

Driver Anger: Experienced and Expressed

Sonja Elisabeth Forward

Senior researcher, Swedish Road and Transport Research Institute (VTI), Linköping, Sweden

Abstract

This study aimed to explore driver anger using a Driving Anger Scale (DAS), a subscale of the Driver Behaviour Questionnaire (DBQ) and a General Anger Scale (AX-O). The driving anger scale measured both experienced and expressed anger in various driving related contexts. In connection with this we also explored the effect of gender and age. Participants in this study who received a postal survey were 1794 adult subjects (1283 males and 511 females). The items dealing with different anger provoking situation were analysed using a principle-components factor analysis and formed four sub-scales: impeding driving, illegal driving, hostile gestures and police presence. The result showed that young drivers scored higher on impeding driving, hostile gestures and police presence. Women in all age groups scored higher on illegal driving and in the oldest age group this also applied to impeding driving. The results also showed a high correlation between the degree of provocation and expression of anger in both men and women. Young drivers expressed their anger more overtly than older drivers. With regard to gender very few differences was found except for young men expressing more anger in connection with hostile gestures and women in the oldest age group expressing more anger in relation to illegal driving. The combination of DBQ and DAS presented a significant relationship indicating that own behaviour was related to their reaction of others. Finally the results could establish that the expression of anger behind the wheel was related to how people express their anger in other situations. In conclusion the degree of anger varies according to its context. Men and women and different age groups are provoked by different events in traffic although when they are provoked very few suppress this feeling. Anger on the road is also strongly related to anger off the road.

Keywords: Driver behaviour; Aggression; Violations; Gender

Introduction

Anger can be defined as an emotional state or as [1] describes it "Anger is the heat of liquid in a container". It can vary in frequency, intensity and duration and can be experienced as anything from mild irritation to intense fury and rage, [2]. It is fairly prevalent and could be felt, in one form or another, several times a week [3].

Anger may or may not be linked to aggression and it is therefore important to differentiate between angry feelings and how that anger is expressed [4]. If anger is the emotional state then aggression can be described as its response, immediate or planned, intending to harm, hurt or injure another person or object [5].

It can serve different functions such as; reduce tension; increase self-esteem and escape from boredom. A person can be angry without becoming aggressive and [3] showed that only 10% of the angry feelings resulted in physical aggression. The same applies to aggression; it is possible to behave in an aggressive way without being angry, something which has been described as instrumental aggression [2]. This is a proactive form of aggression involving some degree of planning to achieve a goal. This form of aggression can be carried out in a cold and calculating manner [6]. On the opposite end of the spectrum we have another form of aggression, namely the emotional or hostile one. This is less calculated and is related to a number of bodily reactions (e.g. increased heart rate and muscle tension). In this instance the person is more ruled by emotions than cognitions. Many times this feeling is triggered by negative feelings when he/she is perceived to be under threat [6].

Driver aggression

Studies have found that a large proportion of drivers have experienced anger whilst driving [7,8]. In the study by Underwood, et al. [8] 85 percent of the participants reported that they had experienced anger while driving during the last two weeks. In Parker et al. [7] 89

percent of the drivers reported that they had committed an act which could be described as aggressive violation. Anger is also more likely to be expressed whilst driving than during other activities [9,10].

Another term used to describe driver anger is "road rage" although this might be misleading since it includes both a criminal act on the road and some milder forms of frustrations, resulting in beeping the horn or gesticulation [11]. It was therefore suggested that the term "road rage" should only refer to criminal actions of assault and that it is distinguished from other forms of aggressive behaviour.

Aggressive driving might well be perceived as unacceptable but some would argue that aggressive behaviour behind the wheel is tolerated and even excused which can be due to western societies encouraging aggressiveness, competitiveness and risk-taking. Other reasons could be that the car symbolises power [12] and that it provides some protection (anonymity) making the drivers less restrained [12-14]. Novaco (1989) would argue that the car is used as an instrument of dominance and that the road then becomes an arena for competition and control. Pordage [15] also believed that perceived control over the situation was an important factor explaining the expression of anger, but he also added that it could be a way to demonstrate your own skills. A demonstration which can well lead to both risky and reckless driving [8,11,16,17]. Other studies have also found that anger can lead to risky driving but that this would be as a consequence of a superficial assessment of the situation [18,19].

***Corresponding author:** Sonja Elisabeth Forward, Senior researcher, Olaus Magnus vag 35, Linköping, Sweden, Tel: +46706380363, E-mail: sonja.forward@vti.se

Received December 12, 2014; **Accepted** May 28, 2015; **Published** June 05, 2015

Citation: Forward SE (2015) Driver Anger: Experienced and Expressed. J Ergonomics S3: 017. doi:10.4172/2165-7556.S3-017

Copyright: © 2015 Forward SE. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

With this in mind it is not surprising that studies have found a relationship between aggressiveness and crash involvement [20-22]. Furthermore, driving violations, another factor related to accidents [23,24], has also been related to aggressiveness [8,25]. Elliot [11] argued that aggressive driving many times results from careless and risky driving. He goes on by saying that the "victim frequently precipitate the initial event which causes anger in the perpetrator, and retaliation by the victim leads to escalation of the conflict and eventually to assault".

