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Psychological Aspects of Risk and Aggression among Motorcyclists – “Mad Max” Syndrome

The primary objective of this study was the psychological examination of a group of Polish motorcyclists against a group of students and graduates of Technical Universities. This work poses a question regarding the differences in temperament, aggression and the level of risk between motorcyclists and the control group. The second question was whether it was possible to create a typology of Polish motorcyclists taking into account the variables describing risk, temperament and aggression. This study used the Pavlovian Temperamental Scale (Strelau, Zawadzki, 1998), Stimulating-Instrumental Risk Inventory, SIRI 2001 (Zaleskiewicz 2001), Multifactor Risky Behavior Scale (Studenski 2004), Unhealthy behavior Inventory (Makarowski 2008) and the Buss and Perry Aggression Questionnaire (1992). The tests were performed on 267 motorcyclists and 188 students and graduates of Technical Universities. A number of important differences was observed between the motorcyclists and the control group. Motorcyclists had a higher level of mobility of nervous processes and higher degree of excitation at the lower level of inhibitory processes. In terms of the measured level of risk they also had a higher level of stimulating, instrumental and unhealthy risk, at the lower levels of physical, social, ethical and financial risk in relation to the control group. Cluster and confirmation analyses showed the existence of three sub-groups of motorcyclists: prevaricators, ones with a Mad Max syndrome, and adventurers. The confirmation analysis was carried out on an additional group of 243 motorcyclists.

Keywords: motorcyclists, Mad Max syndrome, aggression on road, road accidents

It is estimated that about 60 000 people were killed on the Polish roads in years 1999 – 2009. In 2007, motorcyclists in Poland took part in 953 road accidents in which 156 people died and 1027 suffered injuries. In 2008, the number of victims increased: 193 motorcyclists died and 1228 were injured. In 2009, the increasing trend was maintained, with motorcyclists participating in 2576 accidents, causing 1151 accidents with 194 fatalities and 1228 injured. The most common causes of accidents caused by motorcyclists were speed unsuitable for traffic conditions - 622 accidents, inappropriate overtaking - 163 accidents, and failure to maintain a safe distance between vehicles - 93 accidents¹.

The analysis of transport safety shows that road transport is the most dangerous form of travel. Travel by car has a 20 times higher risk of death than by plane or train, but motorcycling increases the risk of death by the astounding 395 times (Krystek & Kastner, 2004). These statistics relate to the average for the EU countries, and it

should be remembered that Poland has an approximately three times higher rate of deaths per 100 000 vehicles than in the EU.

A research by the Institute of Road Transport (2006) on the aggression on roads indicated that the largest number of offenses is committed by drivers aged from 18 to 39 years, and particularly aged 18 - 24 years (Bąk & Bąk, 2008). Those drivers have a higher propensity to risk, speeding, bravado, inadequate assessment of competence (overestimation of their abilities as drivers), a low level of emotional and social maturity, and indiscipline manifested in the failure to comply with the Driving Rules and Highway Code (Bąk, 2003).

In the context of traffic, risk can be understood as the following (Waszkowska & Garczarek, 2008):

- Objective risk related to the probability of an accident
- Subjective risk related to the cognitive assessment of the probability of an accident

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- Sense of risk associated with tension and emotional arousal
- Individual risk of a driver, e.g. connected with specific characteristics of a driver or his psychophysical condition.

There are many theories that explain various aspects of accidents; studies have been carried out for over 100 years but none of them has been able to explain the mechanisms of accidents in an exhaustive and homogeneous way. The beginnings were dominated by the theories of accidents as random events over which man has no control. But soon these presumptions were challenged, for example by Greenwood and Yule who claimed that certain people are statistically more prone to accidents than others.

These views were compatible with a psychotechnical trend in psychology and intensive development of various diagnostic methods, such as intelligence or personality tests used to diagnose the potentials of individuals. In the context of the psychology of transport, these studies were designed to identify high risk individuals. The basic premise was that accidents are caused by people with some personality disorders. This approach to the mechanism of accidents was challenged by Forbes, as early as in 1939, who observed that most traffic accidents are caused by average drivers (Jamroz, 2006, 2008).

