



Psychometric adaptation of the driving anger expression inventory in a Chinese sample



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ABSTRACT

The purpose of this study was to assess the psychometric properties and the factorial structure of the Driving Anger Expression Inventory (DAX) in a Chinese sample. We also explored the relationships among driving anger expression, general anger expression, and driving outcomes. Three hundred and fifty-eight drivers completed the Chinese version of the DAX, the Anger Expression Scale (AX), the Dula Dangerous Driving Index (DDDI) and a questionnaire about several types of traffic violations. A confirmatory factor analysis of the Chinese DAX yielded a four-factor solution with 20 items. This solution showed the best goodness of fit of the data and acceptable reliability. The validity of the revised DAX was also verified. The aggressive expression forms were positively correlated with dangerous driving behaviors. Using the vehicle to express anger was associated with fines. The aggressive forms were also positively correlated with general anger expression-out and negatively correlated with general anger control. The adaptive expression of anger was positively correlated with anger control but negatively correlated with dangerous driving behaviors, penalty points and fines. Furthermore, young drivers (<30 years old) reported more personal and physical aggressive expressions of anger than other drivers. Gender differences were only found in some age groups. Thus, the revised DAX was confirmed to be a reliable and valuable instrument to measure forms of driving anger expression in traffic environments in China.

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1. Introduction

As a new automobile consumption market, China has witnessed a dramatic increase in the number of vehicles and drivers on its roads over the past 10 years. According to the 2011 report of China Road Traffic Accidents Statistics (CRTAS, 2011), the number of vehicles in China increased from 18 million in 2001 to over 105 million in 2011. Over the same period, the number of drivers increased from 42 million to 173 million. The rapid increase in the number of drivers has resulted in a large number of novice drivers whose driving style differs from that of US drivers. In particular, Chinese drivers concentrate on driving skills and capabilities, whereas US drivers concentrate on practical driving safety guidelines. For example, Chinese drivers seldom use running lights during rainy or snowy weather, and less than half of drivers use turn signals to indicate their intention to change lanes (Zhang, Huang, Roetting, Wang, & Wei, 2006). Therefore, the traffic environment in China differs from that in other countries. Chinese drivers are involved in a greater number of traffic accidents than drivers in the US and

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Japan (Atchley, Shi, & Yamamoto, 2014; Zhang, Tsimhoni, Sivak, & Flannagan, 2010; Zhang et al., 2006). Thus, there is an acute need to systematically and deeply study the driving behavior of Chinese drivers.

Anger is an emotion that drivers often experience while driving (Underwood, Chapman, Wright, & Crundall, 1999). Deffenbacher, Oetting, and Lynch (1994) provided a clear definition of driving anger as a situation-specific form of trait anger that refers to the propensity to become angry behind the wheel. They also found that high-anger drivers were more easily provoked by traffic situations and engaged in more aggressive and risky driving behaviors than low-anger drivers (Deffenbacher, Filetti, Richards, Lynch, & Oetting, 2003; Deffenbacher, Huff, Lynch, Oetting, & Salvatore, 2000). Similar results have been reported in many countries (Iversen & Rundmo, 2002; Lajunen & Parker, 2001; Li, Yao, Jiang, & Li, 2014; Sullman, 2006). According to the Cognitive Neosocial Theory (Anderson & Bushman, 2002; Berkowitz, 1989, 1990), aversive events produce negative affect, which automatically stimulates various thoughts, memories, expressive motor reactions, and physiological responses related to fight and flight tendencies. In the driving environment, different situations may provoke anger, and drivers' irritated thoughts and expressed reactions may differ. For example, two drivers may experience the same level of anger when they encounter a trigger situation, but they may address the same situation in different ways. Specifically, one angry driver may yell and attempt to force the trigger driver to the side of the road, whereas the other angry driver may tell himself that it is not worth getting mad at the trigger driver. These various methods of managing anger may result in different driving behaviors and violation outcomes (Deffenbacher, Lynch, Deffenbacher, & Getting, 2001; Deffenbacher, Lynch, Oetting, & Swaim, 2002; Deffenbacher, Oetting, Lynch, & Morris, 1996). Moreover, the two major dimensions of dangerous driving behavior, aggressive driving and risky driving, have different features (Dula & Ballard, 2003; Richer & Bergeron, 2012). Aggressive driving refers to any behavior in which a driver intends to physically or psychologically harm others (Dula & Ballard, 2003), such as using verbal expressions (e.g., yelling or cursing at another driver), physical expressions (e.g., leaving the vehicle and confronting or physically fighting with another driver) or their vehicle (e.g., flashing lights, honking horns, following close behind and cutting off another driver) to express anger (Deffenbacher et al., 2002). Risky driving refers to behaviors that do not intend to cause harm to others but potentially have negative outcomes because precautions are not taken. Such behaviors may be socially unacceptable or socially acceptable but dangerous (Turner, McClure, & Pirozzo, 2004; Willemsen, Dula, Declercq, & Verhaeghe, 2008). Risky driving behaviors include running red lights, weaving through traffic and speeding (Aarts & van Schagen, 2006; Dula & Ballard, 2003; Elvik, 2012; Rosen & Sander, 2009). Driving anger has been associated with both aggressive driving and risky driving (Bachoo et al., 2013; Jovanovic, Lipovac, Stanojevic, & Stanojevic, 2011), but different forms of anger expression may have different influences on these two dimensions of driving behavior. Considering the rapid motorization of China and the associated problems of traffic congestion and the resulting stress and frustration, an exploration of the effect of anger expression and control on Chinese drivers is warranted.

