



Red light running by young motorcyclists: Factors and beliefs influencing intentions and behavior



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ABSTRACT

Traffic violations by young riders are major safety problems in motorcycle dominated countries. This study investigates young motorcyclist's red light running (RLR) intentions and behavior based on the Theory of Planned Behavior (TPB) framework. Behavioral, normative, and control beliefs underlying rider's RLR are identified. Young riders (N = 246) complete a TPB questionnaire measuring direct and beliefs-based measurement items. The exploratory factor analysis technique reveals factors according to TPB. Structural Equation Modeling (SEM) results show moderate to good fits to the observed data and provide qualified support for the utility of TPB in explaining traffic violation behavior. The findings reveal that perceived norm and attitude dominate violation intentions. Beliefs about normative referents and negative outcomes affect RLR intentions. Intentions affect behavior, especially when riders lack of perceived autonomy. Rider's degree of control is affected by the beliefs about facilitating circumstances and weather conditions. Besides, perceived autonomy and perceived capacity each influence violation intention and behavior independently. Implications for young motorcyclist safety interventions based on current findings are discussed.

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1. Introduction

Globally, nearly a quarter of all road traffic deaths are motorcyclists (WHO, 2015). In the South-East Asian Region, where the use of motorcycles is much higher than elsewhere, motorcycle-related fatalities have risen to one-third (WHO, 2015). Thailand ranks second in the list of countries having the highest road tolls. There were 38 road fatalities per 100,000 people in 2015, mainly from motorcycle-related accidents. On a powered two-wheel vehicle with little protection from injury running in mixed traffic condition, it is not surprising that motorcyclists comprise 80% of traffic trauma patients registered in hospitals records (Ichikawa, Chadbunchachai, & Marui, 2003). Not used for recreational purposes as in developed nations, the typical small-size motorcycle (100–125 cc scooters) is used as a family vehicle by Thai people. Motorcycles are relatively cheap to purchase and run and very popular. The number of motorcycles increase from 8.2 million in 1994 to 20 million in 2016, presently representing 54% and 61% of the country and regional registered vehicles, respectively (Department of Land Transport (DLT), 2017).

Motorcycles tend to be the first motor vehicle of the young and these age groups are more likely to engage in traffic accidents (Tanaboriboon & Satiennam, 2005). In Thailand, over two-thirds of motorcyclist trauma patients are aged between 10

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and 29 years (Ichikawa et al., 2003; Nakahara, Chadbunchachai, Ichikawa, Tipsuntornsak, & Wakai, 2005). The same situation is also found in other motorcycle dominated regions, such as in Vietnam (Hung, Stevenson, & Ivers, 2006) and Indonesia (Susilo, Joewono, & Vandebona, 2015). It is, therefore, important to pay more attention to motorcyclist's safety and young motorcyclist safety is particularly a problem of concern that requires immediate action.

Young riders are associated with traffic violations (see, Susilo et al., 2015 for disregarding traffic regulations; Wu, Yao, & Zhang, 2012; Jensupakarn and Kanitpong, 2018 for red-light running). Red-light running (RLR) is frequent and dangerous traffic violation behavior. Field observation study reveals that the red-light running rate of motorcyclists is higher than those of motor vehicle (Yan, Li, Zhang, & Hu, 2015). Besides, the right-angle crash associated with RLR always results in serious injury especially when it occurs to vulnerable motorcyclists.

Understanding violation behavior could be a critical component to developing policies and interventions to change the risky behaviors. Whilst rider behavior has been studied and revealed in developed countries (e.g., Chorlton, Conner, & Jamson, 2012; Clarke, Ward, Bartle, & Truman, 2007; Elliott, Baughan, & Sexton, 2007; Musselwhite, Avineri, Susilo, & Bhattachary, 2012; Steg & van Brussel, 2009; Tunnick et al., 2012, etc.), there is currently limited information available for the small-size motorcycle that operate in mixed traffic in developing countries. Therefore, more research effort to gain a better understanding of small-sized motorcyclist violation behavior is warranted. This study thus focuses on young motorcyclists in developing countries, to explain their red light running (RLR) intention and behavior.