Age and gender

Individuals differ in their propensity toward aggression and young males, in particular, have been noted for their high level of aggression. The same seem to apply to aggressive drivers who are typically young and male [26-30]. In a study by Krahe and Fenske [31] another factor was added namely macho personality. The results showed that young macho men assigned greater importance to speed and sportiness of a car and reported significantly more driving aggression than young non-macho men. Perhaps it is the combination of being young, male and macho which predict aggressive driving rather than just age and gender? Studies comparing men and women in general tend to support this since they usually fail to find a difference [7,32-34]. Some studies have also found that women score higher on driving anger than men [35,36]. In the study by Hauber [35] it was the combination of age and gender which explained their results since young women usually were more aggressive than older men. These results would be consistent with other studies looking at general anger, which have shown that women tend to experience anger as frequently as men [2,3]. The same applies to studies looking at anger expression which have failed to distinguish between the two groups [37,38]. Although the frequency of both anger and aggression is very similar the reasons and the manner in which men and women express it is not [39-42]. For instance, several studies have found that women reported more anger than men following condescending remarks and that men were more likely to get into physical fights, damage property and verbally assault people than women [42].

Psychometric scales

A number of psychometric scales have been developed to measure anger, which are both contexts specific and general. The expression of anger as measured by Spielberger Anger Expression (AX) scales include two sub-scales; the AX/In and the AX/Out. AX/In describes angry feeling not expressed and AX/Out feelings that are expressed verbally or physically [43]. Results from studies using factor analyses have found that these two sub scales are independent from each other [43]. Another scale, namely the Driving Anger Scale (DAS), measure aggression on the road [44]. It contains 33 items which forms six sub-scales; 1) hostile gesture, 2) illegal driving, 3) police presence, 4) slow driving, 5) discourtesy and 6) traffic obstructions. In connection with driver anger the effects of gender has also been investigated. In the study by Deffenbacher, et. al. [44] men got angrier on a police presence and slow driving whereas women got angrier at illegal driving and traffic obstructions. This was later replicated by Sullman et. al. [36] who showed that women reported more anger in response to traffic obstructions and González-Iglesias et al [41] who found that men expressed more anger in connection with police presence and women at traffic obstructions. However, in a study by Lajunen, et al. [7] no difference between men and women in their reported anger was found, suggesting that they are provoked by the same reasons and to the same degree.

The aim of this study was to take the research on aggression behind the wheel a step further and also assess how perceived anger is related to expressed anger. In addition to this, aggressive driving style and behaviour described as acting out were also analysed. In this paper it is not possible to present the results from the complete survey. The emphasis will rather be on the reaction to anger, its relationship to aggressive driving and general anger. It is conceivable that age and gender will have an effect on anger thus these groups will be analysed separately.

Method

Participants

Participants in this study were 1794 adults, 1283 were male and 511 females. The sample was drawn from the Swedish register of car owners and stratified into three age groups; 543 was aged 17-25 years ($M=21.9$), 619 was aged 45-56 years ($M=50.1$) and 632 was aged 62-72 years ($M=68.3$). Half the sample had been involved in an accident ($n=895$ and 10 percent had been involved in a situation which can be described as driver anger ($n=180$). In these cases 62 percent had been the driver ($n=111$). The mean annual mileage was 16.232 km (SD 13.135 km). This is more than the national average since the annual mileage during recent years have been around 12.000 km [45].

Procedure

3000 postal surveys were sent to the participants including a self-addressed envelope. In the explanatory letter it was explained that the information was strictly confidential and would be used for research purpose only. 143 surveys were returned to sender and of those who could reply 60% did so after two reminders.

The main part of the questionnaire was originally designed by the Manchester Driving Group. In this paper the results from three different scales will be presented: Aggressive driving violation, the Driving Anger Scale and a General anger scale (AX-O).

Aggressive driving violation was measured by a shortened version of the Driver Behaviour Questionnaire (DBQ) [29]. It included twelve items (e.g. 'Become so angered by another driver so you follow him/her with the intention to show that he/she has done something wrong', 'Stay in a lane that you know will be closed ahead until the last minute before forcing your way into the other lane', 'Sound your horn to indicate your annoyance to another driver') (Cronbach's $\alpha=.79$). The answers were rated on 5-point Likert scales (1=*very usual* to 5=*very unusual*).

