



Driving anger and traffic violations: Gender differences

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ABSTRACT

In this work, we examined the contribution of anger-related variables to explaining traffic rule violations with control for the effect of variables such as age, gender and annual mileage. Also, we explored gender differences in driving-elicited anger and its forms of expression with provision for exposure in terms of mileage. In addition, we studied male and female driving habits in relation to individual histories of fines and accidents with a view to identifying the role of drivers' anger in driving violation behaviours. To this end, we conducted a survey on a sample of 541 drivers (53.9% females, 46.1% males) aged 20–73 years. The results obtained with provision for mileage revealed substantial differences in driving behaviour between genders. Thus, males reported greater number of fines and accidents, and were more prone to violating traffic regulations. There were also gender differences in the specific driving situations causing anger. Thus, males were angrier at police presence and females at traffic obstructions. There were additional differences in anger expression forms, with women exhibiting a more adaptive attitude. The specific contribution of anger-related variables to driving violation behaviours was explored, and its theoretical and treatment implications are discussed.

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1. Introduction

Road traffic accidents cause many deaths and injuries throughout the world. According to the [European Road Safety Observatory \(2007\)](#), 43 thousand people die and more than 1.8 million people are injured in traffic accidents in Europe every year, the highest fatality numbers being those for people 18–35 years of age. Roughly four-fifths of 15–54 year old fatalities are men; also, 77% of all fatalities of all ages are male and less than a quarter females. In Spain, there were 85,503 road traffic accidents, with 2478 fatalities and 120,345 people injured, in 2010 ([Dirección General de Tráfico, 2011](#)). Also, surveys conducted by Spain's Traffic Department have confirmed that males have received more traffic fines and lost more driving license points than females ever since the point system came into force in the country in 2006. The surveys have also shown that females are more compliant with traffic regulations and that males are less concerned about road safety issues. In addition, males attach less importance to risky behaviours and consider accidents a less serious problem than do females ([Dirección General de Tráfico, 2008, 2009](#)).

Several studies have suggested that the human factor plays an important role in road accidents. The Attitudes report produced in Spain ([Alonso et al., 2002](#)) highlights the fact that approximately 90% of the accidents are due to human factors such as unsafe driving, personality traits and attitudes. Anger is one of the most important factors among those investigated at length. Usually, anger refers to a psychobiological emotional state characterised by feelings of annoyance of variable intensity depending largely on the inference a subject makes on the intentionality of another. In fact, the attribution of hostility

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and malevolence can be seen as a key feature of anger, one that is essential towards assessing this emotion; therefore, the relationship of people to their environment is crucial in this context (Miguel-Tobal, Casado, Cano-Vindel, & Spielberger, 2001).

Recent research and media reports suggest that incidents of angry drivers and road rage are becoming very common (Hennessy & Wiesenthal, 2005; Pepper, 2003). Also, although road rage is the most extreme expression of driver anger and relatively rare, experiencing anger while driving is much more usual in today's society. A study by Parker, Lajunen, & Stradling (1998) found that 89% of 270 drivers admitted to occasionally committing aggressive violations such as chasing other cars, indicating hostility to other drivers or sounding the horn to indicate annoyance with other drivers. Similarly, Underwood, Chapman, Wright, & Crundall (1999) used a diary approach to examine driver anger and found 85% of the 100 drivers studied over a period of 2 weeks to experience anger while driving.

Moreover, many studies indicate that anger is one of the most prevalent factors involved in road accidents (Dahlen and Ragan, 2004; Deffenbacher, Lynch, Filetti, Dahlen, & Oetting, 2003). Also, some authors have reported a relationship between high anger and various risky behaviours on the road including tailgating, speeding and light flashing (Deffenbacher, Filetti, Richards, Lynch, & Oetting, 2003; Deffenbacher, Huff, Lynch, Oetting, & Salvatore, 2000).