2. Literature review

2.1. Factors associated with traffic signal violation of powered two-wheel vehicles

In developed nations, extensive research has provided a great deal of knowledge about factors associated with traffic signal violation. Literature reviews shows what circumstances and driver characteristics are related to traffic-light violation (e.g., Al-Ghamdi, 2014; Bonneson, Brewer, & Zimmerman, 2001; Bonneson & Zimmerman, 2004; Elmitiny, Yan, Radwan, Russo, & Nashar, 2010; Harb, Radwan, & Yan, 2007; Palat & Delhomme, 2012; Porter & Berry, 2001; Porter, Johnson, & Bland, 2013; Retting, Ferguson, & Farmer, 2008; Retting & Greene, 1997; Retting, Ulmer, & Williams, 1999) as well as what measures are effective in tackling the problems (e.g., Bonneson, Zimmerman, & Brewer, 2002; Erke, 2009; Høye, 2013; Lund, Kyrchenko, & Retting, 2009; Retting, Ferguson, & Hakkert, 2003; Retting, Williams, & Greene, 1998; Shin & Washington, 2007).

Among the extensive research, a sub set of studies has provided information on powered two-wheel vehicles with limited information for small-sized motorcycles. To the best of our knowledge, rider RLR characteristics were revealed from field observation studies in China (Wu et al., 2012; Zhang & Wu, 2013), and Thailand (Jensupakarn & Kanitpong, 2018). Wu et al. (2012) reported an alarming rate of RLR in China, as 62% of e-bike riders has RLR behavior. The male and young or middle-aged riders were more likely to perform RLR run against a red light than other user groups (Wu et al., 2012). Supporting circumstances for RLR were when she or he was alone, when there were fewer riders waiting, and when there were riders already crossing on red (Wu et al., 2012). In addition, Zhang and Wu (2013) found that sunshields, a facility located at a stop line to protect riders from hot sunlight and extreme weather, can decrease the likelihood of rider RLR.

In Thailand, Jensupakarn and Kanitpong, 2018 also found that male and young riders were more likely to perform RLR. Other rider characteristics related to RLR were “not wearing a safety helmet”, “traveling alone”, and “using a manual gear motorcycle”. In terms of traffic and physical characteristics, this study found that the violation rate increases when an intersection has “less traffic volume”, “good illumination at night”, “wider lanes”, “clear intersection sight distance”, and “advanced warning signs”. Besides the field observation, on-scene, in-depth investigation and reconstruction of 969 collisions involving 1082 motorcycle riders in Thailand found that RLR is associated with riding after drinking (Kasantikul, Ouellet, Smith, Sirathranont, & Panichabhongs, 2005).

While some rider's characteristics and facilitating/impeding circumstances contributing to RLR are revealed, there has been no research to understand why they decide to run a red light. The use of behavioral decision theory can play an important role for the tasks. The theory that has proved useful to explain traffic violation behavior is the Theory of Planned Behavior (TPB) (Ajzen, 1985, 1991; Fishbein & Ajzen, 2010).

2.2. TPB and its application to traffic violation

TPB is a reasoned action model extending from the Theory of Reasoned Action (TRA). It is a widely used behavioral decision theory that has received good empirical support (Armitage & Conner, 2001; McEachan, Conner, Taylor, & Lawton, 2011). The TPB states that human behavior affects via intention. Riders are expected to carry out their intentions when the opportunity arises (Fishbein & Ajzen, 2010). This intention is produced from three underlying factors: the attitude (ATT: i.e., the degree to which a rider is favorable or unfavorable to RLR), the subjective norm (SN: i.e., the perceived social pressure to perform or not to perform RLR), and the perceived behavioral control (PBC: i.e., the perceived autonomy or capacity to perform RLR).

According to TPB, the three theory's factors are produced from three kinds of belief considerations. Attitudes are produced from behavioral beliefs (i.e., beliefs about the silent outcomes of RLR weighted by the corresponding outcome evaluation.)

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