Twenty-seven items based on the Driving Anger Scale (DAS) developed by Deffenbacher et al. [44] measuring; hostile gestures (e.g. 'Someone honks at you about your driving'), illegal driving (e.g. 'Someone is driving too fast for the road conditions'), slow driving (e.g. 'Someone is driving too slowly in the passing lane holding up traffic'), discourtesy (e.g. 'Someone is driving right up on your back bumper') and police presence (e.g. 'You see a police car watching traffic from a hidden position') were included. The respondents were asked to imagine different anger provoking situations and then rate the amount of anger that it would provoke using a five point Likert scale, ranging from 1=*not angry* to 5=*extremely angry*. In addition to this the participants were also asked to indicate how they would react to each situation already presented ranging from; 1=*no reaction*, 2=*horn honking or flashing with the lights*, 3=*make a gesture to the other driver*, 4=*swear or verbally abuse the other driver* 5=*drive closely and/ or follow the other driver to show that they had made a mistake*, 6=*stop*

the vehicle and go out preparing themselves for a discussion and 7=use physical violence.

General anger was measured by eight items. The questions were derived from one of Spielbergers' sub-scales, namely the Anger expression-out (AX-O) scale (e.g. 'I use violence to defend my rights, when angry', 'I break things') (Cronbach's $\alpha=.72$). Responses ranged from 1 very usual to 5 very unusual. The final section included background information such as socio-demographic information, car use, frequency of driving, accidents and conviction history and finally a question asking if they had been involved in a situation which would be described as road rage, if the answer was affirmative the participants were asked to describe the incident.

Results

Experienced driver anger

The twenty-seven items based on the Driving Anger Scale (DAS) measuring the response to different anger provoking situations [44] were analysed using a principle-components factor analysis (PCA) with a Varimax rotation. Before performing the test the data was inspected and the Kaiser-Meyes-Olkin measure of sampling adequacy and the Bartlett's Test of Sphericity were accepted (.94 and $p<.001$). The Principle-components analysis produced 4 components, with eigenvalues greater than 1.0. To estimate their internal reliability Cronbach's α scores were calculated. Results from this test demonstrated that the four components were acceptable, with medium to high scores [46]. Five of the items; driving right up on your back bumper; cuts in front of you on the freeway, at night someone is driving right behind you with bright lights, hit a deep pothole that was not marked and driving behind a vehicle that is smoking badly or giving off diesel fumes presented a loading of less than .5 and were not included. The four rotated factors, accounted for 52% of the total variance. The factor loadings for the 4 components and Cronbach's alpha are summarized in Table 1.

Table 1 demonstrates that the first component explained 32%, the second 9.4%, the third 5.4% and the fourth 4.6% of the variance. All items, perhaps best described as 'impeding driving', loaded on factor 1 with a value of between .50 and .76. Constructs related to illegal driving loaded on component 2 (values between 0.62 to 0.70), constructs related to hostile gesture on component 3 (values between 0.77 to 0.82) and constructs related to police presence loaded on component 4 (values between 0.77 to 0.81). Table 2 presents the mean and standard deviations of the different components.

Table 2 shows that hostile gesture and impeding driving generated most anger. Police presence generated very little anger. Age has been shown to be an important factor and the different age groups was therefore analysed separately using a one way Anova, [Table 3].

Table 3 shows a significant difference between the different age groups and their own experience of anger; hostile gesture ($F(2, 1640)=61.99$), illegal driving ($F(2, 1701)=25.39$), impeding driving ($F(2, 1647)=89.68$) and police presence ($F(2, 1645)=42.64$). A post hoc Tukey test showed that the youngest group experienced more anger when the other drivers were perceived as impeding their movements, acted in a hostile manner and when the police was present at $p<0.001$. However, illegal driving was something, which made the oldest group angrier than the other two age groups at $p<0.001$. Police presence generated very little anger in all age groups and was therefore dropped from further analysis. In order to determine the effect of gender three independent t-tests were performed, see Table 4.

relationship was also found between illegal action and aggressive driving violation which would indicate that drivers who get angry about others not following the rules in traffic are less likely to commit traffic violations. The correlation between expressed anger and aggressive

Table 1: Driving Anger Scale: Exploratory factor analysis and Cronbach's alpha.

Item	Component 1: Impeding Driving
Someone in front of you does not start up when the light turns green.	
A pedestrian walks slowly across the middle of the street, slowing you.	
Someone is driving too slowly in the passing lane holding up traffic.	.67
Someone cuts in and takes the parking spot you have been waiting for.	.54
Someone is driving slower than reasonable for the traffic flow.	.76
A slow vehicle on a winding road will not pull over and let people by.	.57
Someone backs right out in front of you without looking.	.70
Someone speeds up when you try to pass them.	.68
Someone is slow in parking and holding up traffic.	.50
Someone pulls right in front of you when there is no one behind you.	.56
A bicyclist is riding in the middle of the lane and slowing traffic.	.52
	.60
	.54
	32.0%
	.88
% of variance explained	
α	
Item	Component 2: Illegal Driving
Someone is driving too fast for the road conditions.	.67
Someone is weaving in and out of traffic.	.70
Someone does not stop at a stop sign.	.69
Someone is driving way over the speed limit on a road with a speed limit of 90 km/hr.	.68
A car change lanes without indicating.	.62
% of variance explained	9.4%
α	.74
Item	Component 3: Hostile Gesture
Someone makes an obscene gesture toward you about your driving.	.77
Someone honks at you about your driving.	.77
Someone yells at you about your driving.	.82
% of variance explained	5.4%
α	.85
Item	Component 4: Police Presence
You see a police car watching traffic from a hidden position.	.77
You pass a radar speed trap.	.81
A police officer pulls you over.	.76
% of variance explained	4.6%
α	.73

Note: Only loadings above .5 are displayed.

