Contents lists available at ScienceDirect

Accident Analysis and Prevention

Gender roles, sex and the expression of driving anger

M.J.M. Sullman[a,*], J. Paxion[b], A.N. Stephens[c]

[a] *Driving Research Group, Cranfield University, Bedfordshire, MK43 0AL, UK*
[b] *Laboratory of Industrial and Human Automation Control, Mechanical Engineering and Computer Science, Valenciennes University, Valenciennes, France*
[c] *Monash University Accident Research Centre, Melbourne, Australia*

ARTICLE INFO

ABSTRACT

The present study investigated the validity of the 25-item Driving Anger Expression Inventory (DAX) as well as the role of sex and gender-roles in relation to the expression of driving anger in a sample of 378 French drivers (males = 38%, M = 32.9 years old). Confirmatory Factor Analysis supported the four-factor structure of the 25-item DAX (Adaptive/Constructive Expression; Use of the Vehicle to Express Anger; Verbal Aggressive Expression and Personal Physical Aggressive Expression) and two of the three aggressive factors were found to have significant positive relationships with driving anger, while adaptive/constructive expression was negatively related to driving anger. Use of the vehicle to express anger was not significantly related to crash involvement, but was significantly related to all other crash-related conditions (traffic tickets, loss of concentration, loss of control of the vehicle, near crash). The presence of feminine traits, but not sex, was predictive of adaptive/constructive behaviours, while masculine traits predicted more frequent verbal aggressive expression, use of the vehicle to express anger, personal physical aggressive expression and total aggressive expression. This finding may account for the inconsistent relationship found between driving anger and sex in previous research. This research also found that the 25-item DAX is a valid tool to measure the expression of driving anger and that the endorsement of masculine traits are related to more aggressive forms of driving anger expression.

1. Introduction

Anger has been shown to play a substantial role in risky and aggressive driving and has been recognised to be a contributor to motor vehicle collisions (Deffenbacher et al., 2003; Ellison-Potter et al., 2001; Goehring, 2000; Neighbors et al., 2002; Pickford, 2004; Smart and Mann, 2002b; Stephens and Sullman, 2015; Sullman, 2006). In particular, simulator research has found that anger degrades driving performance, in that angry drivers: drive faster, take longer to respond to hazards, follow lead vehicles more closely, and cross more yellow and/or red traffic lights (e.g., Abdu et al., 2012; Mesken et al., 2007; Stephens and Groeger, 2009, 2014; Stephens et al., 2013).

Although there is now a large body of research investigating the types of situations that provoke transitory anger (see Deffenbacher et al., 2016 for a review), far less research has looked at the way in which drivers express anger while driving. However, the most commonly used measure of the expression of driving anger is the Driving Anger Expression Inventory (DAX), which was developed by Deffenbacher et al. (Deffenbacher et al., 2002). The original 49-item DAX was refined by Stephens and Sullman (2014) to a 25-item scale which was comprised of the original four factors: Verbal Aggressive Expression

(VAE); Personal Physical Aggressive Expression (PPAE); Use of the Vehicle to Express Anger (UoV); and Adaptive/Constructive Expression (A/C). A number of studies have also included an overall measure of aggressive expression (Total Aggressive Expression), which is comprised of all items from the three aggressive forms of anger expression (VAE, PPAE and UoV).

Although the 25-item version of the DAX is relatively recent, it has been validated in Spain (Gras et al., 2016), Ukraine (Sullman et al., 2016), along with the Republic of Ireland and the UK (Stephens and Sullman, 2014). All of these studies have supported the four-factor structure of the DAX, as have most of the studies using the 49-item version (i.e., Deffenbacher et al., 2002; Eşiyok et al., 2007; Jovanovi et al., 2011; Sârbescu, 2012; Sullman et al., 2014, 2013). Furthermore, the research using the 25-item DAX has supported the original four factors and the factors have been found to have very good internal reliability (α = 0.80–0.90; Stephens and Sullman, 2014).

While both versions of the DAX have been validated across a variety of countries and driving populations there has been some degree of variability regarding the relationships the DAX factors have with sex. Several studies have reported that females report more adaptive/constructive means of dealing with anger (Eşiyok et al., 2007;

---

* Corresponding author.
E-mail address: M.Sullman@cranfield.ac.uk (M.J.M. Sullman).

Jovanović et al., 2011), while others have found no sex differences (Stephens and Sullman, 2014; Villieux and Delhomme, 2010). A number of studies have found that males tend to engage more often in personal physical aggressive expression (Dahlen and Ragan, 2004; Eşiyok et al., 2007), while others have found no sex differences on this factor (Björkqvist, 1994; Stephens and Sullman, 2015). However, it is unclear whether this inconsistency is rooted in underlying differences in driving populations, sampling techniques or due to the slightly differing factor structures.

Interestingly, some researchers suggest that it is not sex that influences the likelihood of aggression but the gender-role endorsed by the driver (Özkan and Lajunen, 2005). Although the terms sex and gender are often used interchangeably in every day speech, and some scientific research, they are not the same. Sex is a biological fact that is the same regardless of culture. In contrast, the World Health Organisation (WHO) defines gender as "socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women" (WHO, 2017). Thus, male and female are considered to be sex categories, while masculine and feminine are gender categories (WHO, 2017). Therefore, given that the definition of gender includes the types of behaviours that are appropriate for men and women, it would seem likely that gender, or sex-roles could be related to driving behaviour.

