

Can age, sensation-seeking and impulsivity predict angry thoughts of Romanian drivers?

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Abstract: The problems which result from traffic accidents are very well-known world-wide. Very few researchers have studied this problem in Romania. Therefore one of the article's objectives is to explore this issue on the Romanian population. This current study focuses on the angry thoughts of Romanian drivers which can lead to serious problems on the roads. We wanted to explore a part that triggers the drivers' angry thoughts in order to discover what causes them to appear and why. We used regression analysis to see if age, sensation-seeking and impulsivity can predict angry thoughts. This sample analysis included 1557 drivers (977 men) from different cities all over Romania. The results showed that impulsivity and sensation-seeking predicted the drivers' angry thoughts. However, age predicted the angry thoughts only for young drivers, as older drivers usually tried to cope with them and drove safely.

Keywords: anger, angry thoughts, sensation-seeking, impulsivity.

1. Driving anger and angry thoughts

Many studies have differentiated between trait anger which is the general tendency to become angry in all types of situations and state anger which refers to the predisposition of an individual to become angry in a given context (Deffenbacher, Oetting, Lynch & Morris., 1996). Therefore several anger related concepts adapted to different situations have been developed, among which driving-anger. Driving anger was conceptualized as a context-specific type of trait-anger, related to driving (Deffenbacher, Oetting & Lynch, 1994; Villieux & Delhomme, 2010).

A person's predisposition to experience anger while driving and the type of contexts encountered on the road may surely influence a driver's reaction on a behavioral and emotional level (Deffenbacher, Lynch, Oetting & Yingling, 2001; Deffenbacher, Deffenbacher, Lynch & Richards, 2003). When it comes to human interactions, we were created as distinct individuals with different personalities and boundaries; this is why the way drivers perceive and code a driving event can make a difference when it comes to anger. For example, two drivers can be faced with exactly the same context (a driver who does not allow someone to pass his/her car on the road, accelerating every time they try to overtake them) and code it differently:

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one driver can ignore the person thinking that he/she represents a risk on the roads and lets them do what they want, while the other one can perceive his/her behavior as a personal attack and can start thinking of different ways to get revenge.

This type of cognitive processing can lead to an elevated level of arousal triggering hostile gestures, verbal aggressiveness and usage of the car to express their anger and get revenge. These cognitive processes can lead to two types of situations: anger and acting accordingly to one's feelings, resulting in aggressive driving behaviors or coping strategies in order to relax and concentrate on driving safely (Deffenbacher, Petrilli, Lynch, Oetting & Swaim, 2002).

As we can see, the situation the two drivers are facing in our example is the same, but the consequences on the emotional and behavioral levels are quite different. Therefore the ways that drivers think of frustrating situations encountered on the road is very important for the way they react and behave as well as for the well being of both the driver and his/her passengers.

The concept of angry thoughts was introduced in transportation psychology by Deffenbacher, Petrilli, Lynch, Oetting and Swaim (2003), developing a questionnaire which measures it. This concept is comprised of four dimensions as follows: Judgmental/Disbelieving Thinking (refers to questioning other drivers and their driving, how other drivers should not be allowed to drive, rhetorical questions about others' driving skills), Pejorative Labeling/Verbally Aggressive Thinking (refers to harsh and negative statements about other drivers, calling them names and even thinking about how angry the driver is and how he/she could engage in verbally aggressive behaviors), Revenge/Retaliatory Thinking (refers to thinking about revenge and retaliation) Physically Aggressive Thinking (the items involved in the desire to physically hurt another driver) and Adaptive/Constructive Expression (refers to focusing on coping strategies in order not to express anger: listening to music, relaxing, etc.) (Deffenbacher et al., 2003).

Research on angry drivers shows that the type of contexts encountered during driving and the predisposition of the drivers to become angered influences the behavioral and emotional reactions of the road users (Deffenbacher et al., 2001; Deffenbacher et al., 2003). Researchers argue that provocations increase the likelihood of hostile thoughts, aggressive behavior and negative emotional experiences (Anderson & Bushman, 2002).