To explore how people express their anger while driving, Deffenbacher et al. (2002) developed a self-report questionnaire, the Driving Anger Expression Inventory (DAX), to measure various forms of anger expression in traffic environments. The original version of the DAX contains 53 items, but the authors recommended a 49-item version with 4 factors because the fifth factor (4 items) demonstrated low reliability. These four factors are summarized as follows. First, the Verbal Aggressive Expression factor refers to expressing anger at the offending driver by yelling, name-calling or using non-verbal behaviors with verbal aggression (e.g., shaking one's head). Second, the Personal Physical Aggressive Expression factor refers to drivers' expression of anger with their body or through gestures, including shaking their fist and making hostile gestures, to scare other drivers. Third, the Use of Vehicle to Express Anger factor refers to using some part of the vehicle to express anger, such as flashing one's lights or purposely blocking the other driver from performing the action that he/she wants to perform. The first three factors summarize the general aggressive expression index, which has been shown to be positively correlated with aggressive and risky driving behavior and some crash-related conditions (Deffenbacher, White, & Lynch, 2004). Fourth, the Adaptive/Constructive Expression factor refers to using a positive method to cope with driving anger. In this form of expression, the driver attempts to accept the frustrating situation and think of relieving ways to cope with it. This factor has been correlated negatively or has been uncorrelated with the first three factors and is unrelated to accident involvement (Deffenbacher et al., 2002; Sarbescu, 2012; Sullman, Stephens, & Kuzu, 2013).

The DAX has been translated into several languages, including Turkish (Eşiyok, Yasak, & Korkusuz, 2007; Sullman et al., 2013), French (Villieux & Delhomme, 2010), Spanish (Herrero-Fernández, 2011) and Romanian (Sarbescu, 2012), and for several cultures, but the factors in each version differ. The original 49-item English version with four factors has been used widely without the removal of any items (Dahlen & Ragan, 2004; Deffenbacher et al., 2001; Jovanovic et al., 2011; Moore & Dahlen, 2008). By contrast, the Turkish version maintains the four factors but excludes two items from the 49-item version (Eşiyok et al., 2007; Sullman et al., 2013). In addition, Villieux and Delhomme (2010) removed all of the items in the Personal Physical Aggressive Expression factor of the French version because French drivers were unlikely to report the behavior described in this factor. The authors also modified items in the remaining factors according to some modification indices. Thus, the final French version of the DAX contains three factors with 11 items. Herrero-Fernández (2011) tested a 53-item Spanish version of the DAX and verified a five-factor model with good fit in the Spanish culture. Sarbescu (2012) removed some items and combined the verbal and physical factors into one factor to produce a 30-item Romanian version of the DAX that includes three factors and reached an acceptable level of model fit. Sullman (2015) verified a three-factor version without the Physical Aggressive Expression factor in a sample of New Zealand drivers. More importantly, Stephens and Sullman (2014) developed two short versions of the DAX, which can more easily be combined with other questionnaires and requires a smaller sample size than the original version.

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