Subjective Perception of Risk, in Relation to Personality Factors

Carmen-Valentina POALELUNGI[1], Corneliu-Eugen HAVÂRNEANU[2]

Abstract This present research is aimed at examining the personality factors which predict risk perception in traffic, in a Romanian context. Also, the connection between risk perception in traffic and driving behavior, as well as the variables which predict the latter were analyzed. The study was carried out among 232 subjects, 119 of which were male, and 113 female. A questionnaire was composed of 76 items, divided into 5 subscales, was used in order to measure the independent variables (sensation seeking, normlessness, driving anger, altruism and anxiety). For the measurement of the dependent variables, we used a set of 30 traffic images on which the subject was asked to answer 5 questions.The overall results show anxiety as a predictor for risk perception; however it explains only 5% of the variance. As expected, risk perception and excitement prediction, in turn, had a percentage of 7.2% of the speed which subjects prefer to use. Based on previous studies, we expected other personality variables to explain risk perception and driving behavior. Also, because of the fairly low variance explained by the predictive model validated as significant, analysis were performed for each situation provided in the questionnaire, thus supporting the principle according to the participants in traffic who are strongly influenced in their actions by their mood and by the situational context. Consistent with previous studies, gender and age differences were shown to exist in regard to risk perception and driving behavior.

Keywords: traffic, risk, sensation seeking, normlessness, driving, altruism, anxiety

Introduction

Studying risk perception in traffic presents interest mostly because of the efforts of the specialists to diminish the number of traffic accidents. Increasing the responsability level of the drivers can be achieved through media awareness campaigns, or by educating future drivers still in training. Thus, relevant results in this field could help direct educational efforts in the case of beginner drivers, and/or conduct awareness campaigns regarding traffic safety which take into account that the messages need to be constructed in different ways, depending on the targeted subgroup.

As shown in the existing literature in this field, young drivers are the ones most often involved in traffic accidents, compared to other age groups (Bjornskaug, 2000 and Summala, 1987). Also in previous research, it was shown

[1] Alexandru Ioan-Cuza University, e-mail: carmenpoalelungi@yahoo.com
[2] Alexandru Ioan-Cuza University

that young drivers tend to have riskier driving behavior than other drivers. For example, they are more likely to drive at high speeds, or very close to the vehicle in front of them, or conduct dangerous overtakings, compared to other drivers (Gregersen & Bjurulf, 1996). The main causes for these situations were considered to be a lack of abilities and experience, adding here the adolescents' error of perception regarding their own ability to drive. This seems to happen, most likely, due to the fact that young drivers tend to underestimate risky situations in traffic (Brown & Groeger, 1988, Deery, 1999 cit. in Ullberg, 2002) and due to their predilection to consider themselves invulnerable in risk situations (Millstein, 1993).

It is not very clear, however, if risk taking in traffic and involvement in accidents are determined by intentional behavior, lack of abilities, or both. Either way, according to the existing theory, the degree of involvement in accidents and the predilection of assuming risky behavior in traffic are corelated with certain personality traits.

Among the personality traits that were associated frequently with a risky life style, a risky driving style and the frequency of involvement in accidents, are sensation seeking, social deviance, hostility, agression, impulsiveness, emotional liability, and a low level of altruism (Beirness, 1993; Elander, West & French, 1993; Jonah, 1997, Underwood, Chapman, Wright and Crundall, 1999; West & Hall, 1997 cit. in Ullberg, 2002).

The studies which aimed at analyzing the role of individual differences in risk taking in traffic have targeted, generally, the individual contribution of these personality variables. There is, however, little reasearch which is centered on identifying the drivers who represent a high risk in traffic, by identifying the existing personality subtypes, based on the analysis of the combinations of certain personality variables.

In 1999, Deery and Fildes identified 5 personality subtypes for young drivers, by applying personality and driving behavior measuring instruments. Two of these subtypes were considered high risk groups: the subjects reported risky driving behavior, a low traffic accident record, and negative attitudes toward traffic safety. These subgroups were characterized by a high level of „sensation seeking", hostility, offensive tendencies, and traffic aggressions. One of the groups also presented a high level of depression and irritability as well as low scores for emotional balance. Aproximatly 80% of the subjects from the two subgroups were men.

Donovan, Umlauf and Salzburg, in 1988 (cit. in Ullberg, 2002), found 3 such factors. One factor was characterized by high levels of impulsiveness, agression, sensation seeking and hostility. Another factor was characterized by hostility, depression and a low level of emotional balance. The third factor was characterized as well as adapted, which meant the subjects did not have high scores for any of the analyzed personality dimensions.

Wilson, 1991 described 4 existing factors, only one of these considered to be well adapted, the other ones being characterized by high levels of „sensation seeking", hostility and iresponsability; or „emotional instability" - with a high level of hostility, but a low level of „sensation seeking", or characterized by depression and personal problems.

