



# Risky riding behavior on two wheels: The role of cognitive, social, and personality variables among young adolescents

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## ABSTRACT

**Objective:** The main objective of this study was to analyze and estimate the relations between risky riding behaviors and some personality and sociocognitive variables through structural equation modeling. We focused on two-wheel riding behavior among a sample of 1,028 Italian adolescents at their first driving experience. **Conclusions:** The main findings confirmed the role of personality in influencing riding behavior directly as well as indirectly through risk perception. In particular, risk perception was a significant mediator between personality, social norm, and riding behavior. The significant relations that emerged in the general sample were further confirmed in the two specific sub-samples of males and females. In terms of social marketing and educational communication, it may consequently be advisable to proceed in an integrated and coordinated manner at both the cognitive and social level, taking into account some "dispositions to risk" related to personality. **Impact on industry:** The integrated and coordinated action on different levels - cognitive, social, and personality - may therefore allow more effective and significant results in reducing those risky riding behaviors that often underlie young two-wheel riders' higher involvement in traffic accidents.

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## 1. Introduction

### 1.1. Adolescents and road accidents on two wheels

Road traffic injuries represent a severe threat to health and are therefore a priority in most countries. An alarming issue is the ever-increasing involvement of young road users. Every year, 32,000 people younger than 25 years lose their life to road traffic injuries, either as drivers/riders or passengers (World Health Organization, 2007). The same trend is observed in Italy, where 360 youths aged 15–19 years lost their life in two-wheeled accidents in 2008 and 31,584 were injured. Important gender differences are evident: the risk of injury is twofold and the risk of mortality fourfold greater for men compared to women in the age bracket 15–19 years (National Institute of Statistics, 2009).

Because of this increased accident rate, it is important to identify and understand possible risk factors for young two-wheeled riders. Many studies have tried to define and identify high-risk riders by combining several variables and assessing their interactions. In general, those who persist with dangerous behaviors while driving/

riding are considered high-risk drivers/riders and represent a higher accident risk. As observed by Vézina (2001) this population is very heterogeneous and comprises different subgroups with different sociodemographic profiles, attitudes, and behaviors. Many studies have investigated social, cognitive, and personality variables for prediction of high-risk behavior, measured in terms of the number of accidents and/or traffic violations committed in a given period, usually 2 or 3 years, or the frequency of behaviors that are dangerous and do not comply with the highway code while driving/riding.

The first few studies revealed an association between high-risk drivers and individual and cognitive characteristics such as social and personal maladjustment, impulsiveness, and deficit in information processing (Mayer & Treat, 1977), hostility and alienation from the educational system (Pelz & Shuman, 1973), and use of alcohol and/or drugs (Farrow, 1985). Peck (1993) claimed that there is no single variable or combination of variables that can accurately predict risky driving behavior. Some of a driver's characteristics may increase his/her chance of being involved in an accident. These are related to social maladjustment and to personality and attitude traits, together with being young, male, belonging to a low socioeconomic class, and having little driving experience and no previous road accidents or fines. At-risk drivers are therefore more deviant in terms of social maladjustment, alcohol and drug use, and individual characteristics (gender, age, personality traits, etc.) that predispose them to risk-taking behavior. Among these, sensation-seeking has attracted a great deal of attention, in particular because of its effects on favoring

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risky driving behavior among the young, especially if associated with alcohol use (Arnett, 1990; Yu & Williford, 1993).

The social environment also plays an important role, in particular family members and parents who may influence the young person in terms of future risky driving behaviors. In their role as behavior models, parents can indeed pass on their driving style (Bianchi & Summala, 2004) and influence their children's driving behavior through educational styles and expression of attitudes. Shope, Waller, Raghunathan, and Patil (2001) noted that the use of substances such as cigarettes, marijuana, and alcohol, together with negative parental influences, observed at 15 years of age may have a bearing on the increase in road accidents for young people, especially females, aged 23–24 years. This confirms the predictive value of substance use for risky driving behaviors by adolescents. Parental influence is very important as well. Specifically, a 15-year-old who perceives low levels of monitoring, nurturance, and family connectedness and high levels of parental indulgence towards alcohol use by young people will have a higher risk of violations and road accidents when driving, independent of gender.

Many studies have aimed to identify distinctive variables able to predict risky driving behaviors among young drivers. Young two-wheeled riders are an emergent at-risk category that requires further efforts to understand possible risk factors.

Our study focuses on young moped riders, a category largely composed of adolescents with little or no driving/riding experience who are influenced by specific sets of values, beliefs, and social norms, as well as their sociocultural context, and are characterized by a greater propensity for risky behavior. Issues related to the physical development of adolescents must also be considered. Many adolescents are in a stage of growth and physical maturation in which hormones are “raging” and energy levels are high. Even their brain functions are not fully developed, especially with regard to the prefrontal cortex, where impulse inhibition, decision-making, and feedback are processed (Paus, 2005).

