

## Research Article

# Road Users' Risky Behavior: Analysis Focusing on Aggressiveness

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With transport and traffic developing permanently, we can meet more and more aggressive drivers on roads. We can see various kinds of aggressiveness and aggressive behavior that can lead to dangerous situations which can threaten one's health or even life. The problem of aggressive driving on the roads is becoming more current. Speeding, inappropriate gestures, and nonobservance of safe distance, are only a fraction of the aggressive behavior of many drivers that need to be solved in the road traffic. At present, the problem of aggressive driver behavior in Slovakia is not resolved yet.

## 1. Introduction

Aggression on our roads is a very serious phenomenon. The severity of the problem mainly lies in serious consequences, which are results of aggressive behavior on the road, in terms of physical health, social, and psychological damages [1]. In connection with the growing transport increases the number of aggressive drivers on the road. In this branch, however, we lack sufficient technical information as it is in more advanced countries.

To work out aggressiveness in the society is tightly connected with the solution of safe and smooth traffic and with the increase of safe traffic space. When solving traffic safety we have to take into account the following:

- (i) reasons of aggressiveness in traffic,
- (ii) aspects of aggressiveness,
- (iii) possibilities for aggressiveness decrease.

We can see the portion of main causes of traffic fatal accidents in Slovakia on Figure 1 [2]. In the first place it is speeding, which is the expression of the driver's aggression, their style of driving, and also breaking of the basic rules.

If we wanted to examine whether the concept of aggressive, or reckless driving, can be found in the legislation of the Slovakia relating to road traffic, it would be futile, as this

term is often used by the police and by public, but it is not precisely defined.

Aggressive driving on the roads, however, applies to any driver and is not sanctioned so strictly that drivers are cautious and respect other road users when driving.

## 2. Analysis of Aggressive Behavior by Means of a Questionnaire Realized in Slovakia [3]

Driving a car does not mean only controlling it and bringing it to the destination, but it is also a social interaction of drivers towards each other, where emotions play an important role. Destructive emotions, for example, anger, worsen the ability of making a decision. And it also holds for the people behind the steering wheel.

Broad, the questionnaires used for the detection of potential aggressive drivers, or diagnostics of drivers who already have a driving license, have a form of survey. As a basis for the questionnaire, which was implemented in Slovakia, was selected DAS inquiry released by Deffenbacher et al. in 1994. It contains a description of 19 situations with the potential to attract the anger of the driver. Drivers, on a five-step scale, determine how much they were annoyed of the concrete traffic situation. Of course, this questionnaire inspired by Deffenbacher was adapted to the conditions of the Slovakia [4]. It showed that the survey carried out in

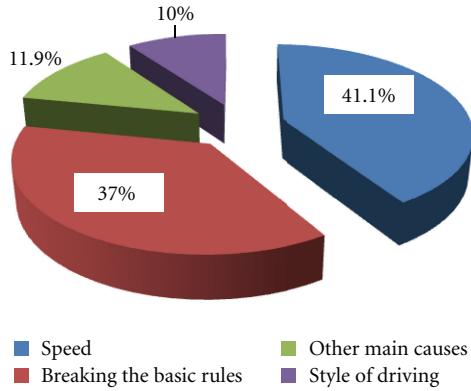


FIGURE 1: The portion of main causes of fatal accidents.

Slovakia should be focused on anger, which is the main problem and is very common with aggressive drivers. This anger should be at least divided (with practical examples) into 5 groups, which should be precisely defined.

*Slovak Autoturist Club* (SATC) was contacted to help with the elaboration of the questionnaire. The questionnaire was created for the purpose of *Ministry of Transport, Construction, and Regional Development of the Slovak Republic*.

On the first page of the questionnaire there are 27 situations that commonly occur on Slovak roads. For each of the questions there is a 5-degree scale with divisions of anger, which the respondent feels in that concrete traffic situation (degrees: no anger, 1st degree of anger, 2nd degree of anger, 3rd degree of anger, and the worst one, 4th degree of anger). On the other side of the questionnaire there is the classification about the duration of perceived anger and in three most annoying situations. Moreover, there are additional questions as the number of years of driving, sex, year of birth, education, and district of residence. At the bottom of the page there are explanations as to the 5-point scale anger.

The 5-degree scale was defined as follows.

