



Driving anger and its relationship with aggressive driving among Chinese drivers



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ABSTRACT

Driving anger poses a serious threat to road safety. Increasing attention is being paid on this issue, with driving anger usually measured by a 14-item version of the Driving Anger Scale (short DAS). However, driving anger problem in China has received limited research attention and there is no corresponding Chinese version of the short DAS. This study adapted the short DAS for use with Chinese drivers and investigated the relationship between driving anger and aggressive driving with an Internet-based survey conducted to a sample of Chinese drivers. The Confirmatory Factor Analysis results showed that a three-factor DAS structure provided a good fit to the data obtained, with the three subscales used being hostile gesture, safety-blocking and arrival-blocking. The hostile gesture subscale and arrival-blocking subscale were positive predictors while the safety-blocking subscale was a negative predictor of aggressive driving. In China, the overall driving anger was lower but its association with aggressive driving was stronger, than that in western countries. These findings provide important insights into causes and consequences of driving anger for the development of effective strategies to reduce driving anger and to enhance road safety.

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1. Introduction

Anger, as one of the most frequently reported emotions for drivers, has been shown to have a series of adverse impacts on driving (Mesken, Hagenzieker, Rothengatter, & de Waard, 2007). From the cognitive perspective, it has been demonstrated that angry drivers tend to concentrate only on the central area of the visual field and neglect peripheral information which is critical for hazard detection, resulting in a reduced risk perception. Also, angry drivers have been shown to direct shorter gazes at less apparent hazards and have slower responses to traffic hazards (Stephens, Trawley, Madigan, & Groeger, 2013). From the behavioural perspective, angry drivers are more willing to take risks (Lu, Xie, & Zhang, 2013). It has been found that driving with anger increases the likelihood of crossing a yellow light (Abdu, Shinar, & Meiran, 2012), tailgating (Philippe, Vallerand, Richer, Vallières, & Bergeron, 2009), speeding (Jeon, Yim, & Walker, 2011), and abrupt lane changing (Underwood, Chapman, Wright, & Crundall, 1999). Moreover, such influences on driving behaviours can be carried over to subsequent situations that are non-anger-provoking (Stephens & Groeger, 2011).

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An important question for traffic safety researchers is how to measure anger on the road and one approach is to use an instrument such as the Driving Anger Scale (DAS). Two versions of DAS, namely the long and short versions, were developed by Deffenbacher, Getting, and Lynch (1994) using a sample of US drivers. The long version of DAS presents 33 anger-provoking traffic scenarios and requires respondents to rate the amount of anger triggered by each condition on a 5-point scale. A cluster analysis of the responses revealed that these 33 scenarios could be classified into the following six subscales: hostile gestures, illegal driving, police presence, slow driving, discourtesy, and traffic obstructions. While the original six-factor structure has been replicated in Spanish (Sullman, Gras, Cunill, Planes, & Font-Mayolas, 2007) and Malaysian (Konstantopoulos, Chapman, & Crundall, 2010) driver samples, other research has reported different factor structures. For example, the long DAS showed a three-factor structure (i.e. progress impeded, direct hostility and reckless driving) when applied to a sample of UK drivers (Lajunen, Parker, & Stradling, 1998), a four-factor structure (i.e. progress impeded, risky driving, hostile gestures and discourteous driving) with New Zealand drivers (Sullman, 2006) and a five-factor structure (i.e. hostile gestures, progress impeded, illegal driving, police presence, and traffic obstructions) in a French driver sample (Villieux & Delhomme, 2007).