Adolescents have a peculiar propensity to adopt risky behaviors that play several roles related to identity development, social participation (Arnett, 1992), and overall personality. Through risky behaviors, an adolescent can prove him/herself, assert his/her “adulthood,” be accepted by peer groups, and satisfy a need for transgression or challenge while claiming his/her autonomy and independence (Silbereisen, Eyferth, & Rudinger, 1986; Silbereisen & Todt, 1994).

More than driving/riding inexperience, the psychosocial aspects and personality traits connected to adolescence have the most significant bearing on traffic accidents and on the adoption of risky behaviors in general (Boyce & Geller, 2002; Deery, 1999; Dworkin, 2005; Fergusson, Swain-Campbell, & Horwood, 2003; Harré, 2000; Iversen & Rundmo, 2004; Rodham, Brewer, Mistral, & Stallard, 2006; Vavrik, 1997).

These specific characteristics can help to differentiate the behavior of adolescent motorcyclists from that of motorcyclists and car drivers over the age of 18 years. In fact, older individuals have a more stable personality and are less prone to emotions and excitement-seeking, and have more control and awareness of their ability to drive and of potential traffic hazards, and are thus more able to understand and direct their own risk-taking behavior (Irwin & Millstein, 1986; Jessor, 1987; McKnight, 1999).

According to cognitive psychology, some behaviors, such as driving, become habits and automatism over time (Ranney, 1994). It is also known that individuals with more entrenched habits take into account less information than those with less entrenched habits, who assess situational contingencies more carefully and choose the driving behavior to adopt more actively (Fuji & Kitamura, 2003).

Considering the often random nature of road accidents and the lack of awareness of what characterizes risky behavior, it is possible that a person unintentionally develops a stable risky driving habit. This willingness to take risks may arise especially during adolescence

due to the increased intensity of traits such as sensation-seeking, normlessness, anger, and unrealistic optimism, each of which interacts with cognitive and biopsychosocial development processes of and social influences.

Bearing in mind that healthy or unhealthy habits that can stabilize and recur over time are developed during adolescence, it is important to understand which variables have the most influence on driving/riding behaviors and subsequent involvement in road accidents to implement more effective preventive and educational actions for this age group. The study of personality, cognitive and social characteristics of young riders is therefore an important and productive focus for research.

Numerous approaches have been taken to understand the variables and processes underlying the driving/riding behavior of young people. A few have centered on the predictive value of some personality traits, others have highlighted the role of cognitive variables in elaborating external information, while others have tried to explain behavior within social cognition models. Despite the extensive literature on traffic psychology, only a few studies have integrated the different approaches. Furthermore, these studies (Chen, 2009; Machin & Sankey, 2008; Ulleberg & Rundmo, 2003; Wong, Chung, & Huang, 2010) focused exclusively on young adults, but it is unclear whether the findings can be generalized to adolescents.

The aim of our study is to contribute to the understanding of the mechanisms and processes underlying risk-taking behaviors on the road by young riders of two-wheeled vehicles. Two-wheeled vehicles are intended to carry up to two people, including the rider. In particular, our study focuses on mopeds with an engine capacity of 50 cc or less and a maximum speed of 45 km/h on a level road (National Institute of Statistics, 2009). We investigate the influence of the main sociocognitive and personality variables used for samples of young drivers on the moped riding behavior of young adolescents aged 14–15 years. This is the age at which young people in Italy can drive a moped after obtaining the driving license. To the best of our knowledge, no studies have investigated the integrated influence of personality variables and cognitive and social skills on 14–15-year-old adolescents when riding a moped.

## 1.2. The role of social, cognitive, and personality variables

Most traffic accidents are due to human factors, namely to risk-taking and irresponsible behavior that violates the highway code. A literature review showed that many possible variables can influence risky driving behaviors. The influence of these variables has been confirmed in several studies for samples of young drivers of four-wheeled vehicles and, in recent years, samples of motorcyclists. For the reasons set out in the Introduction and in light of these studies, we chose to focus on some personality and psychosocial variables analyzed in an integrated model.

### 1.2.1. Risk perception

Among the factors influencing risky driving/riding behaviors, risk perception should be considered. It can be defined as subjective assessment of the probability of a specific event happening and of the magnitude of the possible negative consequences (Sjöberg, Moen, & Rundmo, 2004). This construct was investigated in relation to young drivers of four-wheeled vehicles who are more likely to underestimate dangerous situations (Brown & Groeger, 1988; Deery, 1999) and to consider themselves less at risk compared to other road users (Glick, Kronenfeld, Jackson, & Zhang, 1999), and consequently to engage in risky traffic behaviors (Arnett, 1992; Dworkin, 2005; Harré, 2000; Moller, 2004).

In these studies, risk perception can be considered an antecedent of behavior: the higher the risk perception associated with a behavior, the lower is the chance that a person will engage in this behavior.

In many studies, risk perception appeared to be an important mediator between personality and riding behavior variables (Machin &

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