



Driving anger in Argentina

Gabriel Escanés^{a,*}, Fernando Martín Poó^b

^a Siglo 21 University, Calle de los Latinos N°8555 – B° Los Boulevares, 5008 Córdoba, Argentina

^b Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)/Facultad de Psicología, Universidad Nacional de Mar del Plata, Funes 3250, Cuerpo V Nivel III, Alberti 4439 Dto. 2, Mar del Plata 7600, Argentina



A B S T R A C T

Angry driving is a risk factor for traffic crashes and injuries, however it has been understudied in Latin American countries. The main aim of the present study was to translate and adapt the short form of the Driving Anger Scale (DAS; Deffenbacher et al., 1994) to the Argentinean Spanish. We also included further situations linked to bad conditions of the road network in Argentina. The sample of the study included 988 Argentinean drivers from the general population. Exploratory and confirmatory analysis supported a five-factor structure which were named as infringements by another driver ($\alpha = 0.91$), progress impeded ($\alpha = 0.77$), hostile gestures ($\alpha = 0.95$), police presence ($\alpha = 0.67$) and poor road infrastructure ($\alpha = 0.84$). The DAS in the Argentinean driver's context obtained good psychometric indexes. We also found effects of gender, age, traffic violations and crash involvement on DAS and its subscales. Our findings are valuable as long as they provide information that has not been studied intensively in low and middle-income countries.

1. Introduction

From 2000 to 2011, car crash deaths in Argentina increased by 27%. By the end of that period, the annual mortality rate rose to 12.3 per 100,000 (Escanés, 2015). By 2013, the rate is estimated to have increased to 13.6 per 100,000. This is more than two times the rate in several high-income countries (World Health Organization, 2015). Furthermore, the risk of traffic death might have been underestimated due to the poor quality of vital statistics in Argentina (Ribotta and Escanés, 2014).

The risk of traffic death is due to environmental (e.g. road infrastructure), mechanical (e.g. vehicle condition) and human factors. It is estimated that human factors are involved in 95% of the collisions and the running over of pedestrians (Evans, 1996; Petridou and Moustaki, 2000). Human factors are linked to behavior, attitudes and emotions, among other things.

In terms of emotions, anger has been the most intensely studied (Deffenbacher, 2008; González-Iglesias et al., 2012; Gras et al., 2006). In general, anger emerges when a person perceives the presence of external obstacles which interfere with their own goals, plans or well-being. When people experience anger, they tend to eliminate environmental barriers and this increases the risk of serious injury or death, both for themselves and for other people (Reeve, 2014).

Although anger is a temporary emotional and physiological reaction, Deffenbacher et al. (1994) assumed that it was possible to study

driving anger through the state-trait approach (Spielberger, 1988). According to this approach, it is possible to distinguish between the state of anger and trait anger. Whereas the state of anger is momentary and emerges as a response to a situation that is occurring, trait anger supposes an ever-present predisposition to experience anger. The greater the trait anger, the more predisposed individuals are to experience anger more often in a variety of situations, and the more intense the emotion, such that it results in greater negative social and personal consequences (Deffenbacher et al., 1996).

In the case of driving, the manifestation of trait anger is studied in a more constrained, well-defined context (Deffenbacher et al., 1994). As with trait-anger, drivers tend to feel driving anger to a greater or lesser degree, in a sustained manner and in several situations, all associated with driving a vehicle. Some studies show that when drivers experience more driving anger, there is a greater likelihood of exhibiting more aggressive and riskier behaviors (Bachoo et al., 2013; Stephens and Groeger, 2011). Consequently, these drivers have a higher chance of being involved in a car crash (Deffenbacher et al., 2003b; Dahlen and Ragan, 2004; Wickens et al., 2016).

Deffenbacher et al. (1994), developed the Driving Anger Scale to assess anger while driving. The DAS is a self-reporting measure that asks participants to imagine a set of driving situations and score the anger level that each circumstance elicits. The authors used cluster analysis techniques to select 33 items that have been grouped into six dimensions: “hostile gestures” ($\alpha = 0.87$), “illegal driving” ($\alpha = 0.80$),

* Corresponding author.

