



## Determinants behind young motorcyclists' risky riding behavior

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### ABSTRACT

Young motorcyclists have traditionally been considered a high-risk population. Given the critical influence of riders' behaviors on traffic safety, identifying what riders think can help clarify the nature of accidents. Although psychological studies have explored the relationships among personality traits, attitudes and risky driving behavior, the primary difference this study makes from past studies is incorporating both positive and negative effects in a refined causal framework. This study adopts structural equation modeling to analyze data collected from 683 young motorcyclists aged between 18 and 28. The results conclude three primary personality traits of young motorcyclists, namely sensation seeking, amiability and impatience. While amiable riders represent a group of relatively mature and safe riders, the sensation-seeking riders are extremely self-confident, comfortable with unsafe riding and interested in the utility gained from it. Meanwhile, the sensation-seeking ones also are highly aware of traffic conditions, which may lower the chances of getting into an accident, but the accident could be extremely severe if it ever occurs. Impatient riders, having low riding confidence and traffic awareness deficiency, also seek utility from certain risky riding behaviors. However, their fear of an accident leads them to fail to observe surrounding traffic conditions. The result indicates various mental compromise mechanisms for young motorcyclists in conducting riding behaviors. Thus, corresponding countermeasures, including licensure system and ITS roadway development, should consider the heterogeneous characteristics of young riders.

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### 1. Introduction

Young drivers are considered a high-risk traffic group. Despite their comparatively low exposure to driving, young people are more likely to experience vehicle accidents (Clarke et al., 2005; Machin and Sankey, 2008; Waylen and McKenna, 2008). Early research suggests that immature skills or insufficient experience may account for the high accident rate among young drivers. However, several investigations indicate that experienced young drivers still are exposed to high accidental risk. Inexperience obviously is not the only explanation for accidents; research needs to clarify other factors differentiating young drivers from other drivers (Wong and Chung, 2007, 2008).

Among all human factors, researchers have intensively studied and considered psychological traits as significantly affecting risky

driving behavior (Ulleberg and Rundmo, 2003; Dahlen et al., 2005; Kim and Yamashita, 2007). However, it is still unclear how these two are causally related. According to the Theory of Planned Behavior (TPB) proposed by Ajzen (1991), psychological traits including attitude, subjective norm and perceived behavior control affect behaviors via intention. Based on the theory, Ulleberg and Rundmo (2003) incorporated personality traits, attitudes towards safety and risk perception into Structure Equation Modeling (SEM) to discuss the risky driving behavior mechanism among young drivers. The results demonstrate that personality may indirectly influence risky driving behaviors via attitude. Yet, findings did not show risk perception, positively correlated with attitude, to be directly and significantly related to risky driving behaviors. This finding is inconsistent with past study findings that risk perception significantly affects risky or unsafe driving behaviors (Ryb et al., 2006; Harre and Sibley, 2007; Vanlaar et al., 2008).

According to the risk homeostasis theory, risky driving behaviors induce not only costs such as perceived risk, but also benefits such as excitement or time saving (Hoyes et al., 1996). Ignoring potential driver benefits from such driving will likely result in an incomplete understanding of such risky behaviors. By considering the heterogeneous characteristics of young drivers, further research on risky driving behaviors in different young driving

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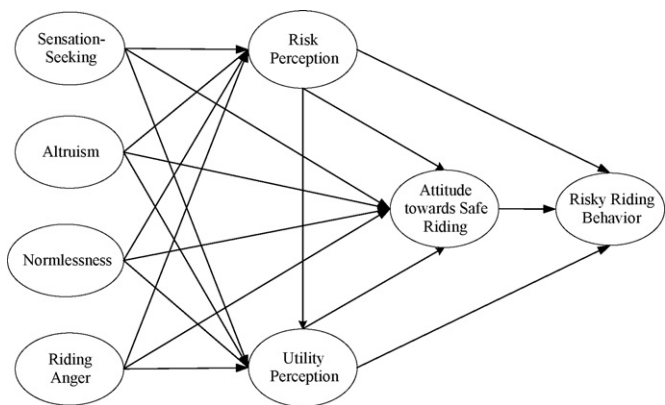


Fig. 1. Conceptual framework of the risky riding behavior model.

groups may enhance understanding of the nature of accidents (Gregersen and Berg, 1994; Chliaoutakis et al., 1999; Sexton et al., 2004). Thus, extending the previously developed model to include utility of risky driving is worthwhile.

This research surveyed young motorcyclists in Taiwan to investigate these relationships. Unlike those in North America or Europe where motorcycles account for only a small portion among all modes, motorcycles, especially mopeds and light motorcycles<sup>3</sup>, in Taiwan are the major transportation mode consisting of 67 percent of registered motor vehicles (MTC, 2007a,b). Moreover, due to cost and convenience considerations, motorcycles are used for commuting rather than mere leisure for the young population in Taiwan, which is different from those in developed countries. To better understand the unique characteristics of risk-taking behaviors among young motorcyclists in Taiwan, this study focuses on the interactions of young motorcyclists between latent constructs including personality, attitude, risk perception, and perceived riding utility during their riding decision making process.