In his work in 2002, Ullberg describes the existence of 6 types of young drivers. The author took into consideration the analysis of 6 personality traits: sensation seeking, anxiety, agression, normlessness, altruism and driving anger. These were related to risk perception in traffic and self-reported driving behavior, with the goal of observing whether the population of young drivers is homogenous or formed by more subcategories of individuals characterized in different ways.

Starting from this data, Machin and Sankey (2008a), analyzed the extent of the personality factors suggested by Ulleberg which predicted the perception of risk and driving behavior in; this only confirmed some of the previously presented data.

Gender was also reported to be related to risky driving behavior, men tending to take more risks compared to women. It was considered that this tendency can be related to evolution, representing an adaptation to the requirements of the environment (Buss, 2004 cit. in Oltedal, Rundmo, 2006). Regarding driving behavior, gender differences were reported on different occasions. Yagil, 1998 (cit. in Oltedal, Rundmo, 2006) discovered male drivers are less motivated to respect the rules, especially young drivers. Whissell and Bigelow, 2003 (cit. in Oltedal, Rundmo, 2006) suggests, also, that accidents appear depending on gender. Moreover, risky driving represents a factor which influences accidents and deaths, especially among men (Vavrik, 1997 cit. in Oltedal, Rundmo, 2006). Rosenbloom and Wolf, 2002 (cit. in Oltedal, Rundmo, 2006) reported riskier methods used by men to overcome danger, compared to those used by women.

Driving experience associated with a high accident risk rate seems to be, also, one of the variables which determines a significant difference regarding risk perception in traffic (Sumer, Unal and Birdal, 2007). Previous research shows that inexperienced drivers get worse results during the risk perception process, both regarding scanning the road, detecting potential risk factors but also regarding the efficient actions taken to avoid accidents (Deery, 1999; Grayson & Groeger, 2000 cit. in Sumer, Unal şi Birdal, 2007). Falkmer şi Gregersen, 2001(cit. in Sumer, Unal şi Birdal, 2007) showed that beginner drivers tend to drive closer to the vehicle in front of them, than experienced drivers do. Beginners are more inefficient when it comes to observing risks at greater distances in traffic (Brown, 1982 cit. în Sumer, Unal şi Birdal, 2007), they fail in controlling and verifying the sides of the road (McKnight & McKnight, 2003 cit. in Sumer, Unal & Birdal, 2007), center their attention on the irrelevant elements in traffic and cannot predict the actions of another driver so that they can avoid potential dangers (Bjornskau & Sagberg, 2005 cit. în Sumer, Unal & Birdal, 2007).

So, to resume, we observe that there is theoretical and empirical data which supports the existence of personality factors in a more or less close relationship

with risk perception and driving behavior, one of the questions we can ask being to what extent can this data be confirmed in a Romanian context.

The research directions in this field are centered, at present, on finding answers regarding:

- The determinants of risk perception in traffic – the type of relationship existing between certain personality factors (such as anxiety, for example – Shahar, 2009) and the perception of risk in traffic. Thus, the goal is reaching a consensis regarding the number of the factors, as well as the ways to characterize the groups of drivers which can represent an increased risk in traffic.
- The degree in which we can talk about certain personality types which could predict the perception or risk only in the case of young drivers or older drivers.
- The degree in which the perception of risk depends on the driving experience, driver's gender or his/her provenience.
- The existence of a causal relationship between the perception of risk and driving behavior.
- How and why the perception of the expert differs from the perception of the beginners.

This research aims at establishing the personality factors which predict the perception of risk in traffic, in a Romanian context. Unlike previous research, this present study was conducted on a population of young drivers (less than 24 years old), but also on a population of drivers over 24 years of age, to see if differences are found regarding the way in which risk in traffic is perceived, depending on the age of the drivers.

Also, the method of measuring the perception of risk is different, this research using real traffic images, unlike the self-reporting questionnaires used in most of the previous research.

Scientifically, obtaining relevant data in this field would strenghten the perspective according to which the personality traits predict individual perceptions and the method of evaluation of the environment (McCrae & Costa, 1995 cit. in Ulleberg, 2002b), as previous research has showen (Matthews & Deary, 1998; Yagil, 2001 cit. in Ulleberg, 2002b). Also, it would contribute to existing information according to which personality traits can be put in relationship with traffic accidents but, until now, no limit has been drawn up to which we can discuss about the existence of this relationship (Elander, West and French, 1993 cit. in Gylfason, Thorisdottir, Peersen, 2004).