- (i) "No anger": the traffic situation causes you no anger.
- (ii) "1st degree of anger": you are annoyed of this situation at a given moment of the situation, making gestures, making facial expression, and after this you feel no anger.
- (iii) "2nd degree of anger": because of the given situation you do face gestures, hand gestures (lift hands from the steering wheel, etc.), which does not offend the other person. In the car you tell yourself your own opinion and after this you feel no anger.
- (iv) "3rd degree of anger": you are annoyed of this situation that, in addition to face gestures and hand gestures you make inappropriate hand gestures (tapping your forehead, showing the middle finger, etc.) hoot, flash lights several times, and in the vehicle you speak your opinion of the driver very loudly.
- (v) "4th degree of anger": you are annoyed of this situation that, in addition to all the reactions listed

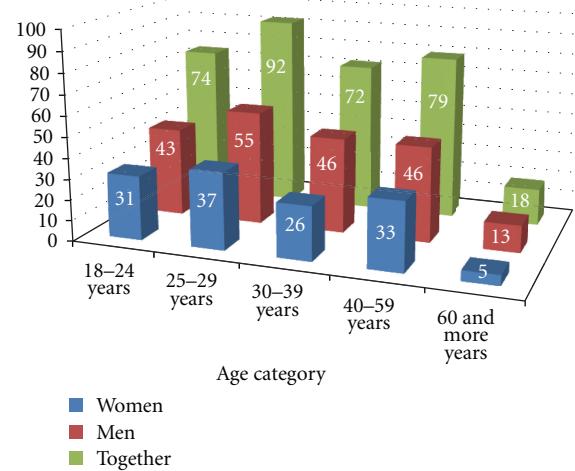


FIGURE 2: The partition of respondents by age and gender.

in the group of 3rd level of anger, you have a need to stop the vehicle, for example, at crossway, tell the other driver to his face your opinion, physical contact with someone who, in your opinion, threatened and limited you.

For the first time the questionnaire was carried out in the period between December 2007 and January 2008 in the Slovakia and, after some adjustments and improvements, was realized in the period from July to August 2010 for the second time. The respondents filled it out electronically and sent it to the specified email address. The ongoing questionnaire was filled in manually too and the respondents were addressed in neighborhood shopping centers, gas stations, as well as near the university. Percentage between electronically and manually filled questionnaires was about 55% and 45%, respectively.

335 respondents (203 of whom were men and 132 women) participated in the questionnaire. Subsequently, respondents were divided into age and gender categories (see Figure 2). The numbers of respondents in different age groups are balanced. The only blip can be observed in the age group 60 years and older, which is due to the fact that the majority of these people responded to the survey only in printed form and during the survey which has been concentrating mainly on the age group 25–29 years and 30–39 years, because of police resources in Slovakia, which show that these drivers cause most accidents.

The questionnaire has been dealt with from different points of view, but the most important is to determine which of the traffic situations is the most annoying for respondents. From the respondents' answers about various traffic situations the average was made, which determined the respondents' level of anger. These averages were divided according to their values, and it was determined which of these situations are the most anger provoking or least moderate (see Table 1). We can see traffic situations, which can become a problem on most roads.

The situation of careless reversing made most respondents angry, and its averaged value was 3.27 and it means

TABLE 1: The most annoying traffic situations according to average value.

	Traffic situation	Average value
(3)	Someone is reversing in front of you without looking back	3.27
(6)	Someone increasing the vehicle speed when you are trying to overtake him/her	3.10
(17)	Someone is pushing on the front of your car after overtaking	3.04
(15)	Someone is pushing on the back of your car (e.g., wants to force the release of the lane).	3.00

TABLE 2: The “average” annoying traffic situations according to the average value.

	Traffic situation	Average value
(11)	Cyclist is cycling in the middle of the lane and slowing the traffic	2.85
(16)	Someone is overtaking or turning without signalization with indicator	2.76
(18)	Someone in the opposite direction does not dim his/her lights	2.72
(2)	Slow vehicle in a mountainous road range does not move to the roadside and holds back other faster vehicles	2.66
(13)	Truck smudges your windscreen when it is overtaking you	2.62
(9)	Someone made inappropriate gestures to you because of your style of driving	2.60
(24)	If a vehicle blocks the intersection	2.55
(8)	You are waiting in traffic jam longer than 10 minutes	2.51
(10)	Someone hoots at you because of your driving style	2.51
(19)	Someone drives very slowly in the fast left lane and you want to overtake	2.47
(1)	Someone in front you changes lane and it takes longer than 5 minutes	2.46
(20)	Someone is overtaking in the wrong lane on the highway	2.38
(25)	Someone parks his/her car out of reserved parking place	2.35
(5)	You go through radar speed trap	2.33
(4)	Someone crosses through the intersection on the red light and threatens you	2.27
(7)	Someone is parking his/her vehicle slowly and is delaying traffic	2.10
(22)	Someone drives very hesitantly and slowly	2.10
(21)	Someone uses phones behind steering wheel without the “handsfree” device and threatens you	2.01

“average anger,” which is already inclined to “great anger” according to the scale. This situation is classified as a passive aggressor on the road, or as negligence. In the second place there was the situation of the increased speed while being overtaken. This situation belongs, however, to the typical aggressive driver’s behavior, which may contribute to serious accidents. The third and fourth places belong to situations which restrict the driver in question. Such behavior may cause the fear and nervousness, which may later result in aggression, but against other participants in road traffic.