Table 2: Mean and Standard Deviation for experience of anger.

Subscales	Mean	Sd
Impeding driving	2.12	.56
Illegal driving	1.88	.63
Hostile gesture	2.21	.95
Police presence	1.21	.53

1=not angry; 5=extremely angry.

Table 3: Age groups: Mean (SD) for experience of anger.

Subscales	17-25	45-56	62-72
Impeding driving	2.38 (0.57) ^a	2.04 (0.52) ^b	1.98 (0.50) ^b
Illegal driving	1.74 (0.57) ^a	1.90 (0.64) ^b	2.00 (0.65) ^c
Hostile gesture	2.58 (1.03) ^a	2.07 (0.87) ^b	2.01 (0.86) ^b
Police presence	1.39 (0.73) ^a	1.17 (0.41) ^b	1.10 (0.34) ^b

1=not angry; 5=extremely angry. Different subscripts indicate a significant difference between the different age groups on $p < 0.001$.

Table 4 shows that men and women aged 17-25 experienced a similar amount of anger despite from their reaction to illegal drivers which the women found more provoking than the men ($t(52)=-.44$, $p < .001$). In the other two age groups, 45-56 and 62-72, the difference were more pronounced since the women got significantly angrier if the other driver broke the rules ($t(58)=6.45$, $p < 0.001$; $t(59)=1.11$, $p < .001$ respectively) and if the other driver behaved in a hostile manner ($t(56)=-.109$, $p < .01$; $t(55)=0.89$, $p < .001$ respectively). In the oldest age group the women also became angrier if the other driver impeded their own driving ($t(56)=-.143$, $p < .01$). Further analysis showed that the annual mileage travelled by men was significantly further than for women ($t(17)=58.70$, $p < .001$). Since this can have an effect on anger a number of separate analysis were carried out comparing men and women but also controlling for annual mileage. The results showed that the largest difference between men and women was in the group who drove an annual mileage of 10.000 to 19.990 km. In this instance women got significantly more angry than the men, something which applied to the three different sub-scales ($p < 0.001$).

Expressed driver anger

The next step was to analyse if experienced anger were related to expressed anger. With regard to the latter the participants were asked to indicate on a scale from 1 to 7 how they would react to each of the situation already described in section 1.

Table 5 shows that the three sub-scales were positively correlated with each other. This suggests that if a driver experience anger then this anger is also expressed, the greater the anger the greater the response. Further analysis showed that this relationship was significant ($p < .01$) for both men and women.

Table 6 shows a significant difference between the ages with regard to impeding driving ($F(2, 1395)=118.66$) hostile gesture ($F(2, 1472)=96.87$) and illegal driving ($F(2, 1410)=3.76$). A post hoc Tukey test showed that the youngest age group expressed significantly more anger when the other drivers was perceived as impeding their movements and acted in a hostile manner at $p < 0.001$. The group which included people aged 45-56 expressed more anger than the oldest age group if the other driver broke the rules at $p < 0.001$. The next step was to determine the effect of gender, thus three independent t-tests were performed, see Table 7.

Table 7 shows that the difference between men and women in the different age groups was relatively small. Amongst people aged 17 – 25 years old women expressed a little less anger than the men with regard to hostile gesture ($F(50, 288)=1.810$) and in the group 45 – 56 the same applied but this time it was to impeding drivers ($F(50, 378)=0.389$). Women in the oldest age group reacted with more anger if the other driver committed an illegal action ($F(42, 132)=0.459$). Further analysis looking at specific items showed that some of the actions were more likely to generate a reaction than others, see Table 8.

Table 8 shows that most of the respondents would react in one form or another if someone took their parking spot and if a slow vehicle

did not pull over. A fairly high proportion would also react if someone made an obscene gesture towards themselves, if they did not stop at a stop sign and if they were weaving in and out of traffic. Further analysis showed that the situations, which made the greatest number of people to react, were the same across the age group with one exception. The youngest age group found weaving in and out of traffic more provoking than others and the oldest group was more likely to react if someone did not stop at a stop sign. The reaction was indicated with a number and one of the more extreme ones described a person who was prepared to stop their vehicle and take up discussion with the other driver. This was obviously fairly unusual but if someone took their parking spot then 17% were prepared to act in this manner.

Driver anger and aggressive driving violations

Aggressive driving violation as measured by the DBQ was included to assess the relationship between their own driving behaviour; both experienced and expressed as measured by DAS. Table 9 presents the results from this test.