The objective and the hypothesis of the research

Starting from existing research, this present study aims at examining personality factors which predict perception of risk in traffic, in a Romanian context. Also, in this research, we are following the existing relationship between

perception of risk in traffic and driving behavior, as well as the variables which predict the latter. Thus, we can establish the following hypothesis:

H1. *Depending on the score obtained for each of the independent variables, there are personality factors which predict the degree of perception of risk in traffic differently.*

H2. *There is a significant relationship between the perception of risk and driving behavior.*

H3. *There are gender and age differences regarding the perception of risk and driving behavior.*

Method

Investigated sample

This research was conducted on 232 subjects, all of them having reported that they owned a driver licence. Of these, 88 subjects had driving experience of less than 10.000 km, 69 had a driving experience between 10.000 km and 50.000 km, and 75 subjects had more than 50.000 km behind the wheel. Around 40% of the subjects were 24 years of age or younger, while 60% were 25 and above. The sample had an almost even gender distribution, with 51% males and 49% females.

Variables

Independent Variables: sensation seeking, normlessness, driving anger, altruism, anxiety, gender, age, number of driven kilometers.

Dependent Variables: perception of risk (measured through the score for the item: Estimate, on a scale from 1 to 5, how dangerous the presented situation is, as a whole), *driving behavior* (operationalized through the speed prefered by the subject in a certain context)

Instruments

Data were collected using two instruments.

One instrument was used for the measurement of the independent variables. The questionaire was composed of a total of 76 items, divided into 5 subscales. The items were selected and adapted using already existing scales, according to:

- analysis of the statistical data we had acces to;
- the actuality of the items;
- the relevance for the context of the present research.

1. The subscale created for the measurement of sensation seeking, contains 20 items, taken from the AISS –*Jeffrey Arnett's Sensation Seeking Inventory*, constructed in 1994. Ten of these items refer to the *degree of novelty*, and the other 10, to the *degree of intensity*, according to the

author, the two mentioned aspects are the main components of „sensation seeking".

For each item, the answer is offered on a Likert type scale, from 1 to 6, where 1 signifies strong disagreement, and 6 signifies strong agreement. The higher the score for this subscale, the more the person is inclined toward sensation seeking.

2. The subscale created for the measurement of *normlessness*, consists of 10 items selected from a number of existing scales: Kohn and Schooler's Scale, 1983 (Seeman, 1991); Dean's Scale, 1961 (Seeman, 1991, pg 313); McClosky and Schaar, 1965 (Seeman, 1991, pg 321); Neal and Groat, 1974 (Seeman, 1991, pg 321-323). For each item, the answer is offered on a likert type scale, from 1 to 6, where 1 means *strongly disagree* and 6 signifies *strong agreement*. The higher the score to this subscale, the more likely it was for the person to breach the norms.
3. The subscale created for the measurement of driving anger, contains 18 items taken from DAS – Traffic Anger Scale, constructed în 1994 by Deffenbacher, Oetting and Lynch (found in the study of O'Brien, Tay şi Watson, 2002). The items are divided into 6 factors: lack of politeness in traffic (items 1-4), blocking traffic (items 5-7), hostile gestures in traffic (items 8-10), slow driving (items 11-13), police presence (items 14-16), breaking the norms in traffic (items 17-18). For each item, the answer is offered on a likert type scale, from 1 to 6, where 1 means very much anger, and 6 means very little anger. The lower the score obtained on this subscale, the more the person was inclined towards a higher degree of driving anger.
4. The subscale created for the measurement of *altruism*, contains 19 items, taken from SRA – Self-reported Altruism Scale, constructed in 1981 by Rushton, Chrisjohn and Fekken. For each item, the answer is given on a likert type scale, from 1 to 6, where 1 means very rarely, and 6 means very often. The higher the score obtained for this subscale, the more the person was inclined toward altruism.
5. The subscale created for the measurement of anxiety, contains 9 items taken from the IPIP Scale – The international Platform of Personality items (http://ipip.ori.org/ newNEOFacetsKey.htm). For each item, the answer is given on a likert type scale, from 1 to 6, where 1 means strong disagreement, and 6 strong agreement. The higher the score obtained for this subscale, the more the person was inclined toward a higher anxiety level.

For the measurement of the dependent variables**,** a set of 30 images containing traffic situations was used. Based on each image, the subject was required to answer 5 questions:

1. Note on the answering sheet the elements which, in your opinion, can contribute to the production of an accident.

2. Order the identified elements according to the probability that they represent the cause of an accident in a given situation (from the most dangerous, to the least dangerous).
3. Assess with a mark from 1 to 5, where 1 means „very low risk" and 5 means „very high risk", how dangerous the situation is, as a whole.
4. What is the optimal speed which should be used in this situation, to avoid any danger?
5. What is the speed you would prefer to use in a situation like this?

Question number 3 was used to operationalize the perception of risk, while question number 5 was used to operationalize driving behavior.