As a rule, men tend to react more angrily and aggressively while driving (especially in traffic jams) than women (Shinar, 1998). Males and females also differ in the way they express anger and aggressiveness (Anderson and Bushman, 2002). Thus, females tend to adopt quieter, more covert aggression forms (e.g., swearing, whispered insults), whereas males tend to exhibit more explicit, directly observable aggressive behaviours (e.g., obscene gestures) (Galovski and Blanchard, 2004). Deffenbacher and co-workers have used the Driving Anger Expression Inventory (DAX) to conduct research in this direction and found males to have significantly higher scores than females on two scales: Personal Physical Aggressive Expression (Deffenbacher, Lynch, Oetting, & Swaim, 2002) and Use of the Vehicle to Express Anger (Deffenbacher, White, & Lynch, 2004). Identical conclusions were drawn by Van Rooy, Rotton, and Burns (2006), and by Hennessy and Wiesenthal (2001), who identified especially significant gender differences in extremely violent situations (e.g., chasing on the road, physical confrontation with other drivers). One plausible explanation for these results is that females tend to anticipate the potential risks and future consequences of their actions better than males, so, as a self-protective mechanism, they avoid any violent behaviours which might elicit an angry reaction in their opponents (Eagly and Steffen, 1986). Therefore, although females may be as angry as males or even more so at some driving situations, they do not always exhibit an aggressive driving behaviour in response. Also, females are more likely to drive with children on board, which is a strong incentive to drive more safely and avoid external manifestations of anger (Lonczak, Neighbors, & Donovan, 2007).

The specific types of cognitions accompanying aggressive driving behaviours also differ between genders. Thus, males tend to report more frequent thoughts of revenge and physical aggression than females (Deffenbacher, Petrilli, Lynch, Oetting, & Swaim, 2003).

Some results, however, should be taken cautiously as they have been obtained without provision for the fact that males usually drive more than females and are therefore more frequently exposed to driving risks (Hole, 2007). The bias is especially substantial in studies based on official statistics since they afford no provision for this variable. This has promoted the use of self-reports to record traffic violations and accidents. Obviously, this methodology precludes recording accidents where the driver has died, but allows the inclusion of minor accidents and incidents that are occasionally "invisible" to insurance companies or even the police—and hence not present in official statistics. In addition, self-reports provide useful, detailed information about a wide range of variables at a fairly low cost, and are thus an advantageous alternative to direct observation and simulation methods—which tend to make drivers feel observed and assessed, and to exhibit a more rule-abiding behaviour in response (Ulleberg and Rundmo, 2003). Since participation is voluntary, and anonymity and confidentiality are assured, self-reports are free of social desirability effects (Lajunen and Summala, 2003).

This methodology has been used to examine gender differences in driving behaviour and revealed, among others, that males (particularly young men) tend to drive in a riskier manner (Deffenbacher, 2008), and also to violate traffic regulations more often (Lajunen, Parker, & Stradling, 1998; Rimmö & Åberg, 1999), than women. On the other hand, females are more prone to small driving errors and slips, especially in situations requiring increased attention and perception (Özkan, Lajunen, & Summala, 2006; Reason, Manstead, Stradling, Baxter, & Campbell, 1990).

Some studies, however, have found no gender differences in driving behaviour (Deffenbacher, Deffenbacher, Lynch, & Richards, 2003; Hennessy and Wiesenthal, 1999). Thus, Lawton, Parker, Manstead, & Stradling (1997) found gender differences in perpetration of interpersonal violations to vanish if the variable "exposure" was considered; therefore, the fact that males perpetrated more violations of this type was a result of their increased mileage relative to females. In fact, Hyde (1984) found gender to account for only 5% of differences in aggression, and other authors (Deffenbacher, 2008; Deffenbacher, Kemper, & Richards, 2007) obtained small to moderate differences at most in this respect.