Since the beginning of the 1930s, mainstream research on the causes of traffic accidents has been dominated by causal theories concerning both external and human factors (i.e. outside and within an individual). Particularly noteworthy is the model of human factors, which assumes that an accident is a result of an offense and mistake committed by a man. In contrast, system theories of accidents indicate that human activities cannot be analyzed in isolation from a larger number of properties of a system in which they operate. In this context, accidents are the result of maladjustment in the interaction between the different components of the system, of which man is only a part. So human behavior and errors should be examined in the context of a system including roads, vehicles and traffic rules. Relatively youngest are behavioral theories concerned with risk assessment and risk acceptance by people, as a very important determinant of accidents (Fudakowski 2004; Makariv 2010; Parker, Manstead, Stradling, Reason, & Barter, 1992; Szymanek, 2008).

In terms of psychological research on different aspects of behavior in traffic, the most frequently examined are the abilities of an individual driver that can contribute to the occurrence of accidents, such as extreme extraversion, concentration on oneself, high level of aggression, impulsivity, irresponsibility, intolerance, psychoticism, self-destructive tendencies, neuroticism, low resistance to stress and low self-control (Jeżewska, Leszczynska, Syltak & Czerski, 2004; Cibor, 2008). One of the crucial characteristics is also the individual level of tolerated risk,

which affects decision-making; not without significance here are temperamental characteristics. Psychologists even use the notion of “temperamental risk factor” (TRF) (Waszkowska & Garczarek, 2008, p. 241; Waszkowska & Merecz, 2006; Tarnowski, 2008; Waszkowska, 2009).

Literature also reports a personality type known as a dangerous driver, often related to as the angry or mad driver, popularly known as a driver with a “Mad Max syndrome”. Road rage, a type of dangerous driving behavior which often contributes to serious accidents (Fong, Forst & Stansfed, 2001 & Britt, 2006; Mann, Zhao, Stoduto, Adlaf, Smart & Donovan, 2007), has even been classified by the American Psychiatric Association as a mental disorder (Laurence, 2004; Ayara, 2006).

The co-factors of extremely aggressive behavior among drivers can be external, such as weather or traffic intensity, anonymity, possibility of escaping the scene of the accident, minor risk of punishment, presence of other drivers flouting traffic regulations, and lack of social disapproval. Individual circumstances include the type of personality or way of responding (Studenski, 2004, 2007, Zaleskiewicz, 2005), fatigue, low tolerance to stress, poor control of emotions and dependence on some psychoactive substances (Bąk, Bąk – Gajda & Ucińska, 2008). Also an infringement of our personal space can cause extreme forms of aggression. A. Buss (1992, 1996, 2001, 2009) presents the following types of aggression on the road:

- Physical aggression – using physical violence against other drivers
- Verbal and signal aggression - using lights, blinding others with lights
- Indirect Aggression - overly dynamic and aggressive driving
- Negativism - failure to follow traffic rules, disobedience of the rules of conduct
- Guilt - experiencing frustrating emotions that require violent release
- Resentment – frustration and anger caused by the mistreatment from other drivers
- Suspicion – assigning one’s own hostility to others and an excessive distrust of others.

The most common behaviors of an angry driver include is approaching the road as the enemy that must be overcome; treating other drivers as rivals; high opinion of one’s own skills as a driver; aggression against the others which may manifest itself in physical, verbal and signal aggression. In October 2000, at Global Web Conference on Aggressive Driving Issues in Canada, it was proposed that driving behavior is aggressive if it is deliberate, likely to increase the risk of collision and is motivated by impatience, annoyance, hostility and/or an attempt to save time (Bąk & Bąk, 2008).

The general aggression model formulated by C. Anderson and J. Bushman (2002) assumes two classes

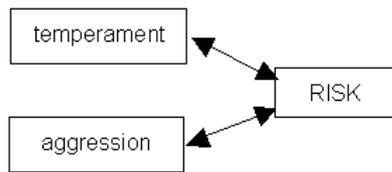


Figure 1. Effect of temperament and aggression on risky behavior.

of determinants of aggression: personal and situational. These factors induce either aggressive or non-aggressive behavior, shaping the current intrapsychological state during a social interaction. According to the authors, the most significant is the emergence of hostile thoughts that interpret behaviors of others as intentionally directed at our loss. In psychology, it is widely accepted that aggression is mediated through one's temperament, and in particular the strength of inhibition (Marszał - Wisniewska, 1999; Strelau, 2006).