The 30 images were selected from a number of 60 images, which were in turn extracted from an initial collection of 713 traffic photos, taken on the roads of Romania. The 60 images were selected according to: the wideness of the road (2 lanes / 2 lanes + emergency lane / 4 lanes), right turn (less dangerous, dangerous), left turn (less dangerous, dangerous), visibility (high – front, to the right, to the left, low – front, to the right, to the left), presence of intersections, presence of buildings to the left, presence of buildings to the right, presence of light poles to the left, presence of light poles to the right, presence of trees to the left, presence of trees to the right, vegetation to the left, vegetation to the right, type of traffic present (heavy traffic, cars, carts, bicycles, pedestrians, animals), presence of traffic in the same direction, presence of traffic from the opposite direction, crossing pedestrians (legal, illegal), heavy traffic, cars, carts, bicycles, pedestrians, animals stationing on the roadway in the same direction, heavy traffic, cars, carts, bicycles, pedestrians, animals stationed on the roadway in the opposite direction, presence of pedestrian crossings (with/without pedestrian traffic), presence of animals next to the roadway on the left, presence of animals next to the roadway on the right, luminosity (day, night), quality of the road (dry/humid), bumpy road, weather conditions (clear, cloudy, precipitations), presence of ditches/parapets on the left, presence of ditches/parapets on the right, presence of utilities (bus station/gas station/halt), presence of police.

Subsequently, the 60 photos selected by the researchers were pre-tested by several experts, in order to fit different degrees of risk. Pre-testing resulted in the selection of 30 images depicting traffic situations, as shown in Table 1.

Table 1: *Pretest results*

Risk degree of the situation	Number of selected situations
Very low risk, speeds over 100 km/h	2
Low risk, speeds of 90-100 km/h	4
Fairly risky, speed of 80 km/h	6
Risky, speed of 60 km/h	13
Very risky, speed of 40 Km/h	6

Procedure

The research was conducted with the help of 40 students in psychology, as part of their reuirements for obteining research credits. Their task was to apply questionnaires on a sample of at least 5 subjects, identified and recruited by them according to the criterias given. The students were instructed regarding the instructions and the method of applying the questonnaire. They were offered a dead-line for the task, when the questionnaires were collected.

Results – statistical analysis and data interpretation

A first examination of the data was done through the frequency analysis, the analysis of the missing values as well as the distributions of the scores, for each variable. The results showed that the independent variables, as well as the dependent variables, have a normal distribution, and that no missing values existed for any of the cases.

Later, the Alpha-Crombach internal consistency coefficient was calculated for every questionnaire used. The only modification was done to the subscale measuring sensation seeking, where item number 2 was eliminated from the analysis in order to increase the value of the internal consistency coefficient. For the other subscales of the questionnaire, no modifications were needed, the values for the alpha cronbach coefficient being over 0.7, as is shown in table 2:

Table 2. *The value of the internal consistency coefficients*

Dimensions	$\alpha_{initial}$	Number of Items	α_{final}	Number of items
1. Sensation Seeking	0.687	20	0.693	19
2. Normlessness	0.766	10	0.766	10
3. Driving anger	0.860	18	0.860	18
4. Altruism	0.860	19	0.860	19
5. Anxiety	0.873	9	0.873	9

Also, two factor analysis were conducted, for the questionnaire measuring sensation seeking and for the one measuring driving anger, to see the extent to which the conceptual delimitations we started from were being respected.

It was observed that for measuring sensation seeking, the factor analysis shows the existence of 3 factors, instead of the two we had started with (novelty and intensity), which, together, explain 29% of the variance of the scores. Taking into account these results, for the following analysis, sensation seeking, only the total score was taken into account, without the deployment of the items into factors.

For the questionnaire measuring driving anger, the exploratory factor analysis confirms the existency of only 5 factors instead of the 6 we had originally started with, traffic blocking being the factor that didn't show up as a stand-alone factor. Together, the 5 factors explain 65.84% of the variance of the scores.

Although the results confirm most of our expectations, the following analysis took into account the total score obtained for the driving anger subscale, giving up the division in factors because, as we shall see further, this variable does not appear to be a good predictor for the perception of risk and driving behavior in most situations.

Results of the linear regression analysis. Table 3 presents correlations between variables included in the survey, variables which the regression analysis performed later were based on. In general, correlations between variables were low, which indicates that no multicoliniarity problems were present.

