



Full length article

Effect of personality traits, age and sex on aggressive driving: Psychometric adaptation of the Driver Aggression Indicators Scale in China



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ARTICLE INFO

Keywords:

Aggressive driving
Driver aggressive indicators scale
The big five personality
Age

ABSTRACT

This study aimed to assess the reliability and validity of the Chinese version of the Driver Aggression Indicators Scale (DAIS), which measures aggressive driving behaviors. Besides, demographic variables (sex and age) and the big five personality traits were examined as potential impact factors of aggressive driving. A total of 422 participants completed the DAIS, Big Five Personality Inventory (BFPI), and the socio-demographic scale. First, psychometric results confirmed that the DAIS had a stable two-factor structure and acceptable internal consistency. Then, agreeableness and conscientiousness were negatively correlated with hostile aggression and revenge committed by the drivers themselves, while neuroticism was positively correlated with aggressive driving committed by the drivers themselves. Meanwhile, more agreeable drivers may perceive less hostile aggression and revenge. More neurotic drivers may perceive more aggressive warning. Finally, the effects of age and sex on aggressive driving were not same as most studies. We found that older age group perceived and committed more hostile acts of aggression and revenge than younger age groups. Female drivers of 49–60 years perceived more aggressive warnings committed by other drivers.

1. Introduction

Aggressive driving is a significant factor causing traffic crashes (Paleti et al., 2010). An American study found that 55.7% of 106,727 fatal crashes between 2003 and 2007 involved potentially aggressive driving behaviors (AAA Foundation for Traffic Safety, 2009). A cross-culture study of four countries showed that aggressive driving behaviors were significantly correlated with more traffic accidents (Özkan et al., 2010).

Although aggressive driving has been studied for several decades, its definition lacks cohesion and specificity. This has been pointed out in several recent studies (Conner and Smith, 2014; Nesbit and Conger, 2012; Perepjolkina and Reñge, 2013; Suhr, 2016; Suhr and Nesbit, 2013). Some researchers focused on observational behaviors, and defined aggressive driving as “any unsafe driving disregard for other road users’ safety by placing them in unnecessary danger” (Harris et al., 2014; Houston et al., 2003). Some researchers focused on the intentions behind the behavior, defined aggressive driving as “any form of driving behavior that is intended to injure or harm other road users physically or psychologically” (Burtaverde et al., 2016; Kováčsová et al., 2014; Kováčsová et al., 2016; Lajunen et al., 1998). Moreover, researchers suggested that both driving behaviors that disregard other road users’

safety and intend to harm others were aggressive driving (AAA Foundation for Traffic Safety, 2009; Goodwin et al., 2013). In this study, we use the second definition that considers intention as a primary factor. On the one hand, it is in accord with the general definition of aggressive behavior – “any behavior directed toward another individual that is carried out with the proximate (immediate) intent to cause harm” (Baron and Richardson, 1994; Anderson and Bushman, 2002); on the other hand, it is easier to distinguish aggressive driving from other unsafe driving such as violations and risky driving. In this definition of aggressive driving, intention matters; for example, when drivers speed up to overtake, trying to irritate other drivers or gain psychological advantage, this constitute aggressive driving behavior.

Aggressive driving includes extreme aggressive reactions of “road rage”, e.g., car ramming or physical attacks, as well as more moderate aggressive road behaviors, e.g., gestures of disapproval, blocking other drivers, and cutting off other cars (Özkan et al., 2010). The initial authors of the DAIS – Lajunen and Parker found that the aggressive violation subscale of the Driver Behavior Questionnaire (DBQ; Reason et al., 1990; Lawton et al., 1997; Lajunen et al., 2004) didn’t cover all aggressive driving behaviors. Therefore, they developed the DAIS to measure aggressive driving behaviors comprehensively and exclusively

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(Özkan and Lajunen, 2005; Özkan et al., 2011). The DAIS consists of 13 items reflecting drivers' possible aggressive behaviors on the road in daily life. It has been validated in Finland, Great Britain, The Netherlands, Turkey (Özkan et al., 2010) and Slovakia (Kováčová et al., 2014). Studies indicated that the DAIS has a clear factor structure, high item loading, and acceptable internal consistency across different countries. Comparing to the Dula Dangerous Driving Index (DDDI; Dula and Ballard, 2003), which also measures aggressive driving, we found that the seven items in aggressive driving subscale of DDDI were included in the DAIS. Furthermore, the structure of aggressive driving could be explored through the DAIS, while aggressive driving was only a dimension of DDDI. Therefore, it is necessary to develop a Chinese version of the DAIS.

General Aggression Model (GAM) was established for better understanding of how aggressive behaviors are committed (Anderson and Bushman, 2002). This model has been used in studies of aggressive driving (Kováčová et al., 2016; Suhr, 2016). GAM consists of 1) person and situation inputs (i.e., person factors like demographic variables and traits, or situational factors like aggressive cues and provocations); 2) internal affective and cognitive processes; 3) outcomes of appraisal and decision processes. Person and situation inputs can lead to aggressive cognitions and behaviors via specific internal state activation (Anderson and Bushman, 2002; Chester et al., 2014). This study focused on the effects of person inputs (age and sex as demographic variables, and personality traits as individual difference) on aggressive driving. The impacts of these factors on driving should not be ignored; a Norwegian study showed that personality traits and sex explain 37.3% of the variation in risky driving behaviors (Oltedal and Rundmo, 2006). In addition, drivers constantly interact with other drivers, so cognition of other drivers' behaviors matters (Åberg et al., 1997; Møller and Hausteijn, 2014; Stewart, 2005). Therefore, the participants were asked to rate twice when filling the DAIS, once for aggressive driving behaviors they committed themselves and once for how often they perceived other drivers' aggressive driving behaviors.