This work was undertaken with the aim of elucidating the relationship between anger at various driving situations, anger expression forms and driving violation behaviours (i.e., deliberate infringement of traffic rules such as exceeding the speed limit or running a red light with no particular aggressive aim). More specifically, based on the above-described results, and bearing in mind the importance of driving anger and its relevance to understanding traffic violations, we set the following objectives: (a) to examine the relationship between driving anger and various dangerous and risky behaviours; (b) to analyse gender differences in anger on the wheel and the way of expressing it; and (c) since gender has been deemed a relevant factor towards studying driving, to assess to what extent driving anger and its relationship with traffic violations vary as a function of gender, with provision for the effect of mileage.

2. Material and methods

2.1. Participants

The survey was conducted on a sample of 541 drivers (53.9% females, 46.1% males) aged 20–73 years (average = 40.14 ± 12.39 yr for males and 39.06 ± 10.77 yr for females, the difference being “not significant”). All had a driving license more than two years old (average = 18.92 ± 10.43 yr).

2.2. Material

Anger-eliciting driving situations were identified and the tendency to anger while driving was assessed by using a reduced version of the Driving Anger Scale (DAS) (Deffenbacher, Oetting, & Lynch, 1994) developed in previous work (González-Iglesias, 2008). The reduced version contains the most representative items on each subscale in the original questionnaire. Such items were selected on the basis of rational (e.g., significance and suitability to the characteristics of the subscale concerned) and empirical criteria (e.g., discriminant coefficient or item-test correlation, asymmetry, item kurtosis and exploratory factor analysis).

The DAS reduced version used consisted of 22 items grouped in six different subscales, namely: Discourtesy, Traffic Obstructions, Hostile Gestures, Slow Driving, Police Presence and Illegal Driving (see Table 1).

The questionnaire respondents were asked to picture themselves in the situation described in each item and assess their potential anger on a Likert scale ranging from 1 (Not at all) to 5 (Very much). All subscales exhibited acceptable self-consistency, with Cronbach's alpha values from .70 to .82.

Anger expression was assessed with a self-developed (González-Iglesias, 2008), reduced version of the Driving Anger Expression Inventory (DAX) (Deffenbacher et al., 2002) comprising 18 items grouped in four different subscales, namely: Verbal Aggressive Expression, Personal Physical Aggressive Expression, Use of the Vehicle to Express Anger and Adaptive/Constructive Expression. The questionnaire respondents were asked to score themselves on a Likert scale ranging from 1 (Almost never) to 5 (Almost always) (see Table 2). Internal consistency, as Cronbach's alpha, exceeded 0.70 on all scales except Use of the Vehicle to Express Anger.

Driving behaviour and violations were assessed with the Traffic Violations subscale in the Driver Behaviour Questionnaire (DBQ) (Reason et al., 1990) as adapted to Spanish by Gras et al. (2006). The subscale consisted of 9 items which were given a score from 0 (Never) to 4 (Very often) depending on how frequently each respondent had experienced the behaviours in question during the previous year. This subscale exhibited a high internal consistence (Cronbach's alpha = .75).

Table 1
Driving anger scale items.