The cognitive processes and thoughts experienced by the drivers while being on the road can lead to aggressive driving behavior and serious injuries or even deaths. This is why it is important to see which personality traits favor the appearance of angry cognitions in order to better understand them and help drivers cope.

2. Impulsivity, sensation-seeking and aggressive driving

Impulsivity refers to the extent of control which an individual has over his/her thoughts and behaviors (Patton, Stanford & Barrat, 1995). Impulsivity can also be explained as a person's predisposition to react rapidly and unplanned to internal and external stimuli, without analyzing the negative consequences of his/her actions (Chamberlain & Sahakian, 2007). Impulsivity is an essential element which renders many public health concerns such as: kleptomania (Bayle et al., 2003), risky sexual behaviors (Black, Serowik & Rosen, 2009), risk of HIV infection (Bornovalova, Gwadz, Kahler, Aklin & Lejuez, 2008), domestic violence (Shorey, Brasfield, Febres & Stuart, 2010) and a series of adverse consequences: driving violations (Paaver, Eensoo, Pulver & Harro, 2006), police arrest (Nilsson, Bromander, Anckarsater, Kristiansson, Forsman, Blennow et al., 2010), driving injuries (Cherpitel, 1999) and aggressive driving (Galovski & Blanchard, 2002, 2004).

Impulsivity has been defined in many ways, for example Zuckerman (1993) defined it as a tendency to react on impulse and a search for intense emotions. Paulsen and Johnson (1980) and Steinberg (2010) concluded that impulsivity presents developmental aspects because it reaches its peak during the period of adolescence and starts to decrease after the maturation of the cognitive control capacities.

According to Xu, Li & Jiang (2014) impulsivity is considered to be one of the major causes of aggressive driving. Regarding the liaison between impulsivity and aggressive driving, the research in this area shows that it can be linked to aggressive behavior on the roads but only in certain situations that trigger the aggressive behavior. Drivers who have high scores on impulsivity tend to interpret other's behavior as a challenge and to react accordingly (Lajunen & Parker, 2001).

Sensation seeking is another factor which has been explored in research targeting aggressive driving. According to Zuckerman (1990, 1994) sensation-seeking is an individual's tendency to seek and enjoy new and diverse experiences, and their willingness to take risks (such as: social, legal, physical, financial, etc.) just for the sake of experiencing such states. Zuckerman (1990) also stated that individuals with high levels of sensation seeking are more predisposed to risky behaviors while driving, such as: drink driving, racing, not wearing seat belts and speeding (Arnett, 1990, Arnett, Offer & Fine, 1997). Individuals high on sensation seeking are more prone to be involved in collisions.

Another study, which examined sensation seeking, driving anger and impulsiveness (Dahlen, Martin, Ragan & Kuhlman, 2005), concluded that sensation seeking predicts the following behaviors while driving: aggressive

and risky driving, verbally and physically aggressive driving, lapses in concentration and the use of the vehicle in order to express anger.

In conclusion, according to the studies mentioned above, impulsivity and sensation-seeking can predict driving anger and aggressive behavior, but taking into consideration the fact that these two concepts are closely related to angry thoughts while in traffic, we decided to see if they could also predict the Romanian drivers' angry thoughts, elaborating the following hypotheses:

Hypothesis 1: Impulsivity will predict drivers' angry thoughts (Judgmental and Disbelieving Thinking, Pejorative Labeling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking and Coping Self-instruction) in both men and women. The more impulsive a driver is, the more angry thoughts he/she will have.

Hypothesis 2: Sensation-seeking will predict drivers' angry thoughts (Judgmental and Disbelieving Thinking, Pejorative Labeling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking and Coping Self-instruction). Drivers high on sensation seeking will be more prone to experience angry thoughts, than drivers low on sensation seeking.

Hypothesis 3: Age will predict drivers' angry thoughts (Judgmental and Disbelieving Thinking, Pejorative Labeling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking and Coping Self-instruction). The younger a driver is, the angrier his/her thoughts are while in traffic.

Hypothesis 4: Impulsivity, age and sensation-seeking will predict drivers' angry thoughts (Judgmental and Disbelieving Thinking, Pejorative Labeling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking and Coping Self-instruction) in both men and women. We assume that there are no gender differences when it comes to experiencing angry thoughts.

