tasks, experienced, riding awareness, and attention. The light of motorcycle accident mitigation would be occurred.

Although unawareness riding behavior is clear caused for motorcycle accidents in adolescents, but it is unclearly known how to explain factors related this behavior. For deeply understand and clear for psychological mechanisms to this behavior, the Theory of Planned Behavior and extension theories would be used to explain unawareness riding behavior. What and how are psychological related factors could explain unawareness riding behavior of adolescent motorcyclist? There were aimed of this research.

2. Literature review

1. Adolescent and brain system. The complexity of adolescent brain development has translated beginning from child to an adult. Adolescent brain is usually more complex development[13]. The frontal cortex (pre-frontal cortex and its links) is importantly part brain for mainly coordinating other areas, and will fully

development in the third decade of life. Then the adolescent behavior could develop followed fully brain's development. The responding for life skills; such as, setting priorities, organizing plan, controlling emotion and impulse, allocating attention, inhibiting inappropriate behavior, and other maturity behaviors will develop following the brain function maturity[14].

2. Aware and situation awareness; whenever who ride motorcycle on road, the riding road circumstance will change by scenarios. Hazardous events can occur in all of riding scenes. It can be causes of motorcycle accident. However, the perception and cognition abilities can help to fine dangerously scenes from human abilities of situation awareness, and attention capture while riding. The processes of maintaining of situation awareness for processes of visual perception to hazard events whole depend on rider's attention and allocation. The process of event comprehensive and management to responding are depending on brain cognitive load and experiences. Then, Situation awareness is ability of brain aware to unpredictably and rapid change situations; the multifaceted situations which operate and used for guiding choices and action when engaged in real time riding

3. For understanding unawareness riding behavior and psychological related factors, theTheory of Planned Behavior (TPB)[15]. is used to guiding for information by reasons; the TPB has widely used in difference kinds of behavioral researches, and provides the parsimonious model with well defined constructs and pathways to explain in various behaviors. The TPB from Meta analysis was accounted for 27% and 33% of behavioral and intentional of variance, respectively[16]. The TPB is applied in difference kinds of road user intention and behavior. The impacted of TPB constructs to these behaviors were accounted from attitude 15%, subjective norm 23%, perceived behavioral control 32%, and seemed to additional explained by anticipated regret 18%, moral norm 16% and self identity 20%[17]. However, the TPB is compatible with the sense of how people decide to engage health behavior, and expected to help organize, or expand perspective and observation pattern of factors which are associated. Finally, it can be guided to design and improve the behavioral interventions to promote healthy and safety behavior.

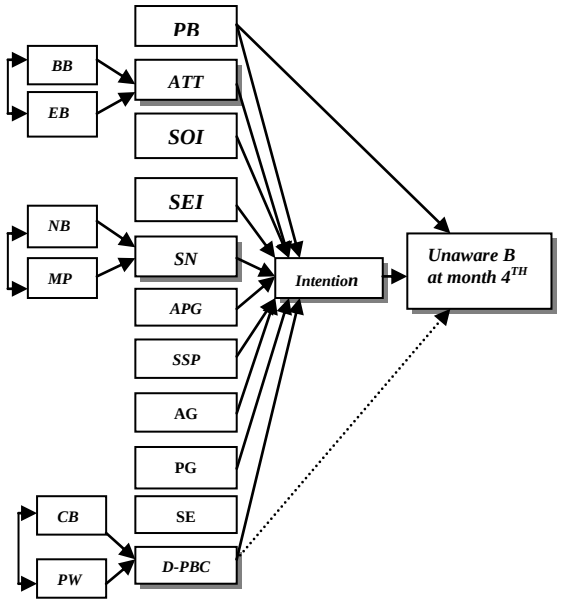

Fig.1. Conceptual framework of this study.

3. Research objectives

1. To study socio-demographic factors, factors related motorcycle riding, and psychological factors under construction of the Theory of Planned Behavior and extensions were correlations to unawareness riding behavior of adolescent motorcyclists.

2. To study factors influencing unawareness riding behavior of adolescent motorcyclists.

4. Methods

The study design was a cross-sectional analytic research. The self-administered questionnaires were used, and consisted of 2 versions. The first version was 13 parts. Part 1 was socio-demographic characteristics; such as, location, sex, age, status, education, household member, household income, type of license permit, riding experience, training experience, riding frequency, length riding per time, engine capacity, motorcycle's gear type, and motorcycle accidental experience. Part 2 was determine of intention to unawareness riding behavior and consisted of 12 questions which are related to intentional unawareness motorcycle riding (possible range 12-84). Part3 was perceived behavioral control to unawareness riding (16 questions and possible range 16-112). Part 4 consisted of factors which predicted intention, and as part 3.1 was directly measured of attitude toward riding intentional unawareness 7 questions (possible range 7-49) and indirect attitude 14 questions (possible range14-98).