Item	Mean	SD	Corrected item-total <i>r</i>	
Discourtesy	2.43	.76		
1	Someone backs right out in front of your without looking	2.26	1.00	.44
7	Someone coming toward you does not dim their headlights at night	2.18	1.07	.51
13	Someone speeds when you try to pass them	2.71	1.09	.47
19	Someone pulls right in front of you when there is no one behind you	2.56	1.02	.51
Traffic obstructions	1.31	.80		
2	You are stuck in a traffic jam	1.55	1.02	.65
8	You are driving behind a large truck and you cannot see around it	1.19	1.05	.60
14	You encounter road construction and detours	1.18	.97	
Hostile gestures	1.87	1.10	.61	
3	Someone makes an obscene gesture toward you about your driving	1.94	1.30	.65
9	Someone honks at you about your driving	1.66	1.20	.64
15	Someone yells at you about your driving	2.03	1.35	.73
Slow driving	1.36	.74		
4	Someone in front of you does not start up when the light turns green	1.18	.95	.56
10	Someone is driving slower than reasonable for the traffic flow	1.58	1.01	.50
16	A slow vehicle on a mountain road will not pull over and let people by	1.56	1.04	.55
20	Someone is slow in parking and holding up traffic	1.15	.97	.49
Police presence	.96	.88		
5	You see a police car watching traffic from a hidden position	1.21	1.30	.56
11	You pass a radar speed trap	.98	1.20	.53
17	A police car is driving in traffic close to you	.76	1.06	.56
21	A police officer pulls you over	.87	1.07	.57
Illegal driving	2.38	.93		
6	Someone is driving too fast for the road conditions	1.89	1.16	.64
12	Someone is weaving in and out of traffic	2.81	1.14	.57
18	Someone runs a red light or stop sign	2.41	1.20	.51
22	Someone is driving way over the speed limit	2.38	1.26	.68

Table 2
Driving anger expression inventory items.

Item	Mean	SD	Corrected item-total <i>r</i>
Verbal aggressive expression	1.66	.82	
4 I make negative comments about the other driver	1.29	1.10	.51
8 I swear at the other driver aloud	1.42	1.09	.54
12 I shake my head at the other driver	1.93	1.08	.46
17 I think things like "Where did you get your license?"	1.98	1.20	.45
Personal physical aggressive expression	.21	.44	
3 I give the other driver the finger	.25	.66	.65
7 I roll down the window to help communicate my anger	.28	.63	.61
11 I shake my fist at the other driver	.10	.41	.51
16 I make hostile gestures other than giving the finger	.25	.63	.51
Use of the vehicle to express anger	.50	.48	
2 I drive a little faster than I was	1.34	.98	.33
6 I speed up to frustrate the other driver	.25	.63	.50
10 I purposely block the other driver	.19	.58	.46
14 I leave my lights on in the other driver's rear view mirror	.22	.61	.30
Adaptive/constructive expression	2.10	.81	
1 I try to think of positive solutions to deal with the situation	2.35	1.16	.58
5 I tell myself it is not worth getting all mad about	2.17	1.23	.59
9 I just try to accept that there are bad drivers on the road	2.23	1.09	.54
13 I try to think of positive things	2.06	1.20	.67
15 I do things like take deep breaths to calm down	1.60	1.21	.51
18 I just try and accept that there are frustrating situations while driving	2.19	1.01	.49

The above-described data were supplemented with the following background information about the respondents: experience (age of driving license), exposure (estimated annual mileage), and number of fines and accidents during the previous five years.

2.3. Procedure

Data were collected on an individual basis by research collaborators at driving assessment centres in Galicia (NW Spain). On their assessment visit, drivers were invited to take part in the survey with assurance of anonymity and confidentiality. Each questionnaire included specific instructions and the assessment scale to be used for each question. The data thus obtained were processed with the statistical package SPSS v. 15.1 for Windows.

3. Results

3.1. Descriptive analysis and gender differences

Table 3 shows the means for each variable by gender as adjusted for exposure on account of the presence of significant differences in annual mileage between males and females ($F = 65.44$, $p < 0.001$; $M_s = 23,292$ vs. $13,308$), which led us to correct the results for its potential effects on gender differences in driving-related variables. As can be seen from Table 3, if annual mileage was included as a covariate, males admitted receiving more fines and being involved in more accidents in the previous five years than females. Also, males reported more traffic violations.

The results of the covariance analysis (ANCOVA) as regards anger-eliciting driving situations suggest that, if exposure is considered, males had significantly higher scores on the police presence subscale and females on the traffic obstructions subscale. By contrast, males and females responded similarly to discourtesy, hostile gestures, slow driving and illegal driving situations.

