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# RISK BEHAVIORS AMONG DRIVERS: AN ASSESSMENT BASED ON RESEARCH

**Summary.** The study was planned to analyze traffic behavior undertaken by drivers, including the emerging so-called awareness gaps. The study was conducted in Poland, and 211 drivers participated in it. The results show many important relationships that could form the basis for proposing effective social campaigns on road safety, including increasing the awareness of drivers as those who have a real impact on its improvement. The analyses confirm the existence of the awareness gap in the examined target group. They also show what kinds of behaviors are considered by drivers to be risky and what kinds of behaviors are aggressive. Moreover, they show the percentage of undesirable behaviors in road traffic and indicate which behaviors are considered by drivers to be the most threatening.

#### 1. INTRODUCTION

For many years, researchers have explored the causes of road accidents and methods of increasing safety in this area. The conclusions that can be drawn on the basis of these analyzes come down to the statement that in road traffic the driver's behavior is the result of objective factors and factors resulting from behavioral adaptation. These factors are influenced by temperamental, personality and attitudinal conditions. Very often, a driver's behavior is burdened with risk despite their awareness of the potential threat. The decision to undertake risky behavior is made as a result of the balance of profits and losses, and the perception of threats and risk acceptance play a decisive role in making such decisions [1-3].

As the analyses show, the main factor influencing the occurrence of road accidents is the behavior of individual groups of road users. In 2021, 20,623 accidents were caused by vehicle drivers (representing 90.4% of all accidents). As a result of these incidents, 1,909 people (85.0%) were killed and 24,307 people were injured (92.0%). One of the main reasons was failure to give the right of way (5,566 accidents) and failure to adjust speed to traffic conditions (5,254 accidents). As many as 1,920 accidents (8.4% of the total) were caused by the decision to drive under the influence of alcohol [4]. These behaviors correspond to broadly understood tendencies to take risks, the consequences of which are road accidents.

Based on the analysis of the main statistical circumstances of road accidents, taking into account the rules of road traffic, the authors of this article identified significant risk factors [4-13]. These include cutting off other drivers, exceeding the speed limit, making sudden/unexpected maneuvers, tailgating, overusing the horn, starting with tires screeching, commenting on other drivers' driving, lecturing, moralizing others, shouting at other road users, gesticulating towards others, frequently changing lanes, not using turn signals, talking on the phone (without a headset), setting a GPS while driving, texting, not wearing seat belts, driving under the influence of alcohol or drugs, and running red lights.

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## 1.1. Models of risky behaviors of drivers

Many authors define risk as exposure to the possibility of events with undesirable consequences [14]. In the quantitative sense, it is understood as the product of the size of the loss (consequences, threats) and the probability of its occurrence [15-17]. Thus, risk is understood as a kind of uncertainty as to the result of one's own actions. Risk can relate to situations in which a person acts in uncertain, unknown, and unclear conditions and in which they also have to take into account random factors and their own limitations [3]. Some theories treat risk as a result of a conscious decision taking into account the potential damage and/or loss. With such an understanding, decisions and risky behaviors are made as a result of a cognitive balance of profits and losses that may result from one's own behavior, and risk perception and acceptance play a decisive role in making risky decisions [1-3]. Risk can also be understood as an action taken by a person with an unknown or uncertain result of exposure to damage and/or loss. In this case, the risk is associated with both an uncertain outcome and exposure to damage [18]. What is common in all the above-mentioned definitions is that risk is not understood as a feature of a situation but as a human reaction to a situation. Therefore, in the analysis of risky behaviors, the act of making a risky decision should be considered.

In the process of making decisions about performing a risky activity (including in road traffic), the possibility of incurring a loss is very often underestimated. Analyses conducted in this area make it possible to identify significant elements affecting the subjective evaluation of risk. Researchers mainly emphasize the level of knowledge and experience (including familiarity with the risk), the subjective sense of influence on the situation (control), the postponement of negative consequences (as well as their catastrophic nature and reversibility), the level of fear aroused by risky activities, and the belief in the effectiveness of one's preventive actions. It is also important whether the risk taken is consistent with one's lifestyle, self-knowledge, self-esteem, sense of control, and personality traits. Great importance is also attached to the strategy of coping with difficult and potentially stressful situations [2, 19-22]. The question remains of how these factors are shaped in relation to vehicle drivers in the context of the risk of causing or becoming a victim of a collision or road accident. Analyses show that drivers do not have sufficient knowledge about accident factors, and above all, they do not appreciate the impact of their own skills on the effects of such situations [6, 7, 23, 24]. In general, drivers are not aware of the risks they incur, especially when their risky behavior leads to the desired result. This type of research is therefore necessary to determine what kind of behaviors can be considered risky according to drivers and what behaviors are expressions of aggression. It is also necessary to define what kind of tolerance we are dealing with in the context of our own and other people's behavior so that we can properly determine the causes of their behavior and, thus, find effective ways to prevent it.

In summary of the above considerations, it can be assumed that the final behavior of the driver is the result of objective, conscious, and other factors resulting from behavioral adaptation.

Road traffic is evaluated through the viewpoint of subjective risk, while the level of acceptance of this risk is an individual feature and depends, among other factors, on the level of demand for stimulation, the level of activity, or the efficiency of the central nervous system.