Based on the research conducted by Ulleberg and Rundmo (2003) and Hoyes et al. (1996), Section 2 presents the methodology, including a conceptual behavior framework, measurements and data collection process, and an analysis procedure. Section 3 illustrates the results of exploratory factor analysis and SEM. Section 4 follows with discussions.

## 2. Methodology

### 2.1. Conceptual framework

This study proposes an explanatory-latent intermediate-dependent framework to investigate underlying mechanisms of young motorcyclist's risk-taking behaviors in traffic. Researchers have considered personality traits as having significant impacts on driving behaviors (Ulleberg and Rundmo, 2003) and adopted personality traits as explanatory constructs to explain risky riding behaviors—the dependent construct. Effectively connecting personality traits and driving behaviors, requires cognitive constructs (Ajzen, 1991). Based on the literature review and the framework proposed by Hoyes et al. (1996) and Ulleberg and Rundmo (2003), this work proposes a preliminary framework in Fig. 1. The four personality trait constructs include sensation seeking, altruism, normlessness and riding anger, as explanatory constructs. Risk perception, attitude towards safe riding and utility perception are treated as latent intermediate

constructs. The dependent construct is risky riding behavior.

#### 2.1.1. Explanatory constructs: personality traits

Personality reflects internal characteristics of individual differences and demonstrates consistent patterns and tendencies in individual reactions to the external environment (McCrae and Costa, 1994; Ulleberg and Rundmo, 2003). Personality traits, the explanatory constructs in this research, are comprised of riding anger, sensation seeking, normlessness and altruism. Numerous studies have investigated the direct and indirect effects of personality traits on risky driving behavior (Ulleberg, 2001; Ulleberg and Rundmo, 2003; Dahlen et al., 2005; Oltedal and Rundmo, 2006; Schwebel et al., 2006; Kim and Yamashita, 2007; Machin and Sankey, 2008). By clustering the personality traits and driving behaviors of young drivers, Ulleberg (2001) claimed that high-risk populations share general characteristics of low altruism and high driving anger, normlessness and sensation seeking. Several works also have suggested that high driving anger, sensation seeking and normlessness increase the frequency of risky driving behaviors (Ulleberg, 2001; Ulleberg and Rundmo, 2003; Dahlen et al., 2005; Oltedal and Rundmo, 2006; Schwebel et al., 2006; Machin and Sankey, 2008). Furthermore, possessing both driving anger and sensation seeking characteristics may increase traffic violations.

Anger can be considered a negative emotion when encountering driving interference (Deffenbacher et al., 1994; Sullman, 2006), and angry drivers more frequently engage in risky driving behaviors. Deffenbacher et al. (1994) developed a Driving Anger Scale (DAS) for measuring angry emotion frequency among drivers. Sullman (2006) adopted the scale to analyze the effect of age on driving anger and found a greater tendency in younger drivers to display angry behaviors while driving.

Dahlen, Ulleberg and Rundmo define sensation seeking as a personality trait involving individual desire for excitement and stimuli (Ulleberg and Rundmo, 2003; Dahlen et al., 2005). Altruism displays concern for others. Both constructs can be derived from the NEO-Personality Inventory measurement which measures the degree of agreement among personality trait statements (Ulleberg and Rundmo, 2003). Researchers have also frequently adopted measurements proposed by Ulleberg (2001) to measure normlessness, characterized as the belief that socially unapproved behaviors are an acceptable means of achieving certain goals.

#### 2.1.2. Latent intermediate constructs

Since personality represents a stable condition, which might be formed during personal growth, most studies assume that personality influences social cognitive variables. Hence, this research considers three latent intermediate constructs, including attitude towards safe riding, perceptions of risk and perceptions of utility.

Attitude, formed by learning or experience, indicates the continuous tendency of people to like or dislike some behaviors (Ajzen, 1991). The attitude towards safe riding is specifically designed to represent an individual's mental position with regard to safe riding behaviors. Ulleberg and Rundmo (2003) indicated that among the personality traits, only altruism both directly and indirectly affects risky driving behavior. However, all other personality traits influence risky driving behaviors only indirectly via attitude towards safe driving. Regarding the relationship between personality traits and attitude towards safe driving, normlessness and sensation seeking negatively affect attitude towards safe driving while altruism has a positive effect. Likewise, Ulleberg and Rundmo (2003) also indicated that young drivers, who tend to disobey traffic laws, speed, and see driving as recreation, exhibit more frequent risky driving behavior. Scales measuring the

<sup>3</sup> Those with engine capacities less than 150 cm<sup>3</sup>.

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