Personality traits reveal individuals' particular patterns of behavior in a variety of situations. Stable personality traits may predispose individuals to experience different mood states, in turn influencing their emotional arousal and behavioral responses (Rusting, 1998). One of the most widely used constructs of personality is the Big Five Factor Model (John et al., 1991). According to previous studies, aggressive driving behaviors were associated with lower scores of agreeableness (Aniței et al., 2014; Cellar et al., 2000; Dahlen et al., 2012), conscientiousness (Aniței et al., 2014; Dahlen et al., 2012; Harris et al., 2014) and openness (Harris et al., 2014; Vazquez, 2013), and with higher scores of neuroticism (Jovanović et al., 2011; Sârbescu et al., 2014) and extroversion (Burtaverde et al., 2016; Harris et al., 2014).

Sex and age are two demographic variables that influence driving behaviors. Drivers of different age and sex may exhibit distinct driving abilities and risk preferences. The sex effect on aggressive driving was inconsistent among studies. Most studies found that males reported more aggressive driving behaviors than females (Dahlen and White, 2006; Perepjolkina and Reñge, 2013; Sârbescu et al., 2014). Others reported that sex was not a significant factor influencing aggressive driving (Jovanović et al., 2011; Vazquez, 2013; Wickens et al., 2012). And we found only one study showing that females were involved in more aggressive driving (Harris et al., 2014). The inconsistency might be related to differences in the intensity of aggressive driving. A study of 192 students demonstrated that male and female drivers reported similar levels of mild aggressive driving, while males reported more violent driving out of vengeful attitude (Hennessy and Wiesenthal, 2002). As for age difference, previous studies showed that age was negatively correlated with aggressive driving (Dahlen and White, 2006; Krahe, 2005; Krahe and Fenske, 2001; Perepjolkina and Reñge, 2013; Wickens et al., 2011). Young male drivers are considered a high-risk group, committing more aggressive behaviors and involved in a higher number of traffic accidents (Perepjolkina and Reñge, 2013; Vanlaar

et al., 2008).

In summary, aggressive driving related study is important for the prevention of traffic accidents, and this unsafe driving attracts increasing attention. However, useful tools measuring aggressive driving is needed in China, so we validated the DAIS. Finally, the associations of aggressive driving with age, sex and personality traits offer a quick detection of aggressive drivers, which could be inspiring for later researches. The study goals are listed below:

- (1) to develop a Chinese version of the Driving Aggressive Indicator Scale (DAIS);
- (2) to assess the relationship between personality traits and aggressive driving;
- (3) to analyze the effects of age and sex on aggressive driving behaviors.

2. Methods

2.1. Participants and procedure

We selected specific locations such as parking lots and residential areas to recruit participants in Beijing, China. Participants were assured of anonymity and confidentiality. The data were collected by a professional research company. Initially, 448 drivers participated in this investigation. After excluding 26 non-serious participants, 422 subjects in total were assessed. Participants were asked to provide their age, sex, education, number of years after acquisition of full driving license, total/annual number of kilometers driven, and number of accidents during the last 3 years. Accidents during last 3 years were measured using the question "In the last three years of driving experience, how many times did you collide with another vehicle, pedestrian, stationary obstruction et al., including mild vehicle damage to severe casualties, whether you were the primary responsible or not." There were 67.8% (286) male and 32.2% (136) female participants. As shown in Table 1, the distribution of age and driving experience in male and female participants were balanced, demonstrating a good representativeness of our sample.

2.2. Measures

2.2.1. the driver aggression indicator scale (DAIS)

The DAIS was developed to assess aggressive driving behaviors exclusively (Özkan and Lajunen, 2005). It consists of 13 items, reflecting possible aggressive driving behaviors on the road in daily life. Participants rated the scale twice, once for "self", reflecting the frequency of such behaviors committed by drivers themselves, and once for "others", reflecting the frequency of their perception of other drivers' aggressive behaviors. The answers ranged from 0 ("never") to 4 ("nearly all the time"). The DAIS has been validated in four different countries, including Finland, Great Britain, the Netherlands, and Turkey (Özkan et al., 2010). It consistently showed a clear two-factor solution for the two parts (both "self" and "other" parts). The first factor was termed "aggressive warning" (AW), with the items reflecting mostly aggressive warnings on the road such as "sounding horn". The second factor was termed "hostile aggression and revenge" (HAR), to describe a driver's hostile actions such as "physical attack". Further, internal consistency coefficients were acceptable. For the *self* part, alpha reliability values for HAR and AW were 0.89 and 0.84, respectively. In the *other* part, alpha reliability values were 0.86 and 0.75, respectively (Özkan and Lajunen, 2005). This scale was translated into Chinese from the English version, by at least two psychologists to ensure that participants understood the meaning of each item clearly.

2.2.2. The big five personality inventory (BFPI)

The BFPI consists of five personality factors, which encompass a total of 44 items (John et al., 1991). These five factors are: extroversion

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