3. Method

a. Participants

The initial sample included 2200 Romanian drivers, all recruited through voluntary participation. A minimum of 5000 driven km was required in order to ensure that the driver had the minimum necessary experience to complete the questionnaire (all submissions with less than 5000 km driven were discharged). Also we were interested only in amateur drivers, and we introduced a filter at the end of the questionnaire asking the drivers to specify if they were amateurs or professional drivers, allowing us to discharge the questionnaires from professional drivers. Finally, we

discharged 643 questionnaires as they were completed by drivers who had driven less than 5000 km until the moment they agreed to participate (their experience ranged from 200 – 3570 kilometers, their age ranged from 18-52 years) and 250 questionnaires completed by professional drivers (with ages ranging from 30 – 54 years)

The final sample included 1557 drivers (977 men and 580 women) from different cities in Romania. The participants' ages ranged from 18 to over 61 years old (the average age was 30.41, $SD=1.14$) and the average number of kilometers driven until the moment of evaluation was 80,000.

b. Measures

In order to assess impulsivity we used the Barratt Impulsiveness Scale (1994), an instrument designed to measure the behavioral construct of impulsiveness. The instrument is comprised of 30 items which describe impulsive and non-impulsive behaviors. The items are scored on a 4-point scale (from 1-never to 4 – always). The instrument's consistency coefficient was .75.

For the sensation-seeking measures we used the Driver Stress Inventory (Matthews, Desmond, Joyner, Carcardy & Gililand, 1997). This instrument has a consistency coefficient of .894, and was designed to measure stress vulnerability in the driving context, contains 41 items which measure 5 stable dimensions of driving: aggression, dislike of driving, hazard monitoring, fatigue proneness and thrill/sensation-seeking in the driving context. Driver Stress Inventory has been found to be associated with violations, risk taking (Dorn and Matthews, 1995) and self reported crashes (Matthews, Dorn & Glendon, 1991). We chose to use this instrument because the situations described by its items are relevant to traffic contexts, in comparison with other instruments which measure the global concept of sensation seeking.

We used Deffenbacher, Petrilli, Lynch, Oetting and Swaim's questionnaire from 2003. DATQ has 65 items and drivers had to rate every item on a 5-point scale (ranging from 5-not at all to 1-all the time) regarding how often they experience thinking of certain things while in traffic. DATQ is comprised of five scales related to angry cognitions, as follows: Judgmental and Disbelieving Thinking ($\alpha = .938$), Pejorative Labeling and Verbally Aggressive Thinking ($\alpha = .904$), Revenge and Retaliatory Thinking ($\alpha = .861$), Physically Aggressive Thinking ($\alpha = .830$) and Coping Self-instruction ($\alpha = .849$).

c. Procedure

The participants were asked to complete a survey over the internet, guaranteeing them their anonymity. The questionnaire was designed in a

manner that would not allow a person to submit it, unless all the fields were correctly completed. The questionnaire was built using Google-Docs, and all the answers were saved automatically on a spreadsheet. In order to gather all the data, the questionnaire was posted on different internet sites and forums dedicated to drivers and the problems they encounter on the roads

4. Results

In order to analyze the data we used regression/prediction as a statistical analysis. The main effect predictors were sensation-seeking, impulsiveness and age. The first table (table 1) presents the correlations between predicting variables (gender, age, sensation-seeking, impulsive behavior) and dependent variable aggressive thoughts (Judgmental and Disbelieving Thinking, Pejorative Labeling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking and Coping Self-instruction).

Table 1 – Correlations between predicting variables and dependent variables

	1	2	3	4	5	6	7	8
1. Gender	-							
2. Age	-.03	-						
3.JD	.09**	-.15**	-					
4. PLVA	.07**	-.26**	.72**	-				
5.RRT	-.17**	-.09**	.33**	.47**	-			
6. PAT	-.15**	-.18**	.36**	.58**	.66**	-		
7. CO	.00	.14**	.36**	.04	-.006	-.04	-	
8. SSS	-.23**	-.30**	.13**	.34**	.37**	.40**	-.09**	-
9. IB	.05*	-.07**	.21**	.25**	.23**	.20**	.11**	.20**

Note: Dimensions of angry thinking JD - Judgmental and Disbelieving Thinking; PLVA - Pejorative Labeling and Verbally Aggressive Thinking; RRT - Revenge and Retaliatory Thinking; PAT - Physically Aggressive Thinking; CO - Coping Self-instruction. SSS – Sensation Seeking Scale; IB – Impulsive Behavior.