Table 9 shows a strong negative relationship between aggressive driving violation and drivers' expression of anger with regard to impeding driving and hostile gesture. This would then indicate that people who themselves report committing driving violations also get more angry if other drivers behave in a hostile manner towards themselves and if they try to impeded their actions. A positive

Table 4: Age and gender: Mean (SD) for experience of anger

Subscale	17-25		45-56		62-72	
	Women n=150	Men n=390	Women n=219	Men n=395	Women n=138	Men n=485
Impeding driving	2.38 (0.54)	2.38 (0.57)	2.08 (0.51)	2.02 (0.53)	2.08* (0.53)	1.97 (0.49)
Illegal driving	1.89** (0.55)	1.68 (0.56)	2.12** (0.69)	1.79 (0.59)	2.24** (0.68)	1.93 (0.62)
Hostile gesture	2.71 (0.95)	2.54 (1.05)	2.20** (0.84)	2.01 (.0.87)	2.33** (0.87)	1.91 (0.84)

1=not angry; 5=extremely angry. *= $p < .01$; **= $p < 0.001$.

Table 5: Pearson's correlation of experienced and expressed anger.

Sub-scales	r
Impeding driving	.59*
Illegal actions	.45*
Hostile gestures	.69*

*= $p < .01$.

Table 6: Age groups: Mean (SD) for expressed anger

Subscales	17-25	45-56	62-72	p
Impeding driving	2.23 (0.76) ^a	1.77 (0.48) ^b	1.67 (0.49) ^c	<.001
Illegal driving	1.52 (0.58) ^a	1.49 (0.48) ^b	1.59 (0.54) ^a	<.001
Hostile gesture	2.43 (1.30) ^a	1.70 (0.91) ^b	1.56 (0.89) ^b	<.001

1=no reaction; 7=strong reaction. Different subscripts indicate a significant difference between the different age groups on $p < 0.001$.

Table 7: Age and gender: Mean (SD) for expressed anger

Subscale	17-25		45-56		62-72	
	Women n=150	Men n=390	Women n=219	Men n=395	Women n=138	Men n=485
Impeding driving	2.15 (0.78)	2.26 (0.75)	1.71* (.45)	1.80 (.48)	1.64 (0.52)	1.67 (0.48)
Illegal driving	1.58 (0.56)	1.50 (0.59)	1.54 (.51)	1.47 (.47)	1.72** (0.53)	1.55 (0.53)
Hostile gesture	2.25* (1.21)	2.51 (1.34)	1.61 (.80)	1.74 (.96)	1.71 (1.01)	1.52 (0.86)

1=no reaction; 7=strong reaction. *= $p < .05$; **= $p < 0.01$.

Table 8: Items most likely to present an angry reaction.

Sub-scale	Description	Reaction %
Impeding driving	Someone cuts in and takes the parking spot you have been waiting for	70
	A slow vehicle on a winding road will not pull over and let people by	59
Hostile gesture	Someone makes an obscene gesture towards you about your driving	44
Illegal driving	Someone does not stop at a stop sign	38
	Someone is weaving in and out of traffic	35

Table 9: Correlation between aggressive driving violations and driver anger (experienced and expressed).

Experienced	Impeding driving	Illegal action	Hostile gesture
Violation	-.40*	.14*	-.31*
Expressed	Impeding driving	Illegal action	Hostile gesture
Violation	-.44*	.01	-.36*

* = $p < 0.001$ **Table 10:** Correlation between the Driver Anger Scale and Anger expression out.

Experienced	Impeding driving	Illegal action	Hostile gesture
Anger expression out (AX-O)	.33*	.04	.29*
Expressed	Impeding driving	Illegal action	Hostile gesture
Anger expression out (AX-O)	.32*	.10*	.31*

* = $p < 0.001$

driving violations display similar results with a strong relationship between impeding driving and hostile gesture. However, the reaction to illegal action was not significant.

Participants anger whilst driving and in more general situations

This study also assessed the relationship between anger experienced whilst driving and anger in situations not particularly related to driving a car. Table 10 presents the correlation between scores on the driver anger scale and general anger scale which shows the likelihood of expressing anger either physically or verbally i.e. "acting out".

From this table we can see that two of the scales measuring driver anger correlated with the scale measuring anger out. This would suggest that a person who gets angry at drivers who impeded their movement and who act in a hostile way is somebody who also expresses his/her anger outside the car in a verbal or physical way. The results also show a strong relationship between anger out and driver anger. The strongest relationship was between impeding driving and hostile gesture. However, in this instance drivers who reacted if somebody else broke the rules would also be more likely to express their own anger verbally or physically.

Discussion

This study assessed how the experience of driver anger was related to the expression of anger using the Driving Anger Scale (DAS). In addition to this, the effect of an aggressive driving style and a general behaviour described as "acting out" was also analysed. Initially, a principle-components factor analysis was conducted including all the items and generated four different sub scales: impeding driving, illegal driving, hostile gestures and police presence. This is broadly similar to Deffenbacher et al. [44] although in their study impeding driving was split into two; slow driving and discourtesy. Other studies have also found that slow driving and discourtesy load on the same factor [7] In

their study, which also included drivers from a broader age group, the items included in this factors were more or less identical to the present study, except for two of the items, one which in Lajunens et al. [7] study loaded on factor 2 and the other which was dropped.