Subject of research

Based on the aforementioned theories and the analysis of studies conducted on drivers, in this paper it was assumed that there are characteristics which determine the psychology of motorcyclists. The primary objective of this study was to draft a psychological characteristic of Polish motorcyclists, with regard to their temperament, risk and aggression. The group of motorcyclists was compared with a control group of engineers and students of Technical Universities. Temperament traits have a status of moderator, which means that they constitute a condition occurring prior to risky behavior. In addition, many empirical studies and theoretical concepts of aggression indicate that an aggressive behavior is also a risky behavior. This can be presented using the following model (figure 1).

The aim of this study was to determine the constellation of important factors included in the model above, resulting from theoretical and empirical analyses.

The following research questions have been posed:

- 1) What is the level of risk, aggression and temperament in Polish motorcyclists?
- 2) Are there any differences, in terms of temperamental characteristics, level of aggression or a tendency to risk, between motorcyclists and other social groups, namely students and graduates of Technical Universities?
- 3) Is it possible to create a typology of motorcyclists taking into account the variables describing risk, aggression and temperament?

In this paper I put forward a hypothesis of the existence of differences between motorcyclists and the control group in terms of temperament, propensity to risk, or the level of aggression. It was assumed that a group of motorcyclists would show higher levels of excitation at a lower level of inhibitory processes, greater tendency to take risky actions, in particular stimulating, unhealthy and physical actions, and finally, higher levels of aggression.

The second hypothesis concerned the existence of a

connection between different dimensions of temperament, risk and aggression, and the heterogeneity of the motorcyclists. This relationship could be presented as a constellation of factors concerning temperament, risk and aggression. The factors would be isolated using factor analysis and verified by a confirmation analysis.

Method

Research tools

In the measurement of psychological variables, the following research tools were used:

I. Pavlovian Temperament Survey - Strelau and Zawadzki (1998)

The Pavlovian Temperament Survey was created by J. Strelau (1998, 2006). The method contains 57 questions. It is one of the few Polish surveys that are used on an international scale. The theoretical basis for this tool was I. Pavlov's theories.

The survey includes three scales:

- strength of excitation (SE) - associated with the level of response to stimuli. The higher the score on this scale, the lower the level of sensitivity to these stimuli, the poorer response and the higher efficiency of the body under conditions of intense stimulation.
- strength of inhibition (SI) - understood as the ability to comply with the restrictions, and the ability to abstain from certain actions, and to postpone reactions in social situations.
- mobility of nervous processes (MO) - understood as the ability to quickly switch from one reaction to another, in other words the body's adaptability to changing environmental conditions.

The survey also allows to determine the balance of the nervous processes, described by the SE/SI ratio.

II. Stimulating-Instrumental Risk Inventory (SIRI) (T. Zaleskiewicz, 2001)

The SIRI 2001 is used to measure the style of perceiving and interpreting risky behaviors. The creator of this questionnaire is T. Zaleskiewicz (2005, 2006). It distinguishes between two types of risk taking: stimulating (S) and instrumental (I).

- Stimulating risk taking (SRT) - risk is seen as a way of providing the stimulation, excitement, and arousal. It emphasizes activity, search for experiences by seeking highly stimulating situations, regardless of the outcome and the risk of loss.
- Instrumental risk taking (IRT) - risk is perceived here as an opportunity to achieve a positive outcome. Taking risk occurs only when there is a chance of profit. The stimulating aspect of risk is not very important, it is

Table 1
Temperament Characteristics Of Motorcyclists And The Control Group.