Part 3.2 consisted of directly measured to subjective norm (2 questions and possible range2-14) and indirect measured 4 questions (possible range 4-28). Part 3.3 was indirectly perceived behavioral control (14 questions and possible range 14-98). Part 4 were extension theories for additional explanation; as, part 4.1 was self identity to unawareness rider (2 questions and possible range 2-14), part 4.2 was social identity for passenger(2 questions, possible range 2-14), part 4.3 was self efficacy to unawareness rider(8 questions and possible range 8-56), part 4.4 was aggressive riding personality 9 questions (possible range 9-63), part 4.5 was sensation seeking personality 6 questions (possible range 6-42), part 4.6 was past guilt of unawareness riding 4 questions (possible range 4-28), part 4.7 was anticipate quilt of unawareness riding in the future 4 questions (possible range 4-28), and part 4.8 was unawareness riding behavior within past 1 year 12 questions (possible range 12-84).

The second version was unawareness riding behavior at month 4 later by after completed the first version, and consisted of 12 questions relate to unawareness riding behaviors (possible range 12-84).

The questionnaires assessed by three experts for contents validity. Reliability was accomplished from a pre-test by pilot testing among 35 younger motorcyclists in study area as similar characteristic as study population. The qualities of instruments analyzed by using Cronbach's alpha coefficient; the results of the first version; Part 2 is 0.75, Part 3, (part 3.1 is 0.81, part 3.2 is 0.76, part 3.3 is 0.84); Part 4 (part 4.1 is 0.78, part 4.2 is 0.82, part 4.3 is 0.81, part 4.4 is 0.78, part 4.5 is 0.76, part 4.6 is 0.80, part 4.7 is 0.76.

Population in this study is adolescent motorcyclist in Mahasarakham province, age between 15 to 24 years-old, riding ability, read and write in Thai languet, normal psychology, and live in study area more than one year.

Sample size was calculated for accuracy parameter estimation[18]. Based on predicting to unawareness riding behavior at month 4 later (after completed intention predicting version), and multiplied by design effect (design effect=2) for multi-stage random sampling. A three stage random sampling was performed for 5 Districts (15 sub-district selected) by simple random sampling for 30villages, and gave samples size for 791. Researcher was pluses for 10% to prevent subjects losing and uncompleted returning questionnaires. The total subjects were given for 870.

Data collection, the questionnaires were self administered by subjects for 1 hours in the first version, and 30 minutes for second version at 4 month later; researcher assistants were checked; asked and fulfill to completion in each question through all versions; enter data and cross-checking by the both of researcher and assistants.

Statistically assumptions were checked, and descriptive by frequency, percentage, mean and standard deviation for general demographic characteristics, and all of variables. The ANOVA and Pearson product moment correlation coefficient were used to analyzing factors which were related to intention and unawareness riding at month 4 after completed the first questionnaire. Stepwise multiple regressions were used to determine the best factors as predictors to unawareness behavior at month 4, and if intention and perceived behavioral control as predictors, it would be performed stepwise multiple regressions for intention, or perceived behavioral control's predictors investigated later.

5. Results

Total of 791 subjects were completed responding to self administered questionnaires in the both of first and second version at four months later. The completed questionnaires for analyzing of two versions were returned for 98% and conducted to data entering and analyzing.

Socio-demographic characteristics of adolescent motorcyclists were male about 50.7%, female 49.3%, age mean 20.1 years-old (SD= 3.2), marriage status 69.4%, live in rural area 59.9%, and majority of occupation was students for 50%. Factors related subjects' motorcycle riding were not holding of Thailand licenses for motorcycling 60.4%. The motorcycle riding abilities were trained by friend, household members, or by themselves for 99.0%; accident experiences 45.8%. Mean of riding time 5.5 years (SD 2.8), riding everyday 8.3%, and duration of riding per time not more than 30 minutes for 25.3%. Engine capacities which were subjects used not more than 110 cc. 68.3%. The manual gear system for 66.2%, were used, and motorcycle accident experienced 45.8%. Subjects were performed actual unawareness riding behavior at month 4 after completed intentional questionnaires about for 52.2-53.5% (Mean= 43.9, SD=8.3, 95% CI: 19.9-20.3). Intention to perform this behavior 54.2-55.6% (mean=45.6, SD=12.6,