Table 3. Corelations between personality traits, risk perception and driving behavior

Dimensions	**1**	**2**	**3**	**4**	**5**
1.Age	1				
2. Number of kilometers	.377**	1			
3. Risk perception	.021	-.094	1		
4. Speed with which should circulate	-.004	-.012	-.199**	1	
5. Speed with which subjects would prefer	-.102	-.032	-.218**	.739**	1
6. Speed difference	.205**	.028	.045	.246**	-.472**
7. Sensation seeking	-.388**	-.169*	-.040	.037	.189**
8. Normlessness	-.153*	.047	-.085	.012	.090
9. Driving anger	.200**	.156*	-.022	-.031	-.098
10. Altruism	-.017	.134*	.094	-.040	-.011
11. Anxiety	.080	-.190**	.232**	.022	-.019

Dimensions	**6**	**7**	**8**	**9**	**10**
7. Sensation seeking	-.241**	1			
8. Normlessness	-.100	.270**	1		
9. Driving anger	.098	-.267**	-.294**	1	
10. Altruism	-.043	.129*	-.024	.011	1
11. Anxiety	.051	-.169**	.165*	-.192**	.03

* p< 0.05, ** p< 0.001

Thus, multiple linear regression analysis was conducted, using the forward method.

The results of the regression analysis, with the personality traits (Sensation seeking, normlessness, driving anger,altruism, anxiety) and demographic variables (age, number of kilometers) included as predictors for perception of risk in traffic are presented in the figure below:

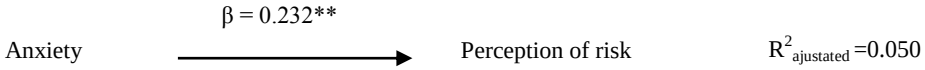

Figure 1. *Risk perception prediction model, N=232, * p< 0.05, ** p< 0.001*

We can see that the predictive model for the perception of risk in traffic contains only „anxiety" from all of the variables included in the analysis. Although the predictive model explains 5% of the scores' variance for the perception of risk,

the obtained data supports the already existing empirical data and confirms the assumption that the perception of risk could be an intermediate variable between anxiety and driving behavior (Elander et al., 1993 cit. în Shahar, 2009).

Figure 2 presents the results for the regression analysis with personality traits (sensation seeking, normlessness, driving anger, altruism, anxiety), the demographic variables (age, number of kilometers driven) and perception of risk, as predictors for the speed which should be used, speed which the subjects choose to use, and the difference between these two values :

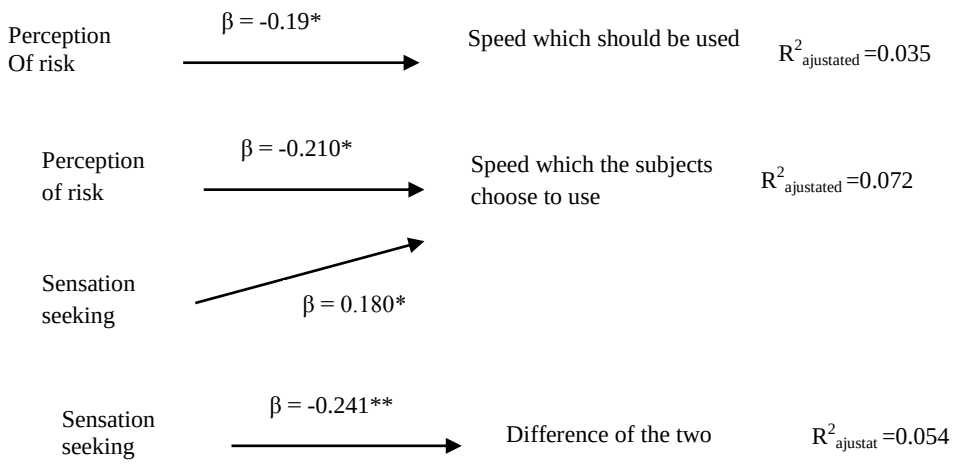

Figure 2: *Prediction models for the speed which should be used, speed the subjects choose to use and the difference between speeds, N=232, * p< 0.05, ** p< 0.001*

We notice that the speed which should be used in traffic is explained at a rate of 3.5% by the perception of risk, the rest of the variance for the scores is not explained by any of the variables inserted into the model. So, the greater the perception of risk, the higher the tendency to be aware of the speed which should be used in traffic to avoid an accident. Still, a large part of the variance of the criterion variable remains unexplained.

Also, the speed the subjects chose to use in traffic is explained at a rate of 7.2%, both by the perception of risk, as well as by sensation seeking, which suggests there is a tendency to accelerate, in spite of the perceived risk, when the subject obtains high scores for sensation seeking. The fact that sensation seeking represents one of the predictors for driving behavior (expressed through the speed the driver chooses to use) is according to the previous research (Machin and Sankey, 2008; Oltedal and Rundmo, 2006; Ulleberg 2002a, 2002b), however we would have expected for the prediction model to contain other variables as well,

such as normlessness or driving anger, which were found to be, in previous research, good predictors for driving behavior.