Variable		Motor	Control	U	Z	p level	d-Cohena
		-cyclists	group				
PTS - Mobility of nervous processes (MO)	Q25	37.00	35.00	21180.5	2.84	0.003	0,28
	Median	41.00	39.00				
	Q75	45.00	44.00				
PTS-Strength of excitation (SI)	Q25	48.00	45.00	19989.5	3.67	<0,001	0,35
	Median	51.00	49.00				
	Q75	54.00	52.00				
PTS-Strength of inhibition (SI)	Q25	47.00	48.00	21447.5	-2.64	<0,001	0,24
	Median	51.00	53.00				
	Q75	55.00	56.00				

the goal that is most crucial. This type of risk requires rational thinking and focus on the goal.

III. *Multifactor Risky Behavior Scale (R. Studenski, 2004)*

The author of Multifactor Risky Behavior Scale is R. Studenski (2004b, 2006). The questionnaire is used to measure the type of an undertaken risky behavior. It contains four scales: physical risk, social risk, ethical risk and financial risk. It consists of 64 questions. Responses use a five point Likert scale. It can be used to examine persons more than 13 years old. The scale includes four sub-scales, the total of which shows a general propensity to risk.

- 1) Physical risk - equated with the loss of life or health;
- 2) Social risk - associated with the possibility of losing one's social position or authority;
- 3) Ethical risk - refers to behaviors resulting in a decrease in self-esteem, or feelings of discomfort due to moral anxiety and sense of guilt;
- 4) Financial risk - associated with the loss or possible loss of material resources.

Sten scores for this tool can be found in its manual (Studenski, 2006).

IV. *Risk Acceptance Scale (R. Makarowski, 2008)*

The questionnaire was developed by R. Makarowski in order to diagnose propensity to risky behaviors with regard to health. It was assumed that people with high level of willingness to risk are also more prone to undertake unhealthy activities. Risk Acceptance Scale can be used to estimate unhealthy risk by the assessment of one's unhealthy behaviors. The scale covers the following areas: 1) operating under conditions of uncertainty, 2) caring for one's health, 3) actions undertaken to save one's health, 4) weighing risk, 5) acting contrary to recommendations, 6) acting under unknown circumstances.

The common perception is that risking one's own health and life is the domain of persons involved in dangerous sports such as mountaineering, racing, aviation, sailing,

and aggressive sports such as boxing, judo and karate. This questionnaire was constructed because there had been no tool for the examination of behaviors that could result in the loss of health. Risk Acceptance Scale consists of 20 questions. Answers are given on a seven point Likert scale, from 'definitely not' to 'definitely yes'. The minimum number of points is 0, maximum: 140. The greater the value, the riskier the declared behaviors.

V. *Buss and Perry Aggression Questionnaire (1992, 2009)*

This questionnaire measures the level of physical and verbal aggression, hostility and anger. The authors of the questionnaire, M. Buss and M. Perry, indicate that physical and verbal aggression are a behavioral component of human life. In their view, anger is associated with physiological arousal and is an emotional component of human behavior. Hostility - the feelings of grievance, aversion and injustice - represents the cognitive component of behavior.

Participants

The study was carried out on 267 motorcyclists - men aged from 18 to 70 years ($M = 30.15$; $SD = 8.94$). The tests on motorcyclists were carried out in 2009 in Gdansk, Elblag and Tczew, cities situated in northern Poland.

Among the tested motorcyclists, 62% had secondary education, 32% declared university education, and the rest had vocational education.

The control group were students and graduates of various Technical Universities in Poland. They were selected because it can be assumed that the interests of both groups are concentrated around technology and engineering. The control group also consisted of men, 188 in total (85 students and 103 graduates of a Technical University), ($M = 29.43$; $SD = 9.97$, minimum 22 years, maximum 70 years).

An additional group consisted of motorcyclists (253 persons, $M = 21.42$; $SD = 6.22$) was tested for confirmation analysis in order to falsify the results of exploratory analysis of the first group of motorcyclists.

Table 2
Risk Levels Of Motorcyclists And The Control Group.