E-mail addresses: Gabriel.Escanes@ues21.edu.ar, gaescanes@gmail.com (G. Escanés), poo.fernando@conicet.gov.ar, poo.fernando@gmail.com (F.M. Poó).

“police presence” ($\alpha = 0.79$), “slow driving” ($\alpha = 0.81$), “discourtesy” ($\alpha = 0.81$) and “traffic obstructions” ($\alpha = 0.78$). From these 33 items, researchers selected 14 items that were highly correlated with the total score and developed an abbreviated version ($\alpha = 0.80$) (Deffenbacher et al., 1994). Both versions highly correlated with each other, and therefore either can be used to measure driver anger. The short scale can be applied more quickly as it also allows respondents to complete the survey in a faster, less tiring way.

The long version of the scale was later adapted for samples of drivers from different countries with mixed results. The DAS was used with samples of Spanish, Turkish, Malaysian and Chinese drivers. In these studies, the results confirmed the original six factor solution (Li et al., 2014; Sullman et al., 2007, 2014; Yasak and Esiyok, 2009).

Conversely, other studies revealed different factor structures. In The United Kingdom, Lajunen et al. (1998), found that the original model did not have a good fit. They reduced the scale to 21 items, grouped into three dimensions: “impeded progress by others” ($\alpha = 0.87$), “reckless driving” ($\alpha = 0.88$) and “direct hostility” ($\alpha = 0.87$). Björklund (2008) applied the UK DAS to a sample of Swedish drivers. The results showed the same sources of anger registered in the UK, but there were some differences in the composition of each dimension. Sullman (2006) applied the DAS to New Zealand drivers and obtained a four-factor structure: “risky driving” ($\alpha = 0.86$), “progress impeded” ($\alpha = 0.85$), “discourteous driving” ($\alpha = 0.88$) and “hostile gestures” ($\alpha = 0.88$). In Ukraine, Stephens et al. (2016) applied the DAS to 339 drivers. Because the original model had a poor fit, 27 items were selected and grouped in a four-factor solution: “discourtesy” ($\alpha = 0.88$), “impeded speed” ($\alpha = 0.80$), “illegal driving” ($\alpha = 0.62$) and “traffic congestion” ($\alpha = 0.82$). Villieux and Delhomme (2007) adapted the DAS to French drivers. They excluded 11 items that did not meet the criterion to be retained for the analysis; the 22 remaining items were grouped in five categories: while “hostile gestures” ($\alpha = 0.80$), “illegal driving” ($\alpha = 0.74$) and “police presence” ($\alpha = 0.75$) were maintained from the original version, the dimension of “discourtesy” was dropped and the factors “progress impeded” ($\alpha = 0.79$) and “traffic obstructions” ($\alpha = 0.75$) were modified.

Table 1 summarizes the dimensions found in different studies. Previous Spanish adaptations are included (Egea-Caparrós et al., 2012; Herrero-Fernández, 2011), as well as studies in which observed dimensions did not concur with the original study (Deffenbacher et al., 1994). Although the studies listed here represent only a fraction of the available literature, these studies indicate that consensus has not been reached. However, there are three repeated factors which are named in different ways by different authors: (1) hostile gestures, (2) illegal or risky driving, and (3) progress impeded (slow driving).

