Accident Analysis and Prevention 88 (2016) 20–28

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

# Driving anger in Ukraine: Appraisals, not trait driving anger, predict anger intensity while driving

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ARTICLE INFO

*Article history:*
Received 18 July 2015
Received in revised form 2 October 2015
Accepted 16 November 2015
Available online 19 December 2015

*Keywords:*
Appraisals
Driving anger
Anger
Ukraine drivers

ABSTRACT

Trait driving anger is often, but not always, found to predict both the intensity of anger while driving and subsequent crash-related behaviours. However, a number of studies have not found support for a direct relationship between one's tendency to become angry and anger reported while driving, suggesting that other factors may mediate this relationship. The present self-report study investigated whether, in anger provoking driving situations, the appraisals made by drivers influence the relationship between trait and state anger. A sample of 339 drivers from Ukraine completed the 33-item version of the Driver Anger Scale (DAS; Deffenbacher et al., 1994) and eight questions about their most recent experience of driving anger. A structural equation model found that the intensity of anger experienced was predicted by the negative evaluations of the situation, which was in turn predicted by trait driving anger. However, trait driving anger itself did not predict anger intensity; supporting the hypothesis that evaluations of the driving situation mediate the relationship between trait and state anger. Further, the unique structure of the DAS required to fit the data from the Ukrainian sample, may indicate that the anger inducing situations in Ukraine are different to those of a more developed country. Future research is needed to investigate driving anger in Ukraine in a broader sample and also to confirm the role of the appraisal process in the development of driving anger in both developed and undeveloped countries.



## 1. Introduction

### 1.1. The driving anger trait

A substantial body of work has found anger experienced while driving to be a predictor of several driving behaviours that increase the risk of crash involvement (e.g. Dahlen et al., 2005; Deffenbacher et al., 1994; Mesken et al., 2007; Sullman et al., 2013). This relationship has been identified using self-report (Sullman, 2006, 2015; Sullman et al., 2014), driving simulator research (e.g. Stephens and Groeger, 2011; Stephens et al., 2013) and studies conducted in real traffic situations (e.g. Mesken et al., 2007). For example, Mesken et al. (2007) found a strong relationship between reported state anger and excessive vehicle speeds. Furthermore, simulator-based research found that, when angry, drivers take longer to respond to potential hazards, follow lead vehicles more closely and demonstrate inferior lateral and longitudinal control (Lansdown and Stephens, 2013; Stephens and Groeger, 2011; Stephens et al., 2013).

Particular drivers are more predisposed to experiencing anger than others. Deffenbacher et al. (1994) developed the Driving Anger Scale (DAS) to measure an individual's propensity to become angry across a number of driving situations. The DAS is the most commonly used measure for trait driving anger (Deffenbacher et al., in press) and has been found to be related to Spielberger's (1988) trait anger scale, with correlation coefficients showing these constructs to be similar but separate characteristics (e.g. Deffenbacher et al., 1994; Sullman and Stephens, 2013).

The original 33-item DAS was placed into six distinct types of situations likely to cause anger, which were: hostile gestures (e.g. being the recipient of rude gestures from other drivers); illegal driving (e.g. running traffic lights); discourteous driving (e.g. someone takes the parking spot you were waiting for); traffic obstructions (e.g. road works); slow driving (e.g. another vehicle driving slowly in the passing lane); and police presence (e.g. passing a speed camera). The original six factor structure has been supported by research in Turkey (Yasak and Esiyok, 2009), Spain (Sullman et al., 2007), Malaysia (Sullman et al., 2015), Japan (McLinton and Dollard,

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http://dx.doi.org/10.1016/j.aap.2015.11.017
0001-4575/

2010) and China (Li et al., 2014). However, a number of other researchers have found an alternative factor structure for the DAS. For example, researchers in the UK found that a 21-item version of the DAS could be best described by three factors (reckless driving, impeded progress and direct hostility) (Lajunen et al., 1998). Further, research from New Zealand found four categories of anger provoking situations; progress impeded, risky driving, hostile gestures and discourteous driving (Sullman, 2006). Finally, French research using a 22-item version of the DAS on university students produced a five-factor solution (progress impeded, illegal driving, hostile gestures, police presence, traffic obstructions) (Villieux and Delhomme, 2007). The inconsistencies in structure may in part be explained by dissimilar analytical methods, such as excluding items with low means, the data reduction method used or perhaps inter-country differences.

There is relative agreement in the published literature about the relationship between self-reported driving anger and a number of background variables. For example, when gender differences on anger propensities have emerged, females report higher levels of driving anger (Stephens and Sullman, 2015; Sullman, 2006; Sullman et al., 2007) and the level of driving anger tends to decline with age and experience (e.g. Parker et al., 2002). Currently, driving anger has not been explored using a sample of drivers from the Ukraine. As Ukraine has a road traffic fatality rate of 13.5/100,000 people, which is around four times as high as that found in the UK (3.7/100,000) and Sweden (3.0/100,000) (WHO, 2013), it is surprising that to date no data exist on the prevalence of driving anger among Ukrainian drivers.