There has been surprisingly little research investigating the relationship gender has with risky and aggressive driving. Although they did not include the DAX, Özkan and Lajunen (2005) found that masculinity was related to risky and aggressive driving behaviour. This finding is, to some extent, backed up by research in Ukraine, which found that gender-roles, not sex, predicted the expression of driving anger (Sullman et al., 2016). More specifically, the Ukrainian research found that femininity played a protective role in reducing engagement in aggressive forms of anger expression. Somewhat surprisingly, that study also found that masculinity was not related to aggressive forms of driving anger expression. However, these findings may not apply to other countries, as Ukraine is a developing country with a very different history and culture to those classified as Westernised.

The present study had two primary aims. The first aim was to validate the 25-item version of the DAX using a novel sample of French drivers. This will involve testing the discriminant validity, by investigating the relationships the DAX factors have with crashes and crash-related conditions, and convergent validity by testing the relationships the subscales have with driving anger and road rage behaviours. The second primary aim of the present study was to investigate the relationships the resultant factors have with gender and sex, which has not been previously investigated in a westernised country.

2. Method

2.1. Participants

A total of 378 participants (males = 145; 38%) completed the questionnaire. Participants ranged in age from 18 to 79 ($M = 32.90 \pm 15.93$; $Median = 25$) years old; had been licensed between 10 months and 58 years ($M = 13.59 \pm 15.30$; $Median = 6.00$) and drove from zero to 56,890 ($M = 12,738 \pm 9800$; $Median = 10,000$) kilometres per year.

2.2. Materials

2.2.1. Aggressive expression of anger

The manner in which drivers generally express their anger was measured with the 25-item four-factor revised DAX. The 25-item DAX is an abridged version of the original 49-item Driving Anger Expression Inventory (Deffenbacher et al., 2002) developed by Stephens and Sullman (2014). The 25-item DAX retains the original four-factors from the 49-item DAX, which are: Adaptive/Constructive expression (e.g.,

Pay closer attention to being a safe driver); Use of the Vehicle to express anger (e.g., Drive a lot faster); Verbal Aggressive Expression (e.g., Swear at the other driver aloud) and Personal Physical Aggressive Expression (e.g., Try to get out and have a physical fight). Each DAX item describes a potential reaction to feeling anger when driving (e.g., "I tell myself to ignore it") and drivers rate how often they react in this way on a four-point scale (1 = Almost never to 4 = Almost always). Higher scores for each item represent stronger tendencies for each of the four types of responses. The 25-item DAX has shown good reliability with Cronbach's α ranging from 0.75 to 0.87 for the four subscales (Stephens and Sullman, 2014). Convergent validity has also been shown through strong positive correlations between total aggressive expression scores and self-reported acts of aggression (Stephens and Sullman, 2014).

2.2.2. Trait driving anger

The tendency to become angered while driving was measured with the 14-item Driving Anger Scale (DAS; Deffenbacher et al., 1994). Each of the 14 DAS items describes a potentially anger provoking situation and participants report the level of anger elicited by each on a five-point scale (1 = Not at all to 5 = Very much). Scores for each item are summed to produce a final DAS score, with higher scores representing stronger tendencies to experience anger while driving. The 14-item DAS has demonstrated good internal consistency (α = 0.80; Deffenbacher et al., 1994) and validity of the DAS has been shown through correlations with Spielberger's (1988) Trait Anger Scale (Deffenbacher et al., 1994; Sullman et al., 2013).

2.2.3. Gender roles

The Bem Sex-Role Inventory (BSRI), short version (Bem, 1981), was used to measure masculinity and femininity. This version of the scale consists of 20 statements that are designed to represent either masculine (10 items) or feminine (10 items) (i.e., I am assertive; I am sensitive) traits. Participants report, on a 7-point scale (1 = Never or almost never true; 7 = Almost always true), how true each statement is about them. The BSRI is commonly used to measure gender-roles (e.g., see Colley et al., 2009) and has been found to have good validity and reliability, with Cronbach's α ranging from 0.75 to 0.90 (Bem, 1981).

2.2.4. Self-reported road rage

Three items measured self-reported engagement in road rage and a further three items measured whether they had been victims of road rage. These items differed from the DAX items as they asked about extreme aggressive behaviours, such as threats of violence, attempts to damage a vehicle and attempts to hurt another driver. Participants respond to each question by reporting how many times they have experienced these behaviours from others and again reporting how many times they had engaged in these behaviours themselves. Participants reported the frequency of these extreme behaviours across the previous 12 months using a 6-point scale (0 = never; 5 = 5+).

2.2.5. Crash related conditions

Six items from the Driving Survey (Deffenbacher et al., 2002) measured how many times in the last three months drivers had: been fined or prosecuted for a driving offence (excluding parking tickets), lost concentration, lost control of their vehicle, experienced a near-crash, had a minor crash or a major crash. These were used as a measure of discriminant validity, as previous research has shown positive relationships between scores on the DAX and crash-related conditions (Deffenbacher et al., 2002; Sullman et al., 2013, 2016).

2.3. Procedure

The questionnaire was first translated from English to French by a French native speaker and then translated from French to English by a French native who is fluent in English. A small number of minor