95% CI: 44.7-46.5), perceived behavioral control 73.6-74.5 %(mean =82.5, SD= 13.4, 95%CI: 81.5-83.4), and past behavior 33.5-34.4% (mean=28.5, SD=4.7, 95% CI: 28.2-28.9). Analyzing factors related this behavior following conceptual framework, and found significantly correlated of unawareness riding behavior with intention (r=0.37, p<0.05), with past behavior (r=0.71, p<0.05), with perceived behavioral control (r= 0.81, p< 0.05), and found significantly correlation between independent variables were intention with perceived behavioral control (r=0.44, p< 0.05), intention with past behavior(r=0.37,p<0.05),and perceived behavioral control with past behavior (r=0.37, p< 0.05). Bivariate correlation coefficient matrix of variables following construct of TPB and extensions was showed in table 3.

The socio-economic characteristics and factors related motorcycle riding were tested following levels of data measuring, and found significantly correlation of intention and age (r=0.31, p<0.001), riding experience (r=0.27,p<0.001), household income (r=0.185, p<0.001) and household member (r=0.18, p<0.001). Category variables and intention were test by ANOVA and found significantly correlation for Occupation (F=11.47, p<0.001), Holding license (F= 9.38, p<0.01), rider training experience (F=7.81, P<0.01), length of riding (F=5.64, P<0.01), capacity of engine (F=10.82, P<0.001),Gear type (F=14.47, P< 0.01), and got motorcycle accident experienced (F= 6.49, p< 0.01). These factors were dummy variables following details of group and including to model fit with TPB and extension variables.

A stepwise multiple regressions were performed between unawareness motorcycles as dependent variables in the models. Analyzing performed by using statistical analytic package program for evaluation of assumption. The results of assumption evaluations led to test for normal distribution by Kolmogorov-Smirnov statistic > 0.5, number of outliers, and multicolinearity analyzed by Tolerance value > 0.20, VIF<4[19], and homoscedasticity of residuals, all of variables were normal distribution and none multicolinearity in between set of independent variable in regression analysis models.

Table 3.The regression coefficient in predicting model of unawareness riding behavior at month 4 (n=791).

Variable	Coefficient		95%CI	t	Sig. level
	B	β			
PBC	0.397	0.808	0.473 - 0.529	35.12	0.001*
PB	0.414	0.236	0.310 - 0.516	7.95	0.001*

Constant= -0.506, **R**=0.83, R^2=0.69 (95% CI=0.65-0.72), $\mathbf{R^2_{Adjusted}}$=0.69, **F** = 878.89, **P-value**<0.001

From table 3, displays the un-standardized regression coefficients (B) and standardized coefficients (β). The R of regression for full model was significantly from zero, R= 0.83, F= 878.89, p<0.05, with R^2 at 0.69 (95% CI= 0.65-0.72), $R^2_{adjusted}$ at 0.69; the best model could predict this behavior accounted for 65%-72% of variance. The best predictors of unawareness motorcycle riding behaviors model were predicted by perceived behavioral to unawareness riding for 66.6% of variance (B=0.397(95% CI= 0.36-0.43), β= 0.19, p< 0.05); in addition could predict by past behavior and accounted for 3% of variance (B=.414 (95% CI= 0.31-0.52), β= 0.236, p < 0.05); not enough data supported for intention to unawareness riding behavior could predict unawareness riding behavior at month 4 later (B=.005(95% CI=- 0.003-0.065), β= 0.007, p> 0.05). There for the equation to predicting model for unawareness riding behavior at month 4 = - 0.506 +.397 (perceived behavioral control) + 0.414(past behavior)

From conceptual framework, direct perceived behavioral control could predict by control belief and perceived power to unawareness riding behavior; an analyzing found significantly correlated between negative perceived behavioral control with control beliefs (r=0.94, p<0.05), with perceived power (r= 0.51, p< 0.05), and found moderate correlation between independent variables were control beliefs with perceived power (r = 0 .50, p< 0.05).

Table 4. The regression coefficient in predicted model of positive perceived behavioral control to unawareness riding behavior (n=791).