### 1.2. Trait driving anger and appraisal tendencies

A large body of work has found trait driving anger to be related to both anger intensity and crash-related outcomes (e.g., Deffenbacher et al., 2001, 2002, 2003; Underwood et al., 1999; Sullman et al., 2007, 2013; Sullman and Stephens, 2013). However, other researchers have not supported these findings. In particular, anger prone drivers do not always report becoming angry while driving, or only do so in relatively non anger-provoking situations (Stephens and Groeger, 2009). In a recent on-road study using an instrumented vehicle, Stephens et al. (2015) found no relationships between anger propensities and angry mood recorded after a 50-minute drive in challenging road conditions. In that study, drivers were asked to "talk aloud" while driving to provide an understanding of which elements of the situation drivers focused on. The researchers found that towards the end of the drive, drivers who focused more on elements of the situation likely to provoke anger (for example, those who focused on having their speed limited compared to others who focused more on elements of the roadway) became more angry across the drive. These findings suggest that indirect relationships may exist between trait driving anger and state anger. In other words, trait anger may encourage drivers to evaluate the situation more negatively and these evaluations may in turn lead to increased state anger and subsequent aggression.

Despite a large amount of attention on driving anger and related behaviours, less research has focused on the relationships, if any, between trait driving anger and the appraisal tendencies of drivers. However, given that how a driver evaluates the situation is likely to determine what a driver does in that situation, this is an important area to research. Parkinson (2001) explored anger while driving within the appraisal tendency framework of Lazarus (Lazarus, 1991; Smith and Lazarus, 1993). The framework (see Fig. 1) outlines two stages of appraisals: primary and secondary, which happen simultaneously and determine whether, and how much, anger is experienced by the individual. Central to the primary appraisals are (i) the perceived relevance of the situation to the person's goals [goal relevance], and (ii) the perceived incongruence of the situation with the person's goals [goal incongruence]. In a driving situation, primary appraisals may be related to the fundamental driving goal, which may be the desire to arrive at a specific destination, safely and on time. Central to the secondary appraisal is whether there is an obvious target of blame [other responsibility]. Anger occurs when the situation is appraised as being goal relevant, yet goal incongruent, and perceived to be caused by another person. Therefore, in driving, anger may be more likely when another road user is perceived as culpable for the situation. Also in the secondary appraisal process are the evaluations of the ability to overcome the current situation. These are (i) the extent to which the person feels that they can make changes to improve the current situation [problem focused coping potential], (ii) the extent to which the person can improve their interpretation of the situation [emotion focused coping potential] and (iii) how much they believe the situation can improve [future expectancy]. However, the latter three have been found to be less important in the cognition–anger relationship than primary appraisals and the core element of other-blame (Smith and Lazarus, 1993).

Using a self-report survey, Parkinson (2001) had drivers recall an anger-provoking situation and rate the intensity of the anger they experienced, as well as provide ratings on the six evaluations that constitute primary and secondary appraisals (goal relevance, goal incongruence, other responsibility, problem focused coping, emotion focused coping and future expectancy). Parkinson found strong support for the influence of appraisal tendencies on the intensity of anger from the recalled driving situation. Regression analyses showed that 25% of the variance in the anger intensity scores was explained by the scores on the evaluations. Further, in this study, drivers with higher trait driving anger also tended to report more intense anger. Therefore, it is likely that trait driving anger was also related to some, if not all, of the appraisals. However, trait anger was not included in the regressions and therefore the contribution of trait anger to anger intensity, when appraisals were accounted for, was not examined. Given that previous research has not always supported direct links between trait and state anger across all driving situations (Stephens and Groeger, 2009), it is likely that this relationship was mediated by the individual's evaluation of the situation. Indeed, Lerner and Keltner (2000) suggest that both dispositional (trait) and state anger are likely to influence appraisal tendencies. In other words, drivers prone to higher levels of anger while driving may also be more likely to evaluate driving situations in an anger-conducive manner; both in terms of primary and secondary appraisals.

The present study was conducted using a sample of drivers from Ukraine, a country where research on driving anger does not yet exist. Further, the present study investigated the relationships between trait driving anger, appraisal tendencies and self-reported anger intensity over an anger provoking driving situation. Structural equation modelling (SEM) was used to examine these relationships for three reasons. Firstly, SEM allowed analysis of the latent factors for primary and secondary appraisals, both of which had more than one observed variable. Secondly, SEM allows all variables and regression equations to be considered simultaneously and therefore is able to tease apart unique contributions of each type of appraisal, as well as trait driving anger, in predicting anger intensity. Thirdly, SEM provides information on measurement error and therefore provides a clearer picture of the unexplained variance in the outcome variables.

In particular the research had three aims; (i) to confirm the factor structure of the DAS in a Ukrainian sample, (ii) to identify which situations are rated as the most anger provoking by drivers in Ukraine, and (iii) to explore the relationships between propensities to become angry with self-reported anger intensity in, and appraisals of, an anger provoking situation. Based on appraisal theories (e.g. Smith and Lazarus, 1993) a model was hypothesised