Angry thoughts in Spanish drivers and their relationship with crash-related events. The mediation effect of aggressive and risky driving

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ABSTRACT

Several studies have related aggressive and risky driving behaviours to accidents. However, the cognitive processes associated with driving aggression have received very little attention in the scientific literature. With the aim of shedding light on this topic, the present research was carried out on a sample of 414 participants in order to validate the Driver's Angry Thoughts Questionnaire (DATQ) with a sample of Spanish drivers and to test the hypothesis of the mediation effect of aggressive and risky driving on the relationship between drivers' angry thoughts and crash-related events. The results showed a good fit with the five-factor model of the questionnaire (Judgmental and Disbelieving Thinking, Pejorative Labelling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking, and Coping Self-Instruction). Moreover, slight gender differences were observed in drivers' angry thoughts, with women scoring higher than men ($\eta^2 = 0.03$). However, younger drivers had higher scores than older drivers in general ($\eta^2 = 0.06$). Finally, several mediation effects of aggressive driving and risky driving on the relationship between aggressive thinking and the crash-related events were found. Implications of the results for research in traffic psychology and clinical assessment of aggressive drivers as well as limitations of the study are discussed.

1. Introduction

Despite the advances in driver training and driving behavior in developed countries, road safety continues to be a major problem worldwide. In the case of Spain, according to the Directorate General of Traffic (DGT) in 2013 there were 89,519 road accidents, which is an increase of 8% relative to 2012. Of the accidents in 2013, 1680 people died (12% less than in 2012), 10,086 were seriously injured (3% less than in 2012), and 114,634 were slightly injured (9% more than in 2012) (DGT, 2015). Research has suggested that human factors predict a greater amount of variance in road accidents than vehicle and road factors do (Brewer, 2000; Evans, 1991). More concretely, the probability of an accident occurring has been associated with a number of variables, including speeding and the intention to commit violations against traffic law (Elander et al., 1993), personality factors, especially trait anger and trait driving anger (Deffenbacher et al., 2003a, 2003b, 2003c, 2003d, 1994; Lynch et al., 1995), and aggression, impulsiveness and sensation seeking (Arnett et al., 1997; Blanchard et al., 2000; Dahlen et al., 2005; Schwebel et al., 2007). Risky behaviour behind the wheel has been related to anger and aggression in many studies (Deffenbacher et al., 2003a, 2003b, 2003c, 2003d; Iliescu and Sârbescu, 2013; Willemsen et al., 2008). In fact, it has been proposed that risky and aggressive behaviours could reinforce each other in a kind of feedback process (Berkowitz, 1990), although it has been also proposed in two experimental studies that anger would cause an increment of risky behaviours behind the wheel (Abdu et al., 2012; Zhang et al., 2016). Besides, despite the apparent overlap between risky and aggressive behaviours, it is important to differentiate them. Aggressive driving is characterized by the intention of causing physical or psychological harm to other persons (other drivers, passengers, pedestrians), while risky driving is characterized by dangerous behaviours which increase crash-risk, such as speeding, maneuvering without a signal or running red lights (Suhr and Dula, 2017). Therefore, while an aggressive behaviour always has the intention of hurting its target, a risky behaviour does not have this intention, even if such a behaviour results in an accident or causes injury to somebody or something (Baron and Richardson, 1994; Berkowitz, 1993; Deffenbacher et al., 2002a, 2002b; Shuster, 1997). Then, the same behaviour could be risky or aggressive, depending on the intention of the person who engages in it.

Considering that anger and aggression are two of the main predictors of risky behaviours on the road, it is important to investigate the mechanisms that underlie them (Bogdan et al., 2016). Several theories

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have arisen to explain drivers' emotional processes. One of the most empirically supported theories is Spielberger's model, which is based on five hypotheses (Quinn et al., 2014; Spielberger et al., 1983; Spielberger et al., 1988). According to this theoretical approach, anger is an emotional state characterized by feelings of irritation, which can occur in different intensities (intensity hypothesis) due to a provocative situation (discrimination hypothesis) and is maintained for a certain period of time (elicitation hypothesis). In addition, it is associated with aggression as a behavioural component (outcome hypothesis) and with a low ability to cope with the provocative situation (negative expression hypothesis). Additionally, researchers have searched for the cognitive mechanisms that maintain this emotion over time. In this sense, hostility has been proposed as a cognitive variable that strongly relates to anger feelings (Eckhardt et al., 2004). Therefore, hostility would imply negative attitudes, judgements and assessments toward the target against which it is directed (Berkowitz, 1993; Birkley and Eckhardt, 2015). Beside this, angry thoughts have been related to the Spielberger's model (Deffenbacher et al., 2003a, 2003b, 2003c, 2003d), so they have been positively related to the intensity on anger (intensity hypothesis) and aggressive expression (outcome hypothesis), and negatively related to the constructive aggressive expression (negative expression hypothesis). In conclusion, according to this theoretical approach angry thoughts and aggression (behavior) would be directly related, as both constructs are part of the same emotional process (anger). Then, risky behavior could be a result of this emotional process.