There were also significant differences in the way the two genders expressed driving anger. Thus, males scored higher than females on the three DAX scales concerning disadaptive expression of anger (viz., verbal aggressive expression, personal physical aggressive expression, use of the vehicle to express anger); however, personal physical aggressive expression was the sole variable retaining significant differences between genders when the effect of mileage was considered.

3.2. Partial correlations

Table 4 shows the partial correlations between variables by gender as corrected for the effect of exposure (annual mileage). Correlation coefficients were subjected to Fisher's r to Z transformation (Guilford and Fruchter, 1978) in order to facilitate comparison of the correlations for males and females. As can be seen, the different situations potentially eliciting drivers' anger were closely related. The lowest correlations were those for the police presence and illegal driving subscales, with $r = .14$ for males and $r = .16$ for females.

Table 3

Means scores adjusted for exposure and gender differences.

	Mean		F	p
	Males	Females		
Crashes in previous 5 years	1.41	0.97	10.72	.001
Tickets in previous 5 years	1.22	0.60	24.74	.001
Violations (DBQ)	0.79	0.61	13.56	.001
<i>Driving anger scale</i>				
Discourtesy	2.43	2.49	0.64	.430
Traffic obstructions	1.22	1.42	6.47	.011
Hostile gestures	1.91	1.78	1.32	.252
Slow driving	1.41	1.37	0.23	.632
Police presence	1.08	0.83	8.01	.005
Illegal driving	2.35	2.40	0.36	.548
<i>Driving anger expression inventory</i>				
Verbal aggressive expression	1.70	1.65	0.33	.568
Personal physical aggressive expression	0.27	0.15	9.33	.002
Use of the vehicle to express anger	0.54	0.46	3.39	.066
Adaptive/constructive expression	2.06	2.17	1.89	.170

Table 4

Partial correlations by gender and with provision for the effect of mileage.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. DIS	–	.60 ^c	.45 ^c	.56 ^c	.29 ^c	.38 ^c	.35 ^c	.05	.24 ^c	–.01	–.08	.15	.02	–.01
2. OBS	.29 ^c	–	.46 ^c	.69 ^c	.55 ^c	.24 ^c	.23 ^c	.11	.39 ^c	–.11	–.04	.28 ^c	.08	–.02
3. HG	.43 ^c	.36 ^c	–	.57 ^c	.42 ^c	.31 ^c	.29 ^c	.21 ^b	.26 ^c	–.25 ^c	–.34 ^c	.21 ^b	.01	.10
4. SD	.48 ^c	.66 ^c	.57 ^c	–	.49 ^c	.16 ^a	.37 ^c	.22 ^c	.50 ^c	–.34 ^c	–.24 ^c	.41 ^c	.11	–.03
5. PP	.23 ^c	.51 ^c	.35 ^c	.51 ^c	–	.23 ^c	.18 ^b	.14 ^a	.29 ^c	–.16 ^a	–.04	.23 ^c	.11	.11
6. ID	.53 ^c	.24 ^c	.26 ^c	.17 ^a	.14 ^a	–	–.03	–.11	–.12	.06	.04	–.21 ^b	–.07	.06
7. VER	.35 ^c	.22 ^b	.28 ^c	.35 ^c	.34 ^c	.07	–	.33 ^c	.43 ^c	–.19 ^b	–.19 ^b	.38 ^c	.14 ^a	.01
8. PHYS	.19 ^b	.28 ^c	.33 ^c	.27 ^c	.28 ^c	–.01	.41 ^c	–	.49 ^c	–.18 ^b	–.12	.32 ^c	.15 ^a	–.03
9. USE	.23 ^c	.32 ^c	.35 ^c	.50 ^c	.34 ^c	–.11	.34 ^c	.52 ^c	–	–.28 ^c	–.20 ^b	.59 ^c	.25 ^c	–.07
10. ADAP	–.13	–.15 ^a	–.20 ^b	–.22 ^b	–.27 ^c	.02	–.25 ^c	–.29 ^c	–.31 ^c	–	.20 ^b	–.25 ^c	–.08	.02
11. Age	–.11	.05	–.19 ^b	–.09	–.07	.11	–.26 ^c	–.26 ^c	–.31 ^c	.12 ^c	–	–.23 ^c	.05	–.04
12. VIOL	.20 ^b	.35 ^c	.35 ^c	.51 ^c	.39 ^c	–.03	.44 ^c	.35 ^c	.55 ^c	–.18 ^a	–.32 ^c	–	.18 ^b	.06
13. Tickets	–.05	.15 ^a	.03	.24 ^c	.27 ^c	–.15 ^a	.06	.04	.16 ^a	–.05	.06	.26 ^c	–	.10
14. Accidents	.04	–.08	.07	.08	.07	–.09	.08	.00	.17 ^a	–.06	–.05	.14 ^a	.32 ^c	–