Variable		Motor	Control	U	Z	p level	d-Cohen
		-cyclists	group				
Physical risk	Q25	30.00	50.00				
	Median	42.00	57.50	12811.00	-8.896	<0,001	0,94
	Q75	55.00	66.00				
Social risk	Q25	32.00	45.00				
	Median	42.00	51.00	15549.50	-6.913	<0,001	0,76
	Q75	52.00	56.50				
Ethical risk	Q25	26.00	53.00				
	Median	50.00	61.00	15674.50	-6.823	<0,001	0,9
	Q75	63.00	68.00				
Financial risk	Q25	30.00	49.00				
	Median	44.00	56.00	14159.00	-7.920	<0,001	0,89
	Q75	57.00	63.00				
Social risk	Q25	24.00	21.00				
	Median	29.00	25.00	17544.50	5.469	<0,001	0,54
	Q75	35.00	30.00				
Ethical risk	Q25	23.00	23.00				
	Median	27.00	25.00	21919.00	2.301	0.010	0,22
	Q75	30.00	28.00				
Financial risk	Q25	70.00	66.50				
	Median	81.00	74.00	19159.50	4.299	<0,001	0,43
	Q75	92.00	83.00				

Results

In order to verify the first of the hypotheses and determine the differences between the variables (temperament, risk, and aggression) in motorcyclists and Technical University students and graduates, a one-sided Mann-Whitney U test was used, as the variables did not have normal distribution. In assessing the mean variability of a given variable, medians were taken into account (because of the nature of the distribution of the analyzed variable) (Stanisz, 2007).

Significant differences were observed between the motorcyclists and the control group in all the aforementioned dimensions of temperament. As expected, a group of motorcyclists had a significantly higher strength of excitation, which may indicate a weaker response to external stimuli and thus a need to seek stronger stimulation, such as riding a motorcycle. On the other hand, they showed a markedly greater strength of neural cells in stimulating situations, and considering their higher level of mobility of nervous processes, their behavior seems to be more adaptive.

The motorcyclists had a lower level of inhibition meant to postpone responses or actions, especially in the social aspect. It should be noted here that individual results (in spite of the differences) oscillated around the average

and low values, standard for the Polish population. When interpreting these results it was assumed that in the sten scores 1-4 points represented low results, 5-6 average, and 7-10 high (Brzezinski, 1980).

Contrary to the assumed hypotheses, the group of motorcyclists were not necessarily extreme adventurers. In all the scales by R. Studenski (Multifactor Risky Behavior Scales), motorcyclists had lower scores than the control group, i.e. regarding physical, social, ethical and financial risks. They did obtain significantly higher results in terms of stimulating, instrumental, and unhealthy risk, which corresponds closely with our results on the dimensions of temperament and need for stimulation. In comparison to Polish standards, these higher stimulating, instrumental and unhealthy risk levels in motorcyclists fluctuated around 6 in the sten score, showing quite an average level of risk. Interestingly, the values for the other risk scales, i.e. concerning physical, social, ethical and financial risk, were at high levels of 8-10 for both groups.

The popular image of the motorcyclist emphasizes the high level of risk in this social group and a relatively high level of aggression. However, it is not necessarily reflected in results presented in the Table 3. Contrary to the assumed hypothesis, there were no statistically significant differences between the motorcyclists and the control group with regard to aggression.

Table 3
Aggression Levels Of Motocyclists And The Control Group.

Variable		Motor	Control	U	Z	p level	d-Cohena
		-cyclists	group				
Physical aggression	Q25	16	17				
	Median	22	20.5	23368.5	1.252	0.110	0,12
	Q75	29	25				
Verbal aggression	Q25	13	14				
	Median	16	16	24871.5	0.164	0.435	0,04
	Q75	54.00	52.00				
Anger	Q25	12.00	11.00				
	Median	15.00	15.00	24478.50	0.448	0.327	0,01
	Q75	19.00	20.00				
Hostility	Q25	16.00	17.00				
	Median	19.00	19.50	24178.50	-0.665	0.253	0,07
	Q75	23.00	23.50				

Table 4
Eigenvalues.