Age has been found to be an important factor when trying to explain aggressive driving thus the participants in this study were drawn from three different age groups (17-25, 45-56 and 62-72) and analysed separately. The results showed that the total scores measuring experience of anger were higher in the youngest group which is similar to results reported elsewhere [26-29,7]. However, the results also suggested that this anger was context related. The youngest group got more provoked if other drivers acted in a hostile manner, if they impeded their own driving and if the police were present. On the other hand the oldest age group would become angrier if the other driver did not follow the rules. However, gender together with age is perhaps of greater interest since a number of studies have found that it is young men rather than young women who are noted for their high level of aggressive driving [7,27,28]. In this study the difference between young men and women was not very great. If anything the difference pointed in the opposite direction with young women being more provoked than the men. Young women were significantly angrier if they encountered another driver who deviated from the rules. In general, and consistent with other studies, young women also got angrier than men in the two older age groups [35,36]. For the older age groups women got angrier at illegal driving and if the driver behaved in a hostile manner than men. In the oldest age (65+) women also got angrier if the other driver impeded their own actions. Hence, the present study could demonstrate that it was women rather than the men who got more angry which is in agreement with other studies [36,47].

The study also asked the participants to consider the different anger provoking situations and state how they would react. A Pearson's correlation analysis was carried out showing a strong relationship between experienced and expressed anger. This strong relationship contradicts the results presented by Averill [3] who found that only ten percent of the experienced anger was expressed. However, Averill [3] did not study aggression on the road and this might well be different. This was also supported by Lawton & Nutter (2002) who argued that anger was more likely to be expressed whilst driving than during other activities. The reason for this can be that driving is different since it offers the person some protection [12-14] and the car itself gives him/her some power and can be used as an instrument [48].

The results also showed that the strongest reaction was displayed if the other driver impeded their driving and if he/she acted in a hostile manner. Like the experience of anger the youngest age group expressed a stronger reaction than the older age groups. The reaction to hostile gesture was also stronger amongst young men compared with young women. On the other hand older women expressed more anger than men in the same group, if the other driver was deviating from the rules. Consistent with results measuring experienced anger young women reacted more strongly than older men. With regard to the fourth scale, police presence, it was dropped since it only generated a very modest amount of anger. One possible reason for this could be that Swedish drivers, as compared to drivers in the USA, where most studies have been carried out [49], did not find the police carrying out traffic surveillance especially anger provoking. Another reason could be that most studies within this field of research have included young drivers [49] who generally express more anger than older age groups [7,26-29]. This would also be in line with the study by Lajunen et al. [7] who also included a broader age group and had to drop this item since

it generated very little anger.

The items included in the DAS were studied in more detail and the results showed that the most anger-provoking situation, which also resulted in the strongest reaction, was if someone took their parking spot. In this case nearly a 1/5 would be prepared to stop their vehicle and take up a discussion with the other driver. One obvious reason for this could be that the car was stationary which provided them with an opportunity to verbally attack the other driver. The second most offensive behaviour was if a slow vehicle on a winding road refused to pull over and let people pass. A large proportion would also react if someone made an obscene gesture towards themselves, and nearly forty percent would react if someone did not stop at a stop sign and if a driver was weaving in and out of traffic. These acts could be interpreted as intentional but also preventable. This, together with unjustified and blameworthy, were aspects Tsytserer and Grodnitzky [50] would argue increased the anger in a person. This would also be consistent with the attribution theory which stress that judgements of responsibility influences the behaviour.[51]

The next question, which this study investigated, was the possible relationship between driver anger, experienced and expressed and their own behaviour as measured by a sub-scale of the DBQ. The results showed that drivers who could be described as 'aggressive violators' also became more provoked by other drivers who blocked their progress or displayed hostile gestures towards themselves. In addition to this they also expressed this anger to a greater extent than others. The exception was the reaction to illegal actions which was not significant. It could therefore be argued that drivers who themselves drive in an aggressive way would be more likely to encounter hostile behaviour from others trying to tell them that their driving behaviour is not acceptable. Since they themselves tend to break the speed limits they would also be more than likely to encounter other drivers who impede their own actions. Hence their own driving style provokes the very thing they dislike, creating a vicious and very dangerous circle.