Note: correlations for women are shown above the diagonal and correlations for men below the diagonal. DIS = Discourtesy; OBS = Traffic obstructions; HG = Hostile gestures; SD = Slow driving; PP = Police presence; ID = Illegal driving; VERB = Verbal aggressive expression; PHYS = Personal physical aggressive expression; USE = Use of the vehicle to express anger; ADAP = Adaptive/constructive expression; VIOL = Traffic violations.

^a $p < 0.05$.

^b $p < 0.01$.

^c $p < 0.001$.

The DAX subscales verbal aggressive expression, personal physical aggressive expression and use of the vehicle to express anger were positively correlated with all DAS subscales except illegal driving in males. This was also the case with verbal aggressive expression and use of the vehicle to express anger, but not with physical aggression—which was significantly related with hostile gestures, slow driving and police presence only—in females. Application of Fisher's r -to- Z transformation revealed that the police presence subscale was more highly correlated with the verbal aggressive expression subscale in males than in females ($z = 1.98$; $p < .05$). An identical relationship was observed between the traffic obstructions subscale and the physical aggressive expression of anger subscale. In this case, the two variables were highly correlated in males ($r = .28$, $p < .001$), but not significantly in females ($z = 2.04$, $p < .05$).

The adaptive/constructive expression of anger subscale was negatively correlated with the DAS subscales hostile gestures, slow driving and police presence in both genders. However, correlation with traffic obstructions was significant only in males.

Age was negatively correlated with hostile gestures and the DAX subscales verbal aggressive expression, use of the vehicle to express anger and traffic violations in both genders. On the other hand, age was positively correlated with adaptive/constructive expression of anger. The negative correlation between anger at slow driving and age was only significant in females, and that between physical aggressive expression and age only in males.

Self-reported traffic violations were positively correlated with all DAS subscales except illegal driving in men and discourtesy in females. Applying Fisher's r -to- Z transformation to the correlation coefficients revealed that the police presence subscale was more highly correlated with the DBQ subscale in males than in females ($z = 2.05$; $p < .05$). Moreover, correlation between illegal driving and violations was not significant in males but very high in females ($z = 2.10$, $p < .05$).

Table 5
Summary of hierarchical regression on traffic violations.

Variables	β	R^2	ΔR^2
Step 1		0.16	0.16 ^c
Age	-0.11 ^b		
Mileage	0.12 ^b		
Gender	-0.12 ^b		
Step 2		0.37	0.21 ^c
Discourtesy	-0.08		
Traffic obstructions	0.04		
Hostile gestures	0.00		
Slow driving	0.20 ^c		
Police presence	0.08		
Illegal driving	-0.10 ^a		
Step 3		0.47	0.10 ^c
Verbal aggressive expression	0.18 ^c		
Personal physical aggressive expression	0.27		
Use of the vehicle to express anger	0.31 ^c		
Adaptive/constructive expression	0.19		

^a $p < 0.05$.^b $p < 0.01$.^c $p < 0.001$.