Variable	Coefficient		95%CI	t	Sig. level
	B	β			
CB	1.773	0.808	0.473-0.529	35.12	0.001*
PW	0.414	0.236	0.310-0.516	7.95	0.001*

Constant= 7.829, **R**=.95, R^2= 0.90(95%CI=0.88-0.91), $\mathbf{R^2_{Adjusted}}$=0.90, **F**=3631.8, P-**value**<0.001

From table 4, displays the un-standardized regression coefficients (B) and standardized coefficients (β); the R of regression for full model was significantly from zero, R=0 .95, F= 3631, p<0.05, with R^2 at 0.90.2 (95% CI= 0.88-0.91), $R^2_{adjusted}$ at 0.902. The best model could predict this variable for 90.2.6%, the best predictors of perceived unawareness riding behavioral control model were predicted by control belief to unawareness riding behavior, then B=1.773 (95% CI= 1.725-1.822), β= 0.924, p<0.05, and perceived power to unawareness riding (B=.118 (95% CI= 0.057-0.179), β= 0.049, p.< 0.05).

There for equation for predicting to perceived behavioral control of unawareness riding behavioral model = 7.829 + 1.773 (control belief) + 0.118 (perceived power).

6. Discussion and conclusion

Although unawareness riding behavior is the main cause of motorcycle accident; otherwise, the results from data analyzing for this behavior in subjects were unclearly influenced by their intention; this result related to previous studying by Watson et al. (2007)[10] in Australia, and concluded behavioral awareness error wasn't influenced by attitude; it did not seem to hold a positive attitude towards this risky behavior. However, the strongest significant predictor was perceived behavioral control, and related to finding from driving related behavior studies[20]. Past behavior was the next predictor. This construct offered by Triandis (1980)[21], and stated that intention is not the sole predictor of behavior, but they are supplemented by habit and facilitating conditions. These findings related to previous studies which are used habit, or past behavior for explanation in driving related behavior studies[22-23]. Normally, novice drivers and riders usually lack of multiple tasks for driving; such as, they are inflexible at the road directly ahead, errors on visual search, hazard perception failure, and they rather lacked of driving skills and poor judgment; by reasons, they have limited of experiences to develop complex driving or riding skills, or higher order of risk perception, or immature perception skills[6,24-25]. Awareness behavior depend on level of consciousness that focusing by attention outward toward the environment, and inward toward self awareness; that allow by social cognitive and personality traits model[26]. Then self awareness usually depend on; such as, private conceptual, public perception, experiences, self information and level of consciousness (such as, thoughts, belief, goals, aspirations, memories, interests, standards, values, opinions, attitudes, perceptions, intentions, motivation, sensations, personality traits, other opinions, social and intimate relationships, abilities, skills, appearance, and actions[27]. In addition, human behaviors usually depend on social cognitive processes, and depend on perception and growth development. This concept relate to processes of adolescent brain development and change, because the cortex's frontal lobes, particularly the pre-frontal cortex and its links to other areas is the most important part of brain and mainly function of brain coordinating. It is one of the latest parts of brain to fully development. It is not fully function and well until into the third decade of life; as a result, there are significantly correlation of this development and adolescent behaviors. Adolescent usually lack of living skills; such as, lacked of setting their priorities, organizing to ideas of plans, forming strategies, control impulses and emotions, allocating attention, inhibiting inappropriate behavior and initiating appropriate behavior, eye movement, insight, empathy and sensitivity to feedback, reward and punishment[14]. Consequently, adolescent behaviors are different by weighted on the level of understanding and decision making about potentially behavioral outcomes. For safety motorcycle riding behaviors of adolescents, there are combined the level of riding skills, riding abilities, and how to use these skills[28]. Driving or riding behavior are individually skills, and likely requires by practices and improves with longer experiences and regarding by age, and these are more important to adolescent. Adolescent usually

is novice drivers or riders; they rather engage in unintentional behavioral perform, or ignorance-based risk taking behavior, and reflection of their inexperienced. These are lacked of skillfully of brain and lead to errors; thus, the most of critical riding skillful is controlled by pre-frontal cortex of brain, and there is still fully develop in those until the age at 25[29].

The unawareness motorcycle riding behavior of adolescent was influenced by perceived behavioral control, and unclear for intention; thus, for mitigating unawareness motorcycle riding behavior in adolescent should improve their riding abilities in risk perception; also adding their experiences for perceptual risk, and riding skillful. The managing for the psychological factors should enhance into perceived behavioral control about their awareness riding behavior; give their riding experience for hazard perception, and habits feedback and management. The contents, especially perceived behavioral control must allocate to training by simulate motorcycle riding on road's scenes followed simulate riding situations practice. It is an important to improve and enhance their riding maturities, and seem to be better than developed by their experiences in riding nature, or by their ages which meant until 25 because it may be late for them.

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