For replenishment it is necessary to add additional allocation of average value. Value from 2.0 to 3.0 was determined as the “average” value of anger and value from 1.0 to 2.0 as “least annoying.”

18 of said traffic situations, which are arranged in descending order, were classified to “average” values of anger. The exact value of the average and location of the traffic situation in the questionnaire can be seen in Table 2.

Last 5 traffic situations were included on the basis of the average value to the group “least annoying,” these situations can be seen in Table 3. Very interesting is the situation 27, which shows the driver’s passive aggression, but many drivers marked this situation with the valuation “no anger” respectively “1st level of anger.”

When comparing groups of men and women, it is possible to use the median value, which we divided in two

equally large parts. Median value was made taking into account dependence on sex and age categories (see Figure 3).

From the picture we can deduce that from samples of 335 respondents, women are more aggressive, or it would be better to define them as more emotional. This condition does not hold for the age group 30 to 39, in which males are more aggressive. So far, it has been claimed that men drive more aggressively and the result of the questionnaire is very surprising. It is also possible to confirm that aggression declines with age, again this is not completely confirmed in the male age group 30–39, which may be due to just more aggressive approach of men to traffic situations on roads, but when you notice women have almost the same median value.

Another elaboration is from the position of the length of anger and they can be selected from 5 options (to 10 minutes, 10 minutes, 10–30 minutes, 30–60 minutes and more than 60 minutes—according to the scale of the questionnaire).

In Figure 4 we can see the duration of women’s anger, which is divided into specific age categories. As can be seen from the figure, the largest number of women (45 women) of different ages indicates (on the traffic situations from the questionnaire) that they can be angry for 10 to 30 minutes. If it is based on the individual ages, women in age groups 25–29 and 40–59 (duration of anger takes 10–30 minutes) are situated in the number of 14, followed by women in age group 18 to 24 the number of 12 persons, were the

TABLE 3: The “least” annoying traffic situations according to the average value.

	Traffic situation	Average value
(26)	Someone starts moving late, when the traffic light signalizes green	1.96
(12)	Policeman tells you to stop nearby the road side and you are in hurry	1.95
(23)	Someone is looking too slow for the parking place	1.92
(14)	You are driving behind a big truck and do not see the situation in the front of the car	1.86
(27)	Someone overtakes you on highway in the speed which is higher than 130 km/h and threatens you	1.73

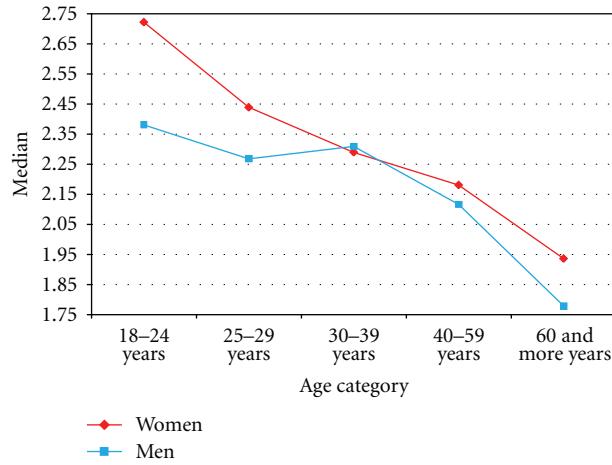


FIGURE 3: Value of median of average anger classification in dependence on sex and age.

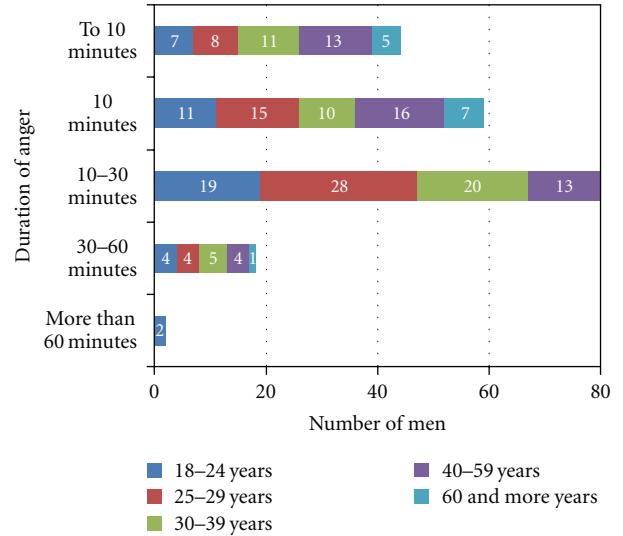


FIGURE 5: Duration of anger—men.