Traffic violations were also closely related with aggressive expression of anger and overall number of fines; however, only in males was there a relationship with number of accidents.

The number of fines received in the previous five years was positively correlated with traffic obstructions, anger at slow driving and police presence; the DAX subscale use of the vehicle to express anger; and the number of accidents. In females, the number of fines was only correlated with the DAX subscale disadaptive expression of anger.

3.3. Predictors of traffic violations

Table 5 shows the results of the multiple linear regression analysis used to predict traffic violations from the DBQ results. A hierarchical procedure was used to establish a first block including age, annual mileage and gender (dummy coding; male = 0, female = 1) to account for the previously observed differences between males and females. The second block included the DAS scales and the third the DAX scales. Each block was subjected to a stepwise selection procedure in order to identify the individual variables to be included in the model.

As can be seen from Table 5, age, mileage and gender in combination accounted for 16% of the variance in self-reported traffic violations. Incorporating the DAS subscales into the model raised its predictive power, anger at slow driving and illegal driving being the individual variables best explaining traffic violations here. Incorporating the use of vehicle to express anger and verbal aggressive expression subscales increased the predictive ability of the model, which thus accounted for 47% of the overall variance in self-reported violations.

4. Discussion

The results obtained here show that a number of gender differences in driving behaviour persist even if differences in mileage between genders are considered. As a rule, males are involved in more accidents, receive more traffic fines and self-report more traffic violations than women. These results, which echo those continually recorded in road accident rate and violating behaviour statistics, are also consistent with those obtained in studies based on self-reported traffic violating behaviours (González-Iglesias, Gómez-Fraguela, Romero, & Sobral, 2012; Mesken, Lajunen, & Summala, 2002) and cannot be exclusively ascribed to men's greater exposure (mileage); in fact, the increased propensity of males to having road accidents and violating traffic regulations must additionally be influenced by other variables (Åberg & Rimmö, 1998; Lonczak et al., 2007).

The degree of driving anger may be one such variable. Our results suggest gender differences in anger strength caused by police presence on the road and obstructed traffic situations. In fact, our data, which were obtained from a driver sample of the general population, are consistent with those of other authors. Thus, Deffenbacher et al. (1994) and Delhomme and Vil-lieux (2005) also found male undergraduates to be angrier at police traffic watching than their female counterparts. Similarly, the latest opinion polls on road safety conducted by Spain's Traffic Department reveal that the work of safety forces and traffic officers in Spain is more appreciated by females than by males (Dirección General de Tráfico, 2009). Probably, males are more frustrated at police presence because it somehow forces them to alter their driving style; in fact, men are seemingly more prone to violating some traffic regulations in order to achieve their aims (Berkowitz, 1993).

Our results also suggest that females tend to be angrier at traffic obstructions causing road blocks than are males. This is consistent with previous findings of Sullman, Gras, Cunill, Planes, & Font-Mayolas (2007). According to Brewer (2000), women's greater anger at traffic obstructions is a result of their difficulty in reconciling family life and work. Although this

hypothesis is quite attractive, studies on female undergraduates, who are usually under lighter family–work reconciliation pressure, have identified an identical pattern (Deffenbacher et al., 1994).

The results of this work also confirm that males and females express driving anger in a different manner, with men being more prone to adopting disadaptive expressions of anger (e.g., physical aggression) than females. Thus, in their original study on an undergraduate population, Deffenbacher et al. (2002) found men and women not to differ in verbal expression of anger while driving, but also to exhibit considerable differences in physical personal aggressive expression, displaced aggression and total aggression index, where men invariably scored higher than women. An identical trend was detected in another study by the same authors (Deffenbacher et al., 2004) and in one conducted in Turkey (Esiyok, Yasak, & y Korkusuz, 2007). Also, Dahlen and Ragan (2004) found evidence that women report more verbally aggressive expression and men more physically aggressive expression. However, a Spanish study using a version of the DAX led to different results: thus, a convenience sample studied by Herrero-Fernández (2011) exhibited no differences in expression of anger at the wheel—even with provision of the effect of age—between genders.