**p<0.01, * p<0.05

When it comes to men we can see from Table 2 that all the models were significant. Judgmental thinking was predicted by age, sensation seeking and impulsive behavior ($R^2 = .084$, $F(3, 976) = 29.656$, $p < .001$). Table 2, also presents the predictors of Judgmental thinking in women. As in the men's case, all three predictors were statistically significant. Judgmental Thinking was predicted by age, sensation-seeking and impulsive behavior ($R^2 = .055$, $F(3, 579) = 11.280$, $p < .001$).

Table 2 - Predictors of Judgmental thinking in women & men

Judgmental thinking	Predictor	B		Std. error		β		t		R ²		R ² change	
		F	M	F	M	F	M	F	M	F	M	F	M
Model I	Age	-1.49	-2.42	.57	.41	-.10	-.18	-2.63	-5.79	.01	.03	.01*	.03***
Model II	Age	-.97	-1.87	.59	.44	-.07	-1.41	-1.63	-4.25	.02	.04	.01*	.01***
Sensation seeking	Sensation seeking	.36	.28	.12	.07	.12	.12	2.92	3.75				
Model III	Age	-.93	-1.91	.58	.43	-.06	-.14	-.06	-4.42	.05	.08	.02***	.03***
Sensation seeking	Sensation seeking	.27	.17	.12	.07	.09	.07	.09	2.28				
Impulsive behavior	Impulsive behavior	.40	.42	.09	.67	.17	.19	.17	6.24				

Note: For women: N=580, R² = .055, F(3, 579)=11.280 , p<.001; For men: N=977, R² = .084, F(3, 976)=29.656, p<.001
***p<.001, **p<.01; *p<.05

Table 3 - Predictors of Pejorative thinking and Verbally Aggressive thinking in women & men

Pejorative thinking and Verbally Aggressive thinking	Predictor	B		Std. error		β		t		R ²		R ² change	
		F	M	F	M	F	M	F	M	F	M	F	M
Model I	Age	-1.99	-2.21	.33	.24	-.23	-.27	-5.87	-9.02	.05	.07	.05***	.07***
Model II	Age	-1.26	-1.29	.34	.24	-.15	-.16	-3.69	-5.26	.13	.18	.07***	.10***
	Sensation seeking	.50	4.82	.07	.04	.28	.34	7.02	11.33				
Model III	Age	-1.24	-1.31	.33	.24	-.14	-.16	-3.68	-5.46	.16	.21	.02***	.03***
	Sensation seeking	.44	.42	.07	.04	.25	.30	6.22	9.79				
	Impulsive behavior	.24	.23	.05	.03	.17	.18	4.49	6.35				

Note: For women: N=580, R² = .160, F(3, 579)=36.581, p<.0001; For men: N=977, R² = .185, F(2, 976)=110.3, p<.0001
***p<0.001; **p<0.01; *p<0.05

Table 3 presents the predictors of Pejorative Thinking and Verbally Aggressive Thinking in women and men. All three predictors were statistically significant and Judgmental Thinking was best predicted by the third model with all three predictors in both men ($R^2 = .185$, $F(2, 976) = 110.3$, $p < .0001$) and women ($R^2 = .160$, $F(3, 579) = 36.581$, $p < .0001$).

As we can see in Table 4, the best model to predict Revenge and Retaliatory Thinking in men was the third model comprised of age, sensation seeking and impulsive behavior ($R^2 = .173$, $F(3, 976) = 67.630$, $p < .001$). As for women, the best model which predicted Revenge and Retaliatory Thinking, was also the third one which comprises all the predictors ($R^2 = .101$, $F(3, 579) = 21.609$, $p < .001$).