The short version of DAS was developed by selecting items from each of the six subscales that were highly correlated with that subscale (Deffenbacher et al., 1994). It only consisted of 14 scenarios and showed a reasonably high alpha reliability of 0.80. The short version of DAS has gained more popularity compared to the long version when assessing driving anger, as it requires shorter completion time but at the same time can still maintain high validity and reliability (Deffenbacher et al., 1994; Sullman & Stephens, 2013). Deffenbacher et al. (1994) suggested that this short DAS had a one-factor structure with US drivers. This has been further confirmed in a recent study by Sullman and Stephens (2013) who examined a sample of New Zealand drivers. However, Herrero-Fernández (2011) found that when the short DAS was adapted with a Spanish sample, a three-factor structure (i.e. impeded progress by others, reckless driving and direct hostility), rather than a one-factor structure, showed a good fit to the data. This 14-item DAS has been widely used for exploring the effects of driving anger on negative driving outcomes. The overall value of the short DAS has been demonstrated to be a useful predictor of aggressive driving behaviours in different countries, including US (Moore & Dahlen, 2008), New Zealand (Sullman & Stephens, 2013) and European countries (Kováčsová, Rošková, & Lajunen, 2014). Also, significant relationships between driving anger and near-misses have been reported (Dahlen, Martin, Ragan, & Kuhlman, 2005; Sullman & Stephens, 2013).

Unfortunately, the majority of existing studies on driving anger are concerned with drivers in the U.S. and European countries only. The road rage problem in eastern countries such as China has not been given much research attention, although many media reports suggest that its severity is increasing (Li, Yao, Jiang, & Li, 2014). A survey on 2023 Chinese drivers showed that approximately 80% of the respondents admitted having experienced anger during driving, especially when they encountered inappropriate behaviours by other drivers or when they got involved in traffic congestion (Chinese Medical Doctor Association, 2011). Traffic accidents caused by road rage have also been reported by the media to alert drivers the danger of angry driving. However, despite sustained media attention, academic research concerning driving anger problem in China is still limited. It seems very likely that, due to the many variations in culture, politics, and society (Maxwell, Sukhodolsky, & Sit, 2009), the characteristic and the consequence of driving anger in China can be quite different from that in western countries.

The only study that has investigated the driving anger problem in China was carried out by Li et al. (2014), where the factor structure and discriminant validity of the long DAS in Chinese context was examined. The results revealed that the original six-factor structure fitted the data best. In addition, it was found that Chinese drivers reported lower level of anger than their American counterparts. However, no study so far has explored the application of the short DAS among Chinese drivers. As a result, it is not known whether the short DAS has a one-factor structure as reported by Deffenbacher et al. (1994) and Sullman and Stephens (2013), or a three-factor structure as found by Herrero-Fernández (2011), or even structures of other forms. Therefore, for a better understanding of the characteristics of driving anger in China, the factor structure of the short DAS requires more in-depth investigation.

Driving anger has been demonstrated to be a significant contributor to aggressive driving in many studies carried out in western countries. For example, using a sample of US drivers, Dahlen et al. (2005) reported a significant and positive correlation between anger and aggressive driving. Herrero-Fernández (2013) found that Spanish drivers with high driving anger would engage in more aggressive driving behaviours. Aggressive driving is a serious problem for road safety in China (Wang, Rau, & Salvendy, 2010). It was estimated that aggressive driving behaviours, such as speeding, running red lights and weaving behaviour, accounted for approximately 95% of all traffic death in 2011 in China (China Road Traffic Accidents Statistics [CRTAS], 2011). However, there is little current knowledge of how driving anger is related to such driving behaviours. As extreme emotional expression is typically disapproved in Chinese culture (Maxwell et al., 2009), anger-aggression correlation is expected to be smaller in China than that in western countries. However, traffic congestion can promote aggressive expressions of anger behind the wheel (Wickens, Wiesenthal, Hall, & Roseborough, 2013) and the congestion problem is more severe in China than in other countries (TomTom Traffic Index, 2013), based on which a stronger anger-aggression correlation is expected among Chinese drivers. Therefore, more research is needed for a better estimation of the consequences of driving anger in China.

To summarise, while driving anger has received sustained research attention in recent years, this problem in China, the country with the largest number of drivers worldwide (Ministry of Public Security, 2014), has not been well addressed. This study aimed to adapt the short DAS for use with Chinese drivers and to explore how driving anger predicts aggressive driving behaviours in China. The outcome of this study is expected to provide policy makers and researchers with a comprehensive

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