Figure 2 also shows that 5.4% of the variance of scores for the difference between speeds variable (speed which should be used and speed the subjects choose to use) is explained by the variance of the scores for sensation seeking. Although it seems counterintuitive, by applying one sample t-test to compare the average for the variable speed the subjects choose to use (52.47) and the variable speed which should be used (53.70), we obtained a significant difference, the average value for speed the subjects choose to use is significantly smaller than the average value for speed the subjects choose to use ($t = 2.191$, $p = 0.029$, $N=223$). So, keeping in mind the predictive model previously presented, we can indirectly state that the higher the score for sensation seeking is, the higher the score for speed the subjects choose to use is, thus lowering the score obtained for difference between the two speeds.

Moreover, the t-test suggests that, overall, the subjects tend to be more cautious in traffic, prefering to drive at a lower speed than the one they believe appropriate in order to avoid any danger. At a deeper analysis, however, we notice that this precaution is a characteristic of women, significant results being obtained when using the t-test ($M_{\text{speed which should be used in traffic - women}} = 53.46$; $M_{\text{speed women choose to use}} = 51.46$; $t=2.35$, $p=0.02$, $N=113$), while, for men, the difference between the average value for the speed which should be used ($M =53.93$) and the average for the speed they choose to use ($M =53.40$) is not significant ($t=0.711$, $p=0.478$, $N=119$).

Also, an analysis according to the subjects' age categories shows that drivers over 24 years of age tend to be more cautious, significant differences between the average values for the two groups being obtained ($M_{\text{speed which subjects choose to use, age < 24 years}} = 53.67$; $M_{\text{speed which subjects choose to use, age > 24 years}} = 51.83$; $t=2.63$, $p=0.009$, $N=140$).

Later on, a number of statistical analysis according to gender, age and driving experience (number of driven kilometers) were conducted, in order to see to what extent differences which are influenced by these variables appeared.

Below you can find the results obtained for the multiple regression analysis, according to gender, to see the differences which appear in the prediction model. The results for the regression analysis with the personality traits (*sensation seeking*, *normlessness*, *driving anger*, *altruism*, *anxiety*) and demographic variables (*age*, *number of driven kilometers*), as predictors for the perception of risk in traffic, according to gender, are presented briefly in Figure 3 and Figure 4:

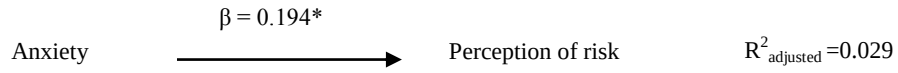

Figure 3: *Prediction model for the perception of risk, men N=119, * p< 0.05*

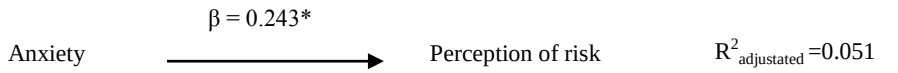

Figure 4: *Prediction model for the perception of risk, women N=113, * p< 0.05*

We can see that anxiety remains constant as a predictor for the perception of risk. In the case of women it explains a larger percentage of the variance for the scores obtained at the criterion variable (5,1%) than in the case of men (2,9%), and the prediction coefficient is, also, higher (β = 0.243*, for women, as opposed to β = 0.194*, for men).

The results for the regression analysis with personality traits (sensation seeking, normlessness, driving anger, altruism, anxiety), demographical variables (age, number of driven kilometers) and perception of risk, as predictors for the speed which the subjects choose to use, according to gender, is presented in the following figure:

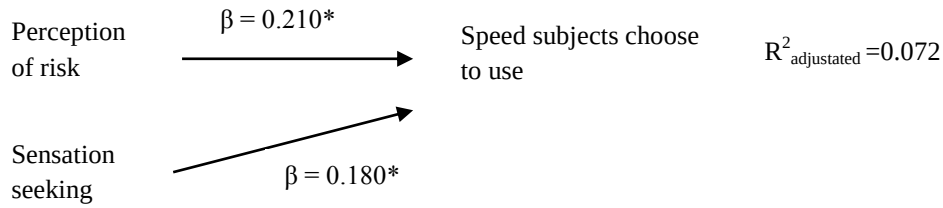

Figure 5: *Prediction model for the speed the subjects choose to use, men N=119,* p< 0.05*

What we must notice is that, for men, as well as for the subjects in general, driving behavior (expressed by speed the subjects choose to use) is explained at the same rate of 7.2% by the results for perception of risk and sensation seeking. At the same time, for women, the predictive model for speed the subjects choose to use, contains none of the variables introduced in the analysis.

These differences could suggest that sensation seeking is, more likely, a variable which should be taken into account especially when we are dealing with male drivers, which is also suggested by previous empirical research, in which groups of subjects found to represent a higher risk in traffic and which were

characterized, among other things, by a high score for sensation seeking, were, also, mainly male (Ulleberg 2002a, 2002b).