Value	Eigenvalue	% of total variances	Accumulated eigenvalue	Accumulated %
1	3.96	28.3	4	28.3
2	3.44	24.5	7.4	52.9
3	2.01	14.4	9.4	67.2

Looking for a typology of motorcyclists without any a priori hypotheses supported by a theory or previous research meant that we were at the stage of exploratory research. Factor analysis of the group of motorcyclists reduced the number of studied variables from 14 to 3 factors. Several methods were used for the determination of factor loadings. The first was the scree Cattell criterion: a method where we look for a place on a linear graph, on the right of which there exists a mild decline in eigenvalues (Stanisz, 2008). Another method used in this study was Kaiser criterion, which says that we can use only those factors which correspond to eigenvalues greater than 1. The eigenvalues used according to this criterion are presented in Table 4.

The share of the explained variance of the first factor is 24%, of the second factor 21% and 22% of the third factor. It means that the variation analysis does not explain 33% of behaviors of the surveyed motorcyclists, but it explains 67% of their behaviors with regard to the studied variables.

The analysis used a standardized Varimax rotation, which aims to maximize the variance of the raw factor loadings.

Table 5 presents the factor loadings after rotation. These loadings (correlation coefficients), when squared, can be interpreted as the share of the explained variance.

Given that the distribution of the investigated variables was not normal, cluster analysis was performed in order to find a new structure and new regularities in the relationships between the variables.

Cluster analysis is not a statistical test, but a “collection” of various algorithms that group objects into clusters. In our case, variables were grouped. In cluster analysis, the initial assumptions of linearity and normality are not necessary (Stanisz, 2007). Prior to this analysis, variables were standardized. The analysis was performed using Statistica Pl. Version 9.0. Out of possible six different measures, Euclidean distance was selected due to the universality of this measure and its capability to reduce outliers. Full bond was selected as a method of agglomeration.

Figure 2 shows a vertical dendrogram. Agglomeration distances are set on the vertical axis, and the horizontal axis shows the corresponding names of variables. At each node (where a new cluster

formed) one can read a distance in which respective elements were bound together to form a new single cluster.

Based on the aforementioned cluster analysis, motorcyclists can be divided into three groups. It should be noted that using different variants of the methods of agglomeration and distance measures, clear affiliation of “strength of inhibition” to one of the three clusters was not observed. Therefore an additional and previously presented factor analysis was performed, according to the instruction by A. Stanicz (2008, p. 141): “Unfortunately there is no objective rule for determining the number of clusters. It must be decided by intuition and knowledge of the tested objects.”

In order to confirm the obtained results, a confirmation analysis was performed on a new group of motorcyclists (N=243, M=28.34, SD=6.22) and the following results were obtained: RMSEA=0.077, AGI=0.88. These results indicate that the obtained model is fairly well matched (Konarski, 2009, Konarski, 2010). The analysis was performed using statistical software AMOS 16.0.

The chart is shown in the figure 2.

Table 5
Factor loadings.

Variable	Factor 1	Factor 2	Factor 3
PTS – Mobility of nervous processes (MO)	-0.091	-0.181	0.764
PTS – Strength of excitation (SE)	-0.134	-0.23	0.732
PTS – Strength of inhibition (SI)	0.13	-0.564	0.043
MRBS – Physical risk	0.903	-0.026	-0.272
MRBS – Social risk	0.907	-0.046	-0.194
MRBS – Ethical risk	0.857	0.155	0.145
MRBS – Financial risk	0.942	0.07	-0.125
SIRI – Stimulating risk	-0.126	0.296	0.77
SIRI – Instrumental risk	-0.048	0.219	0.732
Unhealthy Behavior Inventory	-0.039	0.236	0.713
AQ – Physical aggression	0.153	0.773	0.262
AQ – Verbal aggression	-0.042	0.727	0.222
AQ – Anger	0.148	0.869	0.101
AQ – Hostility	0.114	0.682	-0.169