One other interesting inference from our results is the significance of anger-related variables to driving violation behaviours. Specifically, we found angry emotional states and explicitly aggressive behaviours to correlate with anti-rule driving behaviour (viz., more fines and violations of traffic regulations) and involvement in accidents. This is consistent with the findings of some previous studies (Dahlen, Martin, Ragan, & Kuhlman, 2005; Furnham and Saipe, 1993; Gómez-Fraguela and González-Iglesias, 2010; Iversen and Rundmo, 2002; Underwood et al., 1999). Our results additionally reveal that men tend to react more aggressively than women in some driving situations (particularly, in the presence of police and traffic obstructions), and that the association between some anger-related variables and traffic rule violations differs between genders—the police presence subscale is more strongly correlated with violations in males, and the opposite is true for the illegal driving subscale and DBQ scale.

The results of our regression analysis suggest that age, gender and annual mileage account for an increased proportion (16%) of the variance in traffic violations in the whole sample. Being young, male, and driving more each year is associated with more frequent violation of traffic rules.

Anger at slow driving plays a prominent role in traffic violations. As suggested by Gómez-Fraguela and González-Iglesias (2010), interferences on the road and situations where drivers are forced to slow down have an especially negative, frustrating impact on drivers that are especially prone to reacting angrily. This can increase their emotional arousal and result in episodes of offending driving.

Illegal driving by others is also an important factor towards explaining traffic violations. Our results in this respect confirm a previous assertion by Sullman et al. (2007) that drivers best tolerating “illegal” or “criminal” behaviours are also the most prone to violating traffic regulations. Villeux & Dellhome (2007) obtained similar results with the French version of the DAS, with negative correlation between the illegal driving subscale, loss of license driving points and preferred driving speed.

The variables pertaining to disadaptive anger expression accounted for a significant fraction of the variance in traffic violations. Specifically, verbal aggression (i.e., shouting, insults) and use of the vehicle to express anger increased the predictive ability of the model by 10%. This result shows the need to screen for and assess how anger behind the wheel is expressed because of its strong impact on traffic violations. As suggested by Deffenbacher et al. (2002), interventions aimed at alleviating driving anger and changing forms of anger expression could be useful towards reducing risky and aggressive driving.

Broadly speaking, males are involved in more road accidents and violate traffic regulations more often than women. These differences persist even after correction of the results for annual mileage. Moreover, males express driving anger in a more aggressive way than females and the specific situations that elicit an angry response differ between the two genders. Finally, driving anger variables significantly contribute to explaining self-reported driving violations, as well as its theoretical and treatment implications.

The results of this survey are subject to several limitations the greatest of which is possibly the cross-sectional structure of the data, which precludes causal inferences. Also, the results are subject to the typical limitations associated with self-reported data. Thus, although all participants were assured of anonymity and confidentiality, their responses may have been biased towards social desirability. One other common criticism of self-reported data is the great difference between what drivers report and their actual behaviour. In future work, access to individual driving records may provide objective outcomes confirming self-reported information and reducing concerns about a potential response bias.

Although we considered annual mileage, we made no provision for potential gender differences in vehicle use. These include night driving, fatigued driving, and driving while and under the influence. Most often, even when a woman is in the car in these situations, she will let or want the man to drive. Therefore, exposure is both quantitatively and qualitatively different between men and women. Moreover, as noted by Shinar and Compton (2004), the presence or absence of passengers in the vehicle may influence the driver's degree of anger and forms of expression when driving. Similarly, other situational variables such as road type or time of day may affect drivers' tendency to become angry, violate traffic regulations or be involved in road accidents.

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