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Crash risk and aberrant driving behaviors among bus drivers: The role of personality and attitudes towards traffic safety

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ABSTRAHACT

Several studies have shown that personality traits and attitudes toward traffic safety predict aberrant driving behaviors and crash involvement. However, this process has not been adequately investigated in professional drivers, such as bus drivers. The present study used a personality–attitudes model to assess whether personality traits predicted aberrant self-reported driving behaviors (driving violations, lapses, and errors) both directly and indirectly, through the effects of attitudes towards traffic safety in a large sample of bus drivers. Additionally, the relationship between aberrant self-reported driving behaviors and crash risk was also assessed.

Three hundred and one bus drivers (mean age = 39.1, SD = 10.7 years) completed a structured and anonymous questionnaire measuring personality traits, attitudes toward traffic safety, self-reported aberrant driving behaviors (i.e., errors, lapses, and traffic violations), and accident risk in the last 12 months. Structural equation modeling analysis revealed that personality traits were associated to aberrant driving behaviors both directly and indirectly. In particular altruism, excitement seeking, and normlessness directly predicted bus drivers' attitudes toward traffic safety which, in turn, were negatively associated with the three types of self-reported aberrant driving behaviors. Personality traits relevant to emotionality directly predicted bus drivers' aberrant driving behaviors, without any mediation of attitudes. Finally, only self-reported violations were related to bus drivers' accident risk. The present findings suggest that the hypothesized personality–attitudes model accounts for aberrant driving behaviors in bus drivers, and provide the empirical basis for evidence-based road safety interventions in the context of public transport.

1. Introduction

Public transportation is a vibrant economic sector in the European Union, and transport through buses comes second to the use of passenger cars (Eurostat, 2014). According to a relevant report from the European Agency for Safety and Health at Work (EU-OSHA), professional drivers face an increased risk for road fatalities. Even light transport vehicles are twice as likely to be involved in crashes, as compared to passenger vehicles, and in most cases (85%), crash involvement is the result of human error (EU-OSHA, 2010). The risk of fatalities or serious injury for bus passengers is considerably lower than that of car passengers (Albertsson and Falkmer, 2005 Yang et al., 2009). In the European Union, bus and coach are the most widespread (12.10%) mode for passenger on land transportation, following car use (81.6%). However, the crashes involving bus and coaches in 2010 accounted only for the 0.36% of the total fatalities in crashes (0.52% for urban areas and 0.47% for rural areas; European Union Road Federation, 2012). Furthermore, the last decades witnessed a significant reduction of fatal crashes in bus/coach transportation, and one of the 10 goals of the European Union is to further improve public transportation and road safety by 2050 (European Union, 2011). To achieve this goal more focused research is needed on the risk factors for bus crashes. One way of looking at this is by attending to technical aspects, such as improving vehicle safety features (e.g., the length of the bus), the roadway (e.g., the presence of bus priority and/or a divided roads), as well as the environment (e.g., the traffic conditions and road congestion; Albertsson and Falkmer, 2005; Chimba et al., 2010; Goh et al., 2014).

Another way of looking at improving bus transportation safety concerns driver characteristics and attributes. Specifically, factors

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such as age and gender, work conditions and shifts, experience, celeration behavior and speed choice, as well as sleepiness have been studied with respect to crash risk (e.g., Kaplan and Prato, 2012; Strathman et al., 2010; Tseng, 2012; Vennelle et al., 2010; af Wåhlberg, 2008). A recent study (Goh et al., 2014) analyzing about 7000 Australian bus crashes showed that older age (60 years or older), lower working experience (2 years or less), and being involved in a crash in the past predicted crash involvement in an at-fault crash.

Nevertheless, studies of traffic accidents and crashes in other professional and non-professional drivers have consistently shown that personality attributes play an important role in predicting crash involvement. In a pioneering early study, Burns and Wilde (1995) showed that a "High Risk Personality" profile (i.e., need for tension, risk and adventure in own lives) was associated with speeding and careless driving among professional taxi drivers, whereas excitement seeking was related to traffic rule violation. More recently, Sümer (2003) showed that, among different groups of professional drivers, depression symptomatology, anxiety, hostility and psychoticism indirectly predicted crashes, through their effect on at wheel violations and errors. Furthermore, the study showed that the excitement seeking trait had a direct effect on speeding, and aggressiveness trait directly related to drunk driving.

In addition, a growing body of research in the last decade has emphasized the role of personality characteristics on risky driving and crash risk. Some studies have focused on the impact of single personality dimensions upon risky driving behavior (e.g., Dahlen et al., 2005; Jonah et al., 2001; Lajunen, 2001; Özkan and Lajunen, 2005; Taubman-Ben-Ari and Yehiel, 2012), while others estimated the risk for traffic crashes on the basis of the multivariate combination of different personality dimensions (e.g., Deery and Fildes, 1999; Ulleberg, 2001; Lucidi et al., 2010). Recently some studies used this multivariate perspective to understand the role of personality traits on the driving behavior of drivers of different age groups (e.g., Machin and Sankey 2008; Lucidi et al., 2014; Ulleberg and Rundmo, 2003; Yang et al., 2013).