Taking also into account the results obtained by the research of Rothengatter and Huguenin, 2004, who stated that a theoretical explanation model regarding the psychology of the participant in traffic, should take into account not only the social and cognitive processes, but also the mood of the drivers, as well as the contextual characteristics (Havârneanu, 2011). We conducted predictive analysis for risk perception and speed choice of subjects in traffic conditions, for every situation. Some of the data obtained can be found in the following table:

Tabel 4: *Prediction models for perception of risk and speed subjects choose to use, for every situation, N=232, * p< 0.05, ** p< 0.001*

Situation	Criteria 1 = perception of risk			Criteria 2 = speed subjects choose to use		
	predictors	β	$R^2_{adjusted}$	predictors	B	$R^2_{adjusted}$
2	anxiety	0.172*	0.021	Perception of risk	-0.177*	0.027
	normlessness	-0.145*				
7	-	-	-	Perception of risk	-0.351**	0.133
				Sensation seeking	0.147*	
8	-	-	-	Perception of risk	-0.264**	0.098
				Sensation seeking	0.170*	
9	Number of driven km.	-0.139*	0.015	Sensation seeking	0.141*	0.016
10	Age	0.164*	0.024	Perception of risk	-0.208*	0.058
	Number of driven km.	-0.194*		Sensation seeking	0.134*	
11	Anxiety	0.124*	0.050	Perception of risk	-0.375**	0.016
	Altruism	0.159*		Sensation seeking	0.135*	
	Sensation seeking	-0.143*				
13	Altruism	0.169*	0.024	-	-	-
22	anxiety	0.196*	0.044	Sensation seeking	0.248**	0.057
	Sensation seeking	0.179*				
	normlessness	-0.149*				
	Driving anger	0.140*				

A first general discussion over the data indicates that, according to the context, other variables among those analized in the predictive models also appear, for perception of risk, as well as for speed the subjects choose to use.

For instance, in situations numbers 2 and 22, presented below, the prediction model contains, beside anxiety, the variable normlessness (image 1) and the variable sensation seeking (image 2). As we can see, Picture 2 shows overtaking on continuous white line in good weather and light traffic conditions and Picture 22 shows driving on the opposite lane in order to avoid obstacles on the road.We notice that in both situations, the subject is driving on the opposite lane, in areas where such behavior is not permitted.

Image 1 - PICTURE 2

Image 2 - PICTURE 22

Image 3 - PICTURE 11

Image 3 shows a situation where pedestrians are present on the roadway, specifically on the opposite lane. In this stuation the variables which predict the perception of risk at a rate of 5%, are anxiety, altruism and sensation seeking.

In images number 4 and 5, perception of risk is not predicted by any of the variables inserted in the prediction model. Picture 7 presents a situation of driving at night, with two pedestrians standing on the roadway. Picture 8 shows another situation of driving at night, with a number of cars parked on the first lane, decreasing visibility on the right side of the road. We notice that both images show nocturnal images of traffic situations, which can suggest that such contextual variables could have a greater influence in explaining perception of risk.

Image 4 - PICTURE 7

Image 5 - PICTURE 8

Image 6 - PICTURE 13

This can be supported by the situation in image 6, in which the variance of scores for perception of risk is explained at a rate of 2.4% by the variance of scores for altruism. Picture 13 shows a night-time image of an intersection, with a car crossing the road at an intersection in order to get on the opposite lane. Although it is also a nocturnal image, new contextual elements could explain the apparition of altruism in the prediction model.

Another general observation regarding the prediction for perception of risk is that, situations arise in which the variable number of driven km is included in the predictive model, and its beta coefficients are negative, as we can notice in the

table above, which suggests that perception of risk drops with the increase of the number of driven kilometers. This was also proposed by the explanatory model proposed by the theory of zero risk (Näätänen, Summala, 1976; Summala, 1997, cit. in Lewis-Evans) which states that, as drivers gain experience, they perceive the same situations as being less risky, because of the trust they gain in their own abilities to maintain control.

Later on, we conducted a frequency analysis regarding the fashion in which the situations were categorized by the experts who pretested the images, and the way the subjects of this research categorized the situations. An $\chi 2 = 21.415$, $p = 0.006$ was obtained, which suggests the existence of significant differences regarding the categorization fashion. Thus, if the experts considered 13 of the situations as belonging to class 4, „dangerous", and 5 of the situations as belonging to class 5, „very dangerous", the subjects considered most of the situations as being in class 3 „fairly dangerous". This difference could be one of the explanations for the results obtained.

Conclusions, limits and future research directions

Starting from already existing research in the field, this present study is aimed at examining the personality factors which predict the perception of risk in traffic, in a Romanian context. Also, the connection between perception of risk in traffic and driving behavior was analyzed, as well as the variables which predict the latter.

We expected to find a significant connection between perception of risk and driving behavior, as well as gender and age differences regarding the perception of risk and driving behavior.