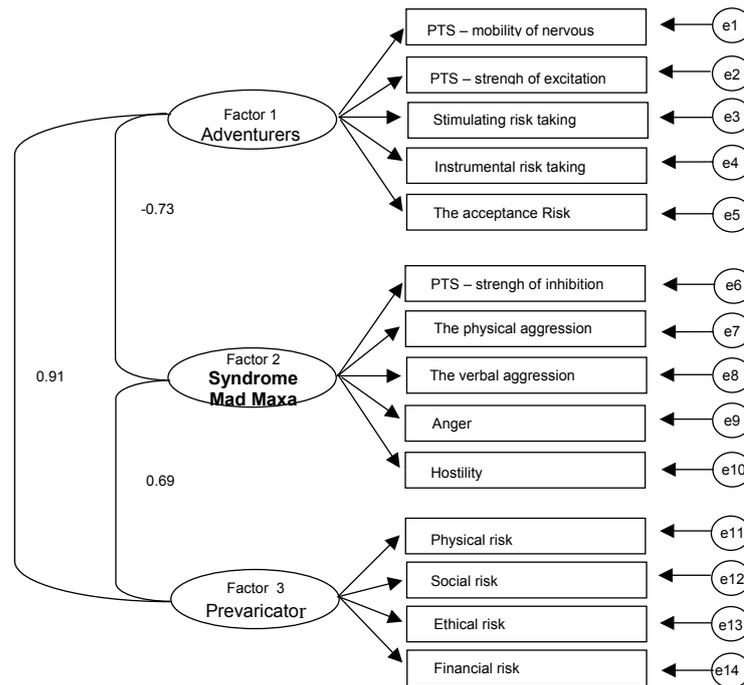


Figure 3. A chart for the three factors.

The analysis used the asymptotically distribution-free method. This method does not require the assumption of multivariate normal distribution, which is a clear advantage. It requires rather large samples for the estimation to be possible at all. A required sample size depends on the complexity of the model (Książkiewicz, 2010).

Based on the aforementioned analysis, motorcyclists can be divided into three groups:

1) Prevaricators, in whom the physical, social, ethical and financial risk was contained in a single factor. Taking into account the previously presented results with regard to

risk and significantly lower levels of all the aforementioned types of risk, we may assume that this group of motorcyclists will seek to avoid any situation which may pose a risk to their health, life or social image. Buying a motorcycle is therefore not so much a manifestation of looking for an extraordinary experience and testing one's limits, but rather the result of interests and passion.

2) Motorcyclists with the Mad Max syndrome, in which the isolated factor includes the strength of inhibition and all the measured types of aggression. This constellation of characteristics indicates that the tested persons cannot

postpone the execution of an activity or interrupt an already started operation. These actions often include aggression, understood as actions and behavior designed to inflict harm or injury. This group strongest corresponds to the characteristics of a *mad driver*:

3) Adventurers, with high levels of the following characteristics: strength of excitation, mobility of nervous processes, and stimulating, instrumental and unhealthy risk.

Discussion

On the basis of all the aforementioned results it can be unequivocally stated that motorcyclists in Poland are not a homogeneous social group. It is impossible to automatically classify the owner of a motorcycle to a group of risk-taking aggressors that violate traffic rules and pose a threat to others. It should be noted that not all motorcyclists can be assigned to the group of “organ donors”, a popular ironic term describing speeding motorcyclists that take unnecessary risk.

Surprising results were obtained in the analysis of aggression. It turned out that with regard to all types of aggression there were no statistically significant differences between the motorcyclists and the control group. We can therefore say that when it comes to aggression, motorcyclists were no different than other studied social groups. However, it should be borne in mind that such conclusions refer to the average intensities of aggression in both groups. As it has been mentioned earlier, a group of motorcyclists is not homogeneous and also includes a personality type with increased aggression, similar to the characteristics of a *mad driver*:

Motorcyclists also had statistically significantly higher levels of “mobility of nervous processes”. In contrast to the control group, motorcyclists may be more inclined to undertake actions in highly stimulating conditions. In comparison with other groups, they may manifest a higher resistance to fatigue in long-term performance and/or in intense activities. At the same time, motorcyclists may adapt faster to new surroundings, and may easily change the mood from positive to negative and vice versa, as evidenced by greater “strength of nervous processes”. This study also shows lower levels of strength of inhibition, which indicates difficulty with abstaining from behaviors that are inconsistent with social expectations and specific ease in revealing their emotions even when it is undesirable.