At the same time, sociodemographic variables like gender and age have been extensively investigated in relation to anger and aggression on the road. In terms of gender, the results are inconclusive. Some studies suggest that men are more probable to behave aggressively than women (Vanlaar et al., 2008; Wells-Parker et al., 2002), while others propose that women are more likely to experience anger (Sullman et al., 2007; Sullman et al., 2014). However, most of the studies found either no gender differences or differences with low effect sizes (Dahlen and White, 2006; Deffenbacher et al., 1994; Herrero-Fernández, 2011a; Lonczak et al., 2007; Wickens et al., 2012). Therefore, the inconsistency in findings suggests that more research is needed to clarify the link between gender and aggressive driving. In contrast, all of the studies have found age differences; there is agreement that negative relationships exist between age and anger and aggression (Deffenbacher et al., 2002a, 2002b; Esiyok et al., 2007; Herrero-Fernández, 2011b; Sârbescu, 2012).

In order to assess the different components of anger, it is necessary to develop reliable and valid instruments. Questionnaires such as the Driving Anger Scale (DAS) have been created to assess trait driving anger, and other tools such as the Driving Anger Expression Inventory (DAX) have been developed to assess aggression as the expression of driving anger. The DAS has been adapted and validated in several countries, such as Spain (Herrero-Fernández, 2011a; Sullman et al., 2007), the UK (Lajunen et al., 1998), New Zealand (Sullman, 2006) and France (Villieux and Delhomme, 2007). The DAX has been also adapted and validated in several countries, including Turkey (Esiyok et al., 2007), France (Villieux and Delhomme, 2008), Spain (Herrero-Fernández, 2011b), Malaysia (Sullman et al., 2015) and Romania (Sârbescu, 2012). Much less attention has been paid to the cognitive aspects of aggression than to the emotional aspects. Then, it is necessary to develop instruments to measure this cognitive part, in order to attain a better knowledge about driving aggression due to its strong relationship with risky driving and road accidents.

The only instrument developed to assess this construct is the Driver's Angry Thoughts Questionnaire (Deffenbacher et al., 2003a, 2003b, 2003c, 2003d), which is composed five reliable factors. The first one was labelled Judgmental and Disbelieving Thinking, which refers to thoughts that question other drivers and their driving, mild to moderate derogation of other people's driving, statements implying that others ought not be allowed to drive, and statements and rhetorical questions indicating that the driver could not believe others were

driving the way they were. The second factor was labelled Pejorative Labelling and Verbally Aggressive Thinking, which refers to judgments that are much more negative and harsher and involve name calling and thinking about how angry the driver is, and how he/she would like to engage in verbally aggressive behaviour. The third factor was labelled Revenge and Retaliatory Thinking, which refers to thoughts of revenge and retaliation and the behaviour the driver is going to engage in to exact revenge. The fourth factor was labelled Physically Aggressive Thinking, which refers to the driver wanting to hurt others physically and to engage in physically aggressive behaviours. Finally, the fifth factor was labelled Coping Self-Instruction, which refers to thinking about positive and adaptive coping. It also involves the driver instructing himself/herself to engage in palliative and relaxing behaviours, as well as safe driving and other positive coping behaviours. For more information about the creation of this list, the reader is encouraged to consult the original article. This factorial structure was confirmed in a study conducted with Chinese drivers (Ge et al., 2016), although in that case the questionnaire comprised only 20 items rather than the original 65. There are some studies with the DATQ that have found positive associations of angry thoughts with risky driving, trait driving anger and aggressive driving (Deffenbacher et al., 2003a, 2003b, 2003c, 2003d, 2004; Ge et al., 2016).

The present research has three main goals. The first is the psychometric adaptation of the Driver's Angry Thoughts Questionnaire in a sample of Spanish drivers. The second is to analyse whether there are age and gender differences in the different ways of angry thinking. The third is to analyse the hypothetical indirect effects of angry thoughts on crash-related events, mediated by aggressive driving and risky driving.

2. Method

2.1. Participants

The final sample was composed of 414 voluntary participants, 345 (83.3%) from Valencia (eastern Spain) and 69 (9.2%) from the Basque Country (northern Spain). Given that the sample should have drivers of all ages, participants were recruited in three different ways. First, the questionnaires were administered to 40 people that participated in a course about good driving practices (which was designed for general population, not specifically for driving offenders) before the course began (2 surveys out of the 40 were uncompleted or confusingly responded). Second, 351 people that were in the authors' environment (friends, family, and students of the degree in Psychology) were also recruited (26 surveys out of the 351 were uncompleted or confusingly responded). Third, a snowball sampling technique was used on Facebook to complete the sample, and then 51 surveys were collected (in this case, the design of the survey avoided having uncompleted responses). This last method has been applied in other similar studies (Sullman et al., 2014, 2015), because a strong equivalence have been found between paper-and-pencil and Internet-based methods of data acquisition for the topic of driving anger and aggression (Herrero-Fernández, 2015). Socio-demographic information for the final sample (n = 414) is detailed in Table 1. Finally, all of the participants were licensed drivers, they did not obtain any profit for participating, and the survey was completely anonymous.

2.2. Instruments

2.2.1. Driver's angry thoughts questionnaire (DATQ)

First of all, the original DATQ (Deffenbacher et al., 2003a, 2003b, 2003c, 2003d) was adapted into Spanish through an inverse translation (Hambleton, 1996). A first translator translated the original from English to Spanish, and a second translator reversed the language from Spanish to English, allowing the authors to compare the original to the result. Both translators had degrees in English Philology, and their work was supervised by a professional translator with the purpose of