In the case of Physically Aggressive Thinking (Table 5) in women we can see that age, sensation seeking and impulsive behavior are the best predictors for physically aggressive thinking ($R^2 = .209$, $F(3, 976) = 85.555$, $p < .001$). When it comes to men we can also see that the third model explains it better. All three predictors were significant statistically ($R^2 = .160$, $F(3, 579) = 36.581$, $p < .001$).

The last level of the dependent variable, Coping self-instructions was best predicted by the third model which contains all the variables (age, sensation-seeking, impulsive behavior) in both men ($R^2 = .049$, $F(3, 976) = 16.70$, $p < .001$) and women ($R^2 = .035$, $F(3, 579) = 6.86$, $p < .001$), as it results from Table 6.

Table 4 - Predictors of Revenge & Retaliatory thinking in women & men

Revenge & Retaliatory thinking	Predictor	B		Std. error		β		t		R ²		R ² change	
		F	M	F	M	F	M	F	M	F	M	F	M
Model I	Age	-.17	-.63	.13	.16	-.05	-.12	-1.29	-3.80	.003	.01	.003	.001***
Model II	Age	.11	.008	.13	.16	.03	.001	.83	.47	.08	.13	.07***	.12***
	Sensation seeking	.20	.33	.02	.02	.29	.36	6.98	11.62				
Model III	Age	.12	-.007	.13	.16	.03	-.001	.85	.04	.10	.17	.21***	.38***
	Sensation seeking	.18	.29	.02	.02	.26	.31	6.29	10.03				
	Impulsive behavior	.08	.17	.02	.02	.14	.20	3.63	6.67				

Note: For women: N=580, R² = .101, F(3, 579)=21.609 , p<.001; For men: N=977, R² = .173, F(3, 976)=67.630, p<.001
***p<0.001; **p<0.01; *p<0.05

Table 5 - Predictors of Physically aggressive thinking in women & men

Physically aggressive thinking	Predictor	B		Std. error		β		t		R ²		R ² change	
		F	M	F	M	F	M	F	M	F	M	F	M
Model I	Age	-.26	-.83	.09	.11	-.23	-.23	-.58	-7.57	.01	.05	.05****	.05****
Model II	Age	-.06	-.38	.10	.10	-.15	-.10	-.36	-3.52	.08	.18	.07****	.13****
	Sensation seeking	.13	.23	.02	.01	.28	.38	7.02	12.51				
Model III	Age	-.06	-.39	.09	.10	-.14	-.11	-3.68	-3.64	.09	.20	.02****	.02****
	Sensation seeking	.12	.21	.02	.01	.25	.34	6.22	11.13				
	Impulsive behavior	.04	.08	.01	.01	.17	.15	4.94	5.25				

Note: For women: N=580, R² = .160, F(3, 579)=36.581 , p<.001; For men: N=977, R² = .209, F(3, 976)=85.555, p<.001
 ***p<.001; **p<.01; *p<.05

Table 6 - Predictors of coping self-instruction in men & women

Coping self instruction	Predictor	B		Std. error		β		t		R ²		R ² change	
		F	M	F	M	F	M	F	M	F	M	F	M
Model I	Age	.86	.92	.24	.20	.14	.14	3.51	4.60	.02	.21	.02***	.02***
		Model II	Age	.81	.77	.25	.21	.13	.12	3.13	3.63	.02	.02
Model III	Sensation seeking			-.04	-.07	.05	.03	-.03	.07	-.72	-2.13		
		Sensation seeking	Age	.82	.75	.25	.21	.13	.12	3.18	3.61	.03	.04
Impulsive behavior	Sensation seeking			-.06	-.12	.05	.03	-.05	-.11	-1.20	-3.22		
		Impulsive behavior	Impulsive behavior	.11	.16	.04	.03	.11	.15	2.74	4.86		

Note: For women: N=580, R² = .035, F(3, 579)=6.86, p<.001; For men: N=977, R² = .049, F(3, 976)=16.70, p<.001; p<.001 ***p<0.001; **p<0.01; *p<0.05

5. Discussions

In this present study age, sensation-seeking and impulsive behaviors were hypothesized to predict aggressive thinking of the drivers, while on the road. The results obtained partially support our hypotheses, given the small values of the R^2 coefficients. As we assumed in the beginning, aggressive thinking (comprised of Judgmental and Disbelieving Thinking, Pejorative Labeling and Verbally Aggressive Thinking, Revenge and Retaliatory Thinking, Physically Aggressive Thinking and Coping Self-instruction) was predicted by age, sensation-seeking and impulsive behavior of the drivers.