A popular opinion is that driving transforms the person, someone who outside the car is very pleasant and placid turns into a violent person when sitting behind the wheel. The study therefore wanted to assess participants reaction to events not related to car driving and see if that was related to the expression of anger whilst driving. The results did not reveal a so called Dr Jekyll and Mr Hyde syndrome, instead the relationship between driver anger and general anger was very strong suggesting that it is people who have a tendency to express their own anger in general who also express more anger whilst driving. This result is also in agreement with a number of other studies [32] and it could therefore be concluded that "we drive as we live" (Tillmann & Hobbs, 1949 cited in Lawton, et al., 1997b) [29]

The limitation of the present study needs to be mentioned. The present study only used self-reported measures of driver anger and general anger and no objective measures to substantiate this. This could be a problem since self-reported measures can be subject to errors, such as social desirability and response consistency effects [52]. However, Lajunen and Summala [47] found that the effect of social desirability is rather small and other studies have found that surveys are able to measure actual behaviour reasonably well [53,54]

Conclusion

The aim of this study was to take the research on aggression behind the wheel a step further and also assess how perceived anger is related to expressed anger. In addition to this aggressive driving style and behaviour described as acting out was also analysed. The results presented four different sub scales; impeding driving, illegal driving,

hostile gestures and police presence. The youngest age group both experienced and expressed more anger than the other age groups. The effect of gender varied and the main conclusion was that women experienced more anger than men but that men expressed more anger, but only in the youngest age group. The study demonstrated a relationship between expressed and experienced anger indicating that a person driving a car is less inhibited than in other situations. Drivers who demonstrated driver anger were more likely to drive in an aggressive way. Hence, being more likely to experience others as impeding their actions or indeed expressing hostility towards themselves. Finally, the study ruled out that drivers become different when they are behind the wheel since a strong relationship between driver anger and general anger were presented.

References

1. Lakoff G (1987) *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago: The University of Chicago press.
2. Kassinove H, Sukhodolsky DG (1995) Anger disorders: Basic science and practice issues. In Kassinove (Ed.), *Anger disorders definition, diagnosis and treatment*. Washington DC: Taylor and Francis, USA.
3. Averill JR (1983) Studies on anger and aggression. Implications for theories of emotion. *Am Psychol* 38: 1145-1160.
4. Moscoso MS, Spielberger CD (2011) Cross-cultural assessment of emotions: The expression of anger. *Revista de Psicologia*, 29.
5. Berkowitz L, Harmon-Jones E (2004) Toward and understanding of the determinants of anger. *Emotion* 4: 1069-1077.
6. Stangor C (2012) *Principles of social psychology*. Flatworld knowledge book.
7. Lajunen T, Parker D, Stradling SG (1998) Dimensions of driver anger, aggressive and highway code violations and their mediation by safety orientation in UK drivers. *Transportation Research Board* 1: 107-121.
8. Underwood G, Chapman P, Wright S, Crundall D (1999) Anger while driving. *Transportation Research* 2: 55-68.
9. Lawton R, Nutter A (2002) A comparison of reported levels and expression of anger in everyday and driving situations. *Br J Psychol* 93: 407-423.
10. Parkinson B (2001) Anger on and off the road. *British Journal of Psychology* 92:507-526.
11. Elliot BJ (1999) Road rage media hype or serious road safety issue? Paper presented at the Third National Conference on Injury Prevention and Control, Brisbane, Australia.
12. Whitlock F A (1971) *Death on the road*. London: Tavistock.
13. Ellison-Potter P, Bell P, Deffenbacher JL (2001) The effects of trait driving anger, anonymity, and aggressive stimuli on aggressive driving behaviour. *Journal of Applied Social Psychology* 3: 431-443.
14. Hennessy DA, Wiesenath DL (2001). Gender, driver aggression, and driver violence: An applied evaluation. *Sex Roles: A Journal of Research* 66:1: 16.
15. Pordage CA (1995) A licence to kill. *The Journal of the Institute of Road Safety Officers* 16: 29-39.
16. Deffenbacher JL, Deffenbacher DM, Lynch RS, Richards TL (2003) Anger, aggression, and risky behavior: a comparison of high and low anger drivers. *Behav Res Ther* 41: 701-718.
17. Maxwell JP, Grant S, Lipkin S (2005) Further validation of the propensity for angry driving scale in British drivers. *Personality and Individual Differences* 38: 213-224.
18. Lerner JS, Keltner D (2001) Fear, anger, and risk. *J Pers Soc Psychol* 81: 146-159.
19. Stephens AN, Trawley SL, Madigan R, Groeger JA (2013) Drivers Display Anger-Congruent Attention to Potential Traffic Hazards. *Applied Cognitive Psychology* 27: 178-189.
20. Deffenbacher JL, Huff ME, Lynch RS, Oetting ER, Salvatore NF (2000) Characteristics and treatment of high anger drivers. *Journal of Counselling Psychology* 47: 5-17.