Nevertheless, personality is relatively a stable human characteristic that is not easily malleable by road safety interventions. Furthermore, personality is considered to be a distal predictor of behavior, as compared to other more immediate antecedents of behavioral intention and action initiation (Fishbein and Cappella, 2006). In line with this argument, Nordfjærn et al. (2010) found that, in a representative sample of Norwegian drivers, personality traits, such as anxiety, sensation seeking and normlessness were weakly associated with risky driving, and argued that the personality-risky driving relationship could be better understood after considering more immediate antecedents of driving behavior, such as attitudes towards risky driving. In the behavioral science literature, theoretical models such as the theory of planned behavior and the integrative model posit that the effects of personality traits on both intentions and actual behavioral enactment can be mediated by social cognitive variables, such as attitudes (Ajzen, 2011; Fishbein, 2009).

The relationship between personality–attitudes–behavior has been assessed in the driving literature through the Ulleberg and Rundmo (2003) model. This model purports that a group of personality traits is relevant to risky driving, and these traits could affect risky driving tendencies both directly, and indirectly, through the effects of attitudes towards traffic safety. Ulleberg and Rundmo (2003) showed that, among young drivers, some personality traits (i.e., anxiety, hostility, normlessness, excitement-seeking, and aggression) were indirectly associated to risky driving, while others (i.e., altruism) were directly associated with risky driving. A recent study confirmed this model in a sample of older Italian drivers (Lucidi et al., 2014), and showed that anxiety (positively), and hostility and normlessness (negatively) were associated to more positive attitudes towards traffic safety, which, in turn, were directly associated with different types of aberrant behaviors at wheel such as violations (e.g., conscious deviations from rules or safe practices), lapses (e.g., mistakes due to attention and memory failures), and errors (e.g., mistakes due to the failure of a planned action). Following an analysis of the direct effects of personality on these self-reported driving behaviors, the same study found that excitement seeking was directly (positively) associated with violations, while hostility was directly associated with both lapses and errors.

Taken together, the aforementioned findings show that Ulleberg and Rundmo (2003) 'personality-attitudes-risky driving behavior' model can be applied in different age groups across countries, and validly predict risky driving. However, to the best of our knowledge, no studies have assessed this model among professional groups, such as bus drivers. This leaves an important gap in the driving literature for the following reasons. At a theoretical level, it is important to empirically assess the generalizability and applicability of the Ulleberg and Rundmo (2003) model by extending it to a group of professional drivers. To this end, it is important to assess if the model's components (e.g., personality traits) differentially predict bus drivers' risky driving, as compared to previous studies with non-professional drivers. At a practical level, better understanding the influence of personality attributes on bus drivers' risky driving tendencies will provide valuable input for road safety interventions in this target group. In fact, a study applying the Ulleberg and Rundmo (2003) model to bus drivers can provide the empirical basis and inputs for the design and implementation of practical road safety interventions in line with the EU's 2050 goals for improving public transportation safety and reducing traffic accidents.

In view of these arguments, the present study aims to empirically examine the model of Ulleberg and Rundmo (2003) in a large sample of bus drivers. It is noteworthy, that this is the first time that the specific model is examined in this professional group. It was expected that personality traits would predict aberrant self-reported driving behaviors (driving violations, lapses, and errors) both directly, and through the effects of attitudes towards safe driving. So, in line with Ulleberg and Rundmo (2003), we tested a model that assessed both direct and indirect effects of personality traits on aberrant driving behaviors. A secondary aim of the study was to assess the relationship between the three self-reported behavioral indices (i.e., violations, errors and lapses) with the self-reported crash/near crash involvement. This would add greater external validity to the model and allow us to extend the applicability of the model with respect to observed number of crashes or near crash involvements in bus drivers.

2. Methods

2.1. Sample and procedure

Three hundred and one male bus drivers aged between 22 and 60 years (mean = 39.1, SD = 10.7 years) participated in the study. Participants were recruited through a convenience sampling procedure in public transport companies of two big cities of Central and Southern Italy (i.e., Florence and Naples) by trained research associates from Sapienza University of Rome. The participants held the driver's license from about 15 years, worked as bus drivers for about 12 years and worked mainly within an urban area. The study was approved by the Institutional Review Board of the Department of Social and Developmental Psychology of the University. In line with standards for ethics in behavioral research (e.g., The British Psychological Society's Code of Ethics), all participants were informed about the study and required to give