Adaptations of the DAS short form also revealed varying factor structures. Sullman and Stephens (2013) applied the short version of the DAS with New Zealand drivers. The results support the unidimensional model of the DAS ($\alpha = 0.86$). The short version was also adapted in separate studies for use with two samples of Spanish drivers. On the one hand, research conducted in Bilbao by Herrero-Fernández (2011) revealed a three-factor solution: “impeded progress by others” ($\alpha = 0.77$), “reckless driving” ($\alpha = 0.66$) and “direct hostility” ($\alpha = 0.87$). On the other hand, a study conducted in Murcia assessed

three alternative models with one, three and four dimensions. Compared to the other two factor structures, the four-factor model showed the best fit for the data. The four dimensions were “progress impeded” ($\alpha = 0.76$), “infringement by another driver” ($\alpha = 0.74$), “direct offense” ($\alpha = 0.73$) and “possible sanction” ($\alpha = 0.58$) (Egea-Caparrós et al., 2012).

On the relationship between anger, sex and age, the results are heterogeneous. Some research studies revealed that the levels of driving anger between males and females were not entirely distinct from one another (Deffenbacher et al., 2003a, 2000; Herrero-Fernández, 2011; Lonczak et al., 2007). In contrast, other studies showed significant sex differences; specifically, women had higher scores on anger overall. Additionally, women scored higher than men in other factors, for instance in discourtesy, traffic obstructions, illegal driving, and risky driving (Egea-Caparrós et al., 2012; Sullman, 2006; Sullman et al., 2007).

In terms of differences by age, the results were also mixed. Some authors indicated that older drivers experienced a lesser degree of anger than younger drivers (Berdoulat et al., 2013; Dahlen et al., 2005; Parker et al., 2002; Przepiorka et al., 2014). Conversely, other studies found that there were no significant differences between age groups (Bachoo et al., 2013; Egea-Caparrós et al., 2012). These disparate findings could be due to the fact that, in some cases, participants were college students, while in others they were people from the general population. As a result, depending on the sample, different age ranges were used.

The empirical evidence gathered for the DAS, both for the short and long form, is inconclusive as to its factor structure, as well as its relationships with anger, sex and age. The lack of agreement could be due to various reasons. In some cases, it might be the result of methodological differences, such as using samples of diverse population groups and using diverse analysis techniques to determine factor structure or number of items to scale. In other cases, some researchers argue that it may be attributed to differences in the context and in the road safety culture of the country in which the study was conducted (Özkan et al., 2006; Stephens et al., 2016). The majority of studies that applied the DAS, however, were conducted in high-income countries (European or Anglo-Saxon).

Very few studies were conducted in low and middle-income countries (e.g. Dixit et al., 2011; Li et al., 2014). In Latin America, a study carried out in Brazil presents translated and linguistic adaptations of the DAS, but it does not provide empirical evidence as to its validity (Cantini et al., 2015). No DAS adaptation was found for the Argentine driving context. For this reason, the main aim of the present study was to translate and adapt the short scale of the DAS, Deffenbacher et al. (1994), into Argentine Spanish.

Because traffic conditions in Argentina differ from those of high income countries, we followed the suggestions made by Deffenbacher et al. (2016) and updated the scale. New situations, which were not included in the original version of the DAS, were added. Furthermore, we decided to keep the situations included in the original scale due to its full validity to measure driving anger. Traffic in Argentina is characterized by two main aspects: poor road infrastructure and a large vehicle fleet. On the first point, the Office of the National General Auditor (2013) indicated the existence of weaknesses in the road

Table 1
Dimensions of the DAS in different studies.

Authors	DAS dimensions					
Deffenbacher et al. (1994)	Hostile gestures	Illegal driving	Police presence	Slow driving	Discourtesy	Traffic obstructions
Lajunen et al. (1998)	Direct hostility	Reckless driving		Impeded progress by others		
Sullman (2006)	Hostile gestures	Risky driving		Progress impeded	Discourteous driving	
Stephens et al. (2016)		Illegal driving		Impeded speed	Discourtesy	Traffic congestion
Villieux and Delhomme (2007)	Hostile gestures	Illegal driving	Police presence	Progress impeded		Traffic obstructions
Herrero-Fernández (2011)	Direct hostility	Reckless driving		Impeded progress by others		
Egea-Caparrós et al. (2012)	Direct offense	Infringement by another driver	Possible sanction	Progress impeded		

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