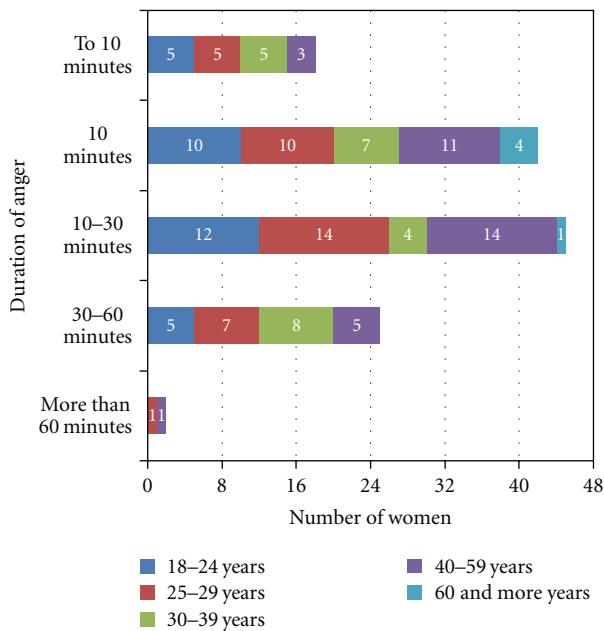


FIGURE 4: Duration of anger—women.

penultimate women's group 30 to 39 with the number 4, and the last group of women over 60 with a value of 1. In the case of women ages 18 to 24, 25 to 29, and 40 to 59, it was also the highest number of “votes” for all the offered options.

For comparison there are numbers of length of men's anger and the duration of their anger is shown in Figure 5. Most men claimed (with the number 80) that they are also angry in traffic situations from 10 to 30 minutes. When it is compared with the numbers of women in response “duration of anger from 10 to 30 minutes” and the same response in men's group, we see that men are reliable in the different age groups more proportionately (if not taking into account the age group 60 and above). The largest number of responses with the number 28 is for men in the age category 25–29, which is followed by men in age category 30 to 39 with 20 responses, then men 18 to 24 years have 19 votes, and last (except for age group 60 and above—0) are men 40 to 59—number of “votes” 13.

If we think about it, we know that only two seconds of inattention can cause an accident and when it is compared with a 10- to 30-minute duration of anger, during which the driver is more distracted while driving and experiencing negative emotions which can be classified as inattention compared to a peaceful state, it is worth consideration!

### 3. The Main Conclusions of the Research in Slovakia

The traffic situations which mainly provoke drivers' anger are those which are the results of social aggressiveness of other drivers or are a result of irresponsibility and inconsideration and sometimes even foolishness of the other road users.

The questionnaire revealed that:

- (i) In the Slovakia aggression clearly increases among drivers on the road and this phenomenon will certainly continue in the future.
- (ii) For women who are generally considered more peaceful, it is demonstrated that they react aggressively to most of the mentioned traffic situations, although they participated in a lower number in the questionnaire.
- (iii) Similarly, both men and women can be angry in the traffic situations and anger takes approximately from 10 to 30 minutes.

#### **4. Conclusion**

Safety is the exemption from accidents and losses on human lives. It also deals with property protection, regulation, management, and transport technology development. The analysis of accidents indicates that 95% of transport/traffic accidents are caused by human factor failure (wrong evaluation of the situation, participant's skills/abilities, etc.). One of the most frequent errors of drivers is a wrong decision in a critical situation. The decision process is very complicated since the driver has to evaluate the arisen situation correctly within fractions of a second [5].

The questionnaire showed a lot of important data, that nervousness and aggression on the roads are clearly rising. Drivers should be aware that their own aggression creates problems to themselves, for example, currently in Slovakia there are different penalties for improper gestures, for speeding and begins to concern the safe distance from other vehicles. However, many times the fines are a negligible sum not only for foreign drivers. The essential idea is the awareness of drivers that they do not drive on the roads alone and should also be considerate to other road users.

Slovakia needs a system based on qualified and specialized institutions. We need the solutions that will help to decrease aggressiveness gradually or to fully eliminate it, "legislation should include such sanctions that when breaking certain rules the drivers should take lessons of defensive drive or therapy where they will try to learn how to control their bursts of aggressiveness [6]."

During the next year we would construct according to this questionnaire a model of a traffic drivers' behavior with a focus on aggression using weights of importance on which basis it would be possible to determine whether the driver's behavior is aggressive in nature or, on the contrary, nonaggressive in nature.

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