In accordance with the assumed hypotheses, motorcyclists were observed to have a higher level of stimulating and unhealthy risk which closely corresponds with previously highlighted higher level of mobility and strength of excitation. It can therefore be suspected that motorcyclists in urban traffic often find pleasure in taking

risk, not necessarily leading to a particular purpose, and not as a result of their level of aggression. Unfortunately, sometimes it may involve downplaying the possible risk to their health or life. In order to fully verify this conclusion, it would be interesting to carry out a comparative study of motorcyclists and other road users – i.e. amateur drivers and professional drivers transporting both property and people.

Surprising results were obtained in terms of risks measured by the Multifactor Risky Behavior Scale by R. Studenski. Here, the tested group of motorcyclists received significantly lower scores regarding physical, social, ethical and financial risk, in comparison with the control group. Perhaps motorcyclists do look for a specific risk associated with any sphere of their life and actions, and require only an additional portion of sensations in order to bring colour to the dullness of everyday life. Once again, the results suggest the heterogeneity of the examined group.

Factor analysis, cluster analysis and confirmation analysis, allowed to separate three factors characterizing the tested motorcyclists, dividing the tested group into three personality types.

The first group (prevaricators) was characterized by a lower level of physical, social, ethical and financial risk, in comparison with control group. These are people who take risky decisions much less frequently than their peers. It can be assumed that in this group there are people for whom buying a motorcycle was not associated with the search for extra stimulation, but rather connected with their interests, passions or other personal factors. Such a group is definitely not a threat on the road and is not compatible with the popular perception of motorcyclists.

The second group (motorcyclists with the *Mad Max syndrome*) are persons with low strength of inhibition and high level of aggression (physical, verbal, anger and hostility). The negative factor loading in the “strength of inhibition” may be a sign of the inability to control emotions, and the positive factor loadings in the level of aggression defines these riders as aggressive, with regard to physical and verbal aggression, anger and hostility.

It should be pointed out that the negative factor loading in the “strength of inhibition” is not accompanied by factors associated with risky behavior. It might mean that persons in this group are aggressive only when they see that nobody will oppose them, when they are confident of their strength. It can be assumed that, given the problems with controlling their own reactions and emotions, these motorcyclists may be really dangerous on the road.

The third group (adventurers) are people combining the “mobility of nervous processes,” “strength of nervous processes”, stimulating risk, instrumental risk and unhealthy risk. Characteristic for them is stimulation by speed, on the verge of life and death, giving them the sense of freedom and happiness. However, looking for this additional thrill

may pose a threat to other road users.

Given all the presented results and the created typology of motorcyclists, it seems reasonable to postulate mandatory psychological tests not only for professional drivers or drivers who violate traffic regulations, but any drivers and motorcyclists of any categories. In this way, it could be easier to eliminate individuals which could pose a threat on the road, in the context of personality and temperament. It also seem reasonable to establish restrictions for the youngest drivers and riders – perhaps the restrictions should also take into account their age and sex.

It would also seem reasonable to introduce issues of psychology in the mandatory training program for drivers. So far, such issues have been presented only during the preparatory courses for examiners and driving instructors, and during courses aimed at reducing penalty points. The introduction of compulsory courses on the psychology of transport, dealing with the problem of determinants of efficiency, aggression and accidents, could support the growth of awareness in people applying for driving licenses, including Category A licenses. Thus obtained awareness can be the first step to modify drivers' behavior.

Conclusions

1. There are clear differences in the various dimensions of temperament and propensity to risk between motorcyclists and other social groups.
2. There are no significant differences between motorcyclists and other groups with regard to aggression.
3. Motorcyclists are not a homogeneous group characterized by a similar temperament, risk and aggression.
4. About 11% of motorcyclists did not like riding at high speed.
5. 28% motorcyclists can be defined by low physical, social, ethical and financial risk. As such, they can be called *prevaricators*.
6. One fourth of motorcyclists have a *Mad Max syndrome*, characterized by an inability to stop physical and verbal aggression, anger and hostility.
7. Almost 15% motorcyclists can be called *adventurers*, attracted by dangerous/risky situations because of associated pleasure.

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