21. Matthews G, Dorn L, Glendon AI (1991). Personality correlates of driver stress. *Personality and Individual Difference* 12: 535-549.
22. Nesbit SM, Conger JC, Conger AJ (2007). A quantitative review of the relationship between anger and aggressive driving. *Aggressive and Violent Behaviour*, 12: 156-176.
23. Lawton R, Parker D, Stradling SG, Manstead ASR (1997a). Predicting road traffic accidents: The role of social deviance and violations. *British Journal of Psychology*, 88, 249-262.
24. Parker D, West R, Stradling S, Manstead AS (1995) Behavioural characteristics and involvement in different types of traffic accident. *Accid Anal Prev* 27: 571-581.
25. Sarma KM, Carey RN, Kervick AA, Bimpeh Y (2013) Psychological factors associated with indices of risky, reckless and cautious driving in a national sample of drivers in the Republic of Ireland. *Accid Anal Prev* 50: 1226-1235.
26. Iliescu D, Sârbescu P (2013) The relationship of dangerous driving with traffic offenses: A study on an adapted measure of dangerous driving. *Accid Anal Prev* 51: 33-41.
27. Parry M (1968). *Aggression on the road*. London, Tavistock.
28. Marsch P Collett P (1986) *Driving passion: The psychology of the car*. Boston: Faber and Faber.
29. Lawton R, Parker D, Manstead ASR, Stradling SG (1997b) The role of affect in predicting social behaviours: The case of road traffic violations. *Journal of Applied Social Psychology* 27: 1258-1276.
30. Parker D, Lajunen T, Stradling S (1998) Attitudinal predictors of interpersonally aggressive violations on the road. *Transportation Research Part F: Traffic Psychology and Behaviour* 1: 11-24.
31. Krahe B, Fenske I (2002) Predicting aggressive driving behavior: The role of macho personality, age, and power of car. *Aggressive Behavior* 28: 21-29.
32. Herrero-Fernández D (2013) Do people change behind the wheel? A comparison of anger and aggression on and off the road. *Transportation Research Part F* 2: 66-74.
33. Joint M (1995) *Road rage*. London: Automobile Association
34. McGarva AR, Steiner M (2000) Provoked driver aggression and status: A field study. *Transportation Research Part F* 3: 167-179.
35. Hauber AR (1980). The social psychology of driving behaviour and the traffic environment: Research on aggressive behaviour in traffic. *International review of Applied Psychology* 29: 461-474.
36. Sullman M JM, Gras ME, Cunill M, Planes M, Font-Mayolas S (2007) Driving anger in Spain. *Personality and Individual Differences* 42: 701-713.
37. Campbell A (1997) Sex differences in aggression: Does social representation mediate form of aggression? *British Journal of Social Psychology* 36: 161-171.
38. Thomas SP (1989) Gender differences in anger expression: health implications. *Res Nurs Health* 12: 389-398.
39. Dahlen ER, Ragan KM (2004) Validation of the propensity for angry driving scale. *J Safety Res* 35: 557-563.
40. Galovski TE, Bushman EB (2004) Road rage: A domain for psychological intervention? *Aggression and Violent Behavior* 9: 105-127.
41. Iglesias B, Gázquez-Fraguela JA, Luengo-Martín A (2012) Driving anger and traffic violations: Gender differences. *Transportation Research Part F*, 15, 404-412.
42. Kring AM (2000) Gender and anger. In Fischer, A. H. (Ed.). *Gender and emotion: Social psychological perspectives*. Cambridge University press.
43. Spielberger CD, Reheiser EC, Sydeman SJ (1995) Measuring the experience, expression and control of anger. In Kassirer (Ed.). *Anger disorders definition, diagnosis and treatment*. Washington DC: Taylor and Francis, USA.
44. Deffenbacher J L, Oetting ER, Lynch RS (1994) Development of a driving anger scale. *Psychological Reports* 74: 83-91.
45. Trafikanalys (2015) Average mileage per year for personbi parts owned by natural persons .
46. Aron A, Aron EN (1998) *Statistics for Psychology*. Prentice Hall, Upper Saddle River, New Jersey.
47. Parker D, Lajunen T, Summala H (2002) Anger and aggression among drivers in three European countries. *Accid Anal Prev* 34: 229-235.
48. Novaco RW (1989) *Aggression on roadways*. California University of Berkeley. Transportation Center. Reprint 16. Irvine, CA.
49. Sullman MJM (2015) The expression of anger on the road. *Safety Science* 72: 153-159
50. Tsytserer SV, Grodnitzky GR (1995) Anger and Criminality. In Kassirer (Edn). *Anger disorders definition, diagnosis and treatment*. Washington DC: Taylor and Francis, USA
51. Weiner B (1993) On sin versus sickness. A theory of perceived responsibility and social motivation. *Am Psychol* 48: 957-965.
52. Terry DJ, Hogg MA, White KM (1999) The theory of planned behaviour: self-identity, social identity and group norms. *Br J Soc Psychol* 38 : 225-244.
53. Albarracín D, Johnson BT, Fishbein M, Muellerleile PA (2001) Theories of reasoned action and planned behavior as models of condom use: a meta-analysis. *Psychol Bull* 127: 142-161.
54. Ajzen I (1991) The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes* 50: 179-211.

This article was originally published in a special issue, **Driver Safety** handled by Editor(s). Prof. Jibo He, Wichita State University, USA