Drivers high on sensation-seeking and impulsive behavior tend to think more aggressively than those with lower levels. This result is in line with other studies (Giambra, Camp & Grodasky, 1992; Zuckerman, 1994). Sensation-seeking refers to an individual's tendency to seek and enjoy experiences with a high-risk degree. Therefore, we can assume that these types of individuals are more likely to think aggressively when they do not obtain what they are searching for – risky situations and high-adrenaline activities while on the road. This is why they search for these types of situations according to their retaliatory thoughts.

Both sensation seeking and impulsive behavior correlated negatively with age which means that they both decrease with age. Therefore the older the drivers get, the less aggressive and dangerous their behavior is on the roads. This result can easily be explained. As people get older their priorities change, and they tend to put their family first, thus giving up the behaviors that could endanger their close ones or situations that could affect them. The research of Bachoo, Bhagwanjee & Govender (2013) sustains this idea: in their research older drivers (25 years and older) have reported negative attitudes with respect to violating traffic rules, careless driving and speeding (all aspects of aggressive behavior). Another result of their study showed that older drivers have scored lower on sensation seeking and urgency in life (impulsivity).

All the dimensions of the angry thoughts' questionnaire correlated negatively with age, except for the coping self-instructions dimension. Therefore the older the adults are, the more cautious they drive, trying to cope with frustration and anger-provoking events on the road. This result is supported by the study of González-Iglesias, Gómez-Fraguela & Luengo – Martín (2012) which sustains that anger and aggressive behaviors on the roads decrease with age. It is well-known that younger drivers are more prone to exhibit aggressive behaviors while driving (Haje & Symbaluk, 2014; Sullman, Stephens & Kuzu, 2013; Sullman, Stephens, & Yong, 2014; Wickens, Mann, Stoduto, Lalomiteanu, & Smart, 2011). González-Iglesias et al. (2012) found that age is negatively correlated with verbal aggression and hostile gestures on the roads and positively correlated with constructive

ways of expressing anger in traffic. Therefore, we can state that the higher-vulnerable group is represented by younger drivers, which act on impulse and search for new and intense sensations while on the road.

We found no differences between men and women when it comes to experiencing angry thoughts. Women can think just as aggressively as men do and can get angered by the same contexts on the road as men, but that does not necessarily mean that they will act accordingly. Women and men differ only in the ways of expressing their anger on the roads (Deffenbacher et al., 2004). This result is partially sustained by the study of Deffenbacher et al. (2003) who found that men and women do not differ in the tendencies of engagement in judgmental & disbelieving thinking, pejorative & verbally aggressive thinking or coping-self instructions but when it comes to revenge/retaliatory and physically aggressive thinking men scored higher.

Limitations and direction of future research

One of the most obvious limits of this present study concerns the use of self-reported measures in the collection of data, due to the difficulty in gathering objective measures of a driver's thoughts, levels of sensation-seeking or impulsivity. Therefore it raises concerns about the drivers' willingness to answer truthfully, and the results can be contaminated by biases (Podsakoff, MacKenzie, Lee & Podsakoff, 2003), although previous researches sustain that the use of self-reported instruments is not biased by social desirability and is relatively reliable (Lajunen & Summala, 2003). Future research may focus on methods of gathering the information of angry thoughts by using board-journals (where drivers can write down every thought or emotion that they experience during driving), simulators, or they could use cameras to record the reactions and the verbal expressions of thoughts during the journeys.

Second, excepting age and gender, we did not analyze other demographic variables, which can influence and predict the drivers' angry thoughts; consequently, it is important for future research to take into consideration factors such as: education, marital status and provenience of the drivers (rural or city).

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