



A meta-analysis of the association between anger and aggressive driving



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ABSTRACT

The aim of this paper was to evaluate the relationship between anger (trait and driving anger) and aggressive driving. In order to test these relationships, we conducted a systematic review of the literature on anger and aggressive driving. We identified 51 eligible studies that we included in this meta-analysis. Based on previous literature, we hypothesised that: (1) there is a positive relationship between anger and aggressive driving; (2) the relationship between anger and aggressive driving behaviour differs based on whether anger is trait-based or traffic context-specific; (3) this relationship also varies depending on the type of aggressive driving; and (4) the relationship between specific anger type and aggressive driving vary according to gender, age, region where the studies were conducted and driving experience. The quantitative analysis was conducted using meta-analytic techniques. Results confirmed the fact that there is a positive relationship between anger and aggressive driving behaviour, the relationship being stronger for trait anger. Moreover, the relationship between anger and aggressive driving depends on different forms of aggressive driving, gender, age, driving experience, and the region where studies were conducted. The theoretical and practical implications of these results are discussed.

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1. Introduction

Aggressive driving consists of any type of behaviour directed to hurt another person, both other drivers and pedestrians, at a physical or emotional level, without taking into consideration those persons' rights or safety (Dula & Geller, 2003). The aggressive behaviours in traffic vary from the less aggressive forms such as flashing lights, running stops or red lights, honking, verbal threats, making non-verbal gestures, tailgating, blocking other drivers, to the most extreme aggressive forms such as unsafe lane changing, speeding, car ramming or physical attacks (Özkan, Lajunen, Parker, Sümer, & Summala, 2010). Aggressive driving is one of the risk factors of crash related conditions (e.g. loss of concentration, loss of control) and of serious crashes (Stephens & Sullman, 2014; Sullman, 2015). Moreover, aggressive behaviour can incite other traffic participants to act aggressively on the road, which may amplify the risks of accidents (Clapp et al., 2011). For these reasons, a recurrent question concerns the factors that predispose a driver to behave aggressively behind the wheel. Probably the most thoroughly studied cause of aggressive driving behaviour is anger, a significant and dangerous phenomenon that commonly occurs (Stephens & Ohtsuka, 2014; Sullman, 2015; Sullman, Stephens, & Kuzu, 2013).

As well as aggressive driving behaviour, anger represents a well-recognised and studied cause of crash involvement and crash-related conditions (Stephens & Groeger, 2011; Sullman & Stephens, 2013; Sullman et al., 2013). This study has focused on two forms of anger, trait anger and trait driving anger, and their relationship to aggressive driving. Regarding the strength

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of the relationship between anger and aggressive driving, empirical studies have yielded mixed findings. Some studies report weak relationships between aggressive driving and both trait anger (Deffenbacher, Alcazar-Olan, Kocur, & Richards, 2014) as well as driving anger (Sullman et al., 2013), while other studies suggest that there is a medium (Herrero-Fernández, 2013; Suhr & Nesbit, 2013) or a strong relationship between aggressive driving and both types of anger (Edwards, Warren, Tubré, Zypthur, & Hoffner-Prillaman, 2013; Nesbit, Blankenship, & Murray, 2012). However, the strength of the above presented relationships varies according to the specific form of measured aggressive driving and the participants' characteristics. Given this fact, the aim of this meta-analysis is to explore these relationships and some moderators that may explain these mixed results regarding the relationship between anger and different forms of aggressive driving behaviour. Due to the frequency of aggressive driving and its serious consequences, it is important to understand its predictors more clearly in order to advance solutions in this area.

2. Anger and aggressive driving

The last decade has been a very prolific period for the empirical research on the relationship between anger and aggressive driving. According to the frustration-aggression model (Berkowitz, 1993), aggression only appears when the frustrating element elicits an intense emotion, such as anger. However, even though the frustrating element elicits anger, aggression will not always occur. Another theoretical framework, the general aggression model (GAM; Anderson & Bushman, 2002), also suggests that specific dispositional and situational factors can produce arousal and an angry mood, which can further produce specific conscious appraisals and aggressive behaviours. These statements have been sustained by studies in traffic psychology (e.g. Kováčsová, Rošková, & Lajunen, 2014; Sullman, 2015).

2.1. Trait anger

Trait anger can be defined as a multidimensional construct, which can be expressed at a cognitive, emotional, psychological or behavioural level (Eckhardt, Norlander, & Deffenbacher, 2004). Many studies showed that individuals who have a propensity towards trait-anger will most likely behave aggressively not only in day to day contexts, but also in traffic situations (Haje & Symbaluk, 2014; Kováčsová et al., 2014; Sullman, 2015). Deffenbacher, Deffenbacher, Lynch, and Richards (2003) reached the conclusion that high trait anger drivers drove faster and in a much more dangerous way than drivers with low trait anger. Other studies suggest that the effect of trait anger on aggressive driving is mediated by trait driving anger (Deffenbacher, Lynch, Filetti, Dahlen, & Oetting, 2003; Kováčsová et al., 2014). Specifically, drivers who have higher levels of trait anger are more likely to become angry in traffic and to express their anger in dysfunctional ways (Deffenbacher, Lynch et al., 2003).

2.2. Trait driving anger

Trait driving anger represents the extrapolation of the general concept of anger into specific driving contexts, being conceptualised as a frequent and intense tendency to become angry when driving (Deffenbacher, Lynch et al., 2003). In this manuscript, we will use *driving anger* to refer to trait driving anger. The positive relationship between driving anger and aggressive driving behaviour has been confirmed in previous cross-sectional studies (Li, Yao, Jiang, & Li, 2014; Stephens & Ohtsuka, 2014; Sullman, 2015; Sullman & Stephens, 2013) and in a previous meta-analytic review (Nesbit, Conger, & Conger, 2007). Experiencing anger while driving can interfere with information processing, which may further lead to an increased tendency to manifest aggressive behaviours (Blankenship & Nesbit, 2013; Parrott, Zeichner, & Evces, 2005).

Moreover, previous studies analysing the relationship between the state of anger and aggressive behaviour showed that one's state of anger can increase the accessibility and activation of aggression-related cues and can facilitate a negative interpretation of information (Berkowitz, 1990). A study that tested these assumptions in a driving context showed that the participants with a high level of trait driving anger reported a greater tendency to overestimate the significance of the situation and a reduced number of anger control statements, compared to the participants with a low level of trait driving anger (Nesbit & Conger, 2011). Blankenship and Nesbit (2013) also found that participants high in trait driving anger responded more quickly to aggressive stimuli (words) when paired with driving than neutral stimuli. Other studies showed that this negative interpretation of a situation and related cognitions can further lead to a greater propensity to report aggressive driving behaviour (Deffenbacher, Petrilli, Lynch, Oetting, & Swaim, 2003).

A widely used instrument to measure trait driving anger is the Driving Anger Scale (DAS; Deffenbacher, Oetting, & Lynch, 1994). The items of this instrument describe situations often encountered while driving, like hostile gestures, police presence, illegal driving, slow driving, discourtesy and traffic obstructions. Respondents rate each item by the degree to which the situation would anger them.

2.3. Other determinants of aggressive driving

Regarding the expression of driving anger, the majority of self-report studies have used the Driving Anger Expression Inventory (DAX; Deffenbacher, Lynch, Oetting, & Swaim, 2002) that placed drivers' aggressive reactions into four categories: verbal aggressive expression (people's tendency to express their anger through verbally aggressive means), personal physical aggressive expression (the ways in which the person uses themselves to express anger by getting out of the car and picking a

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