It was noticed that, overall, anxiety is the only variable which was included in the prediction model, explaining 5% of the variance of scores for perception of risk. This data confirms the expected connection between personality traits and perception of risk, as it was previously shown in other research, which found an increase of perception of risk associated with anxiety (Elander et al., 1993 cit. in Shahar, 2009), perception of risk being, in turn, associated with the presence of risky driving behavior (Horwarth, 1988; Brown and Groeger, 1988 cit. in Shahar, 2009

An analysis conducted on gender showed that anxiety explains 5.1% of the variance for women, while for men it only explains 2.9%. The fairly small percentage explained is in agreement with the theory proposed by Rothengatter and Huguenin, 2004. They asserted that a theoretical explanatory model regarding the psychology of the participants in traffic should take into account at least one component regarding the mood of the driver and one which takes into account context, beside the components regarding the social and cognitive processes.

In other words, the results can be connected to the fact that, beside the personality traits, the perception of risk and driving behavior are determined, to

great extent, by the mood of the driver and the context of the action. If we take into account the differentiated results which we noticed during the analysis of every situation, we can add the fact that drivers with greater experience tend to perceive themselves as a lower risk, or at least to declare they do, something possible because of the manifestation of the illusion of control, which we know signifies the tendency of the individual to consider that he/she has more control over their own behavior or the environment, than they actually have (DeJoy, 1987 apud Parker & Manstead, 1996 cit. in Havârneanu, 2011).

Gender differences were also found regarding caution in traffic, women prefer driving with significantly lower speeds than those they believe optimal for avoiding traffic accidents. This seems in agreement with the results of the prediction analysis conducted.

Also, the speed chosen by subjects is explained at a rate of 7.2% both by the perception of risk, as well as by sensation seeking, which suggests there is a tendency to accelerate, in spite of the perceived risk, when the subject obtains a high score for sensation seeking. Previous research found, as well, sensation seeking to be one of the predictors for driving behavior (the speed the driver chooses to use) (Machin & Sankey, 2008; Oltedal and Rundmo, 2006; Ulleberg 2002a, 2002b), but we would have expected the prediction model to contain other variables as well, such as normlessness or driving anger, which were found in previous research to be good predictors for driving behavior.

However, according to the data obtained, sensation seeking is, more likely, a variable which should be taken into account mostly when we are dealing with male drivers, which is also supported by previous research in which groups of subjects found to represent an increased risk in traffic were, also, mainly male (Ulleberg 2002a, 2002b).

The obtained results can also be explained by the fact that, regarding the instrument used for the measurement of the dependent variable, the selected situations were chosen depending on the difficulty of the situation as established by the experts but, as we've shown, significant differences appeared compared to the way the subjects categorized the evaluated situations (the subjects considered most of the situations as being fairly dangerous – category number 3).

The fact that perception of risk was one of the predictors for speed choice of the subjects in some of the situations, suggests that as the perceived risk is higher, the speed with which subjects choose to drive drops. This result is in accordance with the results of Rolison and Scherman (2002), who proved that perception of risk is negatively correlated with the involvement of adolescents in risky behavior, which suggests that if the perceived risk grows, the chances for the individual to develop behavior complementary to that risk drop. The results obtained could have practical implications in both driving schools as well as in traffic safety campaigns. In driving schools, based on the model developed in this research, an instruction curriculum could be developed for the drivers,

individualized according to the characteristics of the students, beginning drivers being, thus, treated differently, according to their specific personality traits.

Proving there is a significant relationship between personality factors and the perception of risk, as well as establishing a connection between the perception of risk and driving behavior can have practical applications for selecting beginning drivers for thorough training sessions, according to their tendencies of driving in a risky fashion. Moreover, special awareness sessions, regarding the perception of risk in various traffic situations and the behavioral consequences of these perceptions, can be conceived. Also, programs containing images and short movies shot in traffic situations could be developed, thus helping the driver practice his/her ability to perceive risk, and become aware of the practical abilities they have.

Future research could aim at the creation of a standardized instrument for practicing the ability to perceive risky situations, in specific contexts taken from traffic, as well as suggesting some efficient methods for increasing the awareness regarding the psychological threats to which the drivers could be subjected to, such as the illusion of control.

Regarding the traffic safety campaigns, the characteristics of the target populations could be taken into account, so that the effects of the awareness increase regarding excessive speed, for instance, appear in the case of drivers who represent a real threat in traffic, and not simply increase the anxiety level of drivers who already have adequate behavior, because, as it was shown in previous studies, a too low or too high level of anxiety can have negative effects on driving behavior.

In conclusion, this present research proves the existence of connections between personality traits and perception of risk, but, as in previous research, it fails to establish a very strong connection, permitting the finding of other variables which could predict the perception of risk or driving behavior, such as the number of hours of driving. However, this must not diminish the importance of personality factors regarding traffic safety.

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