As can be seen, most models of risky behavior refer to variables related to driver behavior as a result of interaction with the environment. In many cases, these models include motivational and decision-making processes resulting from personality traits or individual cognitive efficiency and central nervous system efficiency. From a diagnostic perspective, such descriptions are very useful because they give the opportunity to fully analyze the multithreaded behaviors of road users.

## 1.2. Factors affecting risk-taking

Many statistical analyses indicate that factors such as age, gender, and driving experience should be taken into account when evaluating an individual's predisposition to risky behavior [25]. For example, women drive more carefully and are less prone to risky behavior on the road than men [23, 25]. In addition, risky behaviors are more often observed among young people than among older drivers. There is a relationship between age, gender, and risky driving with a propensity for risky behavior and risk perception. It is recognized that they are independent predictors of risky driver behavior. Taking risks

is a stronger predictor of risky driving for adolescents and male drivers than for older and female drivers [23].

In the context of undertaking aggressive behavior on the road, there are differences in reactions to the behavior of road users. Women show more irritation in situations when difficulties are caused by others and when the behavior of drivers is perceived as dangerous. Men, on the other hand, tend to react aggressively to carelessness and hostility from other drivers [26].

An important element in understanding the causes of aggressive and risky driving behavior by young adults is their personality [27]. Researchers identified the motivators responsible for risky driving and investigated the role of personality, especially sensation seeking, impulsiveness, and punishment/reward sensitivity, in predicting negative driving outcomes (involvement in accidents and traffic violations). According to the authors, personality, age, and gender are remote factors that indirectly predict involvement in accidents through their association with stable tendencies for abnormal driving behavior. As research confirms, male drivers may be more accident-prone than women because they have certain personality traits that make them underestimate danger and take more risks (higher thrill-seeking, lower sensitivity to punishment), not because they commit more errors (in this regard, no differences were found between men and women). Correlations between age (as well as driving experience) and personality factors were mostly insignificant, with the exception of disinhibition (i.e., seeking intense social experiences), which decreases with age, indicating that lack of self-control is a feature of young (male) drivers, which puts them at risk [27].

Research also shows a relationship between temperamental and personality determinants and the risky behavior on the road declared by drivers [5]. The features differentiating the behavior of drivers are the extent of extraversion and the level of anxiety. Research conducted by Cybulski et al. [28] on drivers of emergency vehicles showed that introverted drivers more often than extroverted people declared driving vehicles with reduced technical efficiency. In addition, people who scored higher on the scale of anxiety as a trait showed a statistically significantly higher intensity of behaviors such as keeping too small a distance from the vehicle in front, making decisions about driving an out-of-order vehicle or driving in a bad psychophysical condition (understood as a result of a medical condition of temporary indisposition), and susceptibility to distractions.

The impact of affect on risky behavior was also analyzed, with the results showing that negative emotions have a greater impact on the perception of risk than positive emotions [29]. Hu et al. [29], using two experiments, verified that emotions and mood influence the perception of risk, the attitudes of drivers to risky behavior in road traffic, and the actual risky behavior of drivers. Negative emotions significantly increased the level of risk perception among drivers but did not lead to appropriate attitudes of drivers towards risky behavior. People with more favorable attitudes towards risky driving were observed to have higher declared driving speeds, which indicated more risky behavior on the road. Based on these studies, it was concluded that negative affect distorts the rational assessment of drivers, and drivers in this situation are likely to consider risky driving acceptable.

In another study, Dahlen et al. [30] analyzed the relationship between six aspects of the driver's personality (i.e., anger level and the "Big Five" personality factors), aggressive driving, and the effects of aggressive driving (indicated by car accidents and traffic violations). The results showed that emotional stability, agreeableness, conscientiousness, and level of anger explain aggressive driving. Drivers with low emotional stability were more prone to anger, exhibited an unstable behavioral pattern, and reacted aggressively to situations they perceived as provocative while driving. Similarly, low-agreeable drivers were intolerant of others, uncooperative, inflexible, and unconcerned with being polite to other road users. Structural equation modeling showed that the most valuable predictors of aggression were agreeableness and anger [30].

It should be noted that the reasons that drivers engage in risky behavior are heterogeneous, which makes it difficult to develop targeted intervention strategies. This type of behavior occurs due to personality traits as well as cognitive and neurobiological processes. Brown et al. [24] found that drivers engaging in risky behaviors are characterized by significant heterogeneity in terms of individual characteristics, causes, and reactions to preventive measures.

## 1.3. Associations between risky behaviors and road aggression

Many statistical analyses indicate that factors such as aggression toward other drivers are often associated with risky behavior. However, this relationship is ambiguous. Aggressive driving is combined with maneuvers made under the influence of disturbed emotions, which leads to behaviors that impose their own preferred level of risk on others. In such a situation, the driver is aggressive because they assume that others will act with the same level of risk; thus, one person usurps the right to increase the risk of others [31]. Aggressive driving, like many other behaviors of this type, is conditioned by various factors. Based on the main theoretical perspectives relating to aggressive behavior, it can be concluded that situational factors that can trigger aggression are important, as are (if not primarily) personality conditions and the related strategy of coping with the resulting tension [6].

The problem of aggression in road traffic is not a new phenomenon, although, over the last few years, it has become the subject of great interest for researchers and specialists in many fields of science. This is related, on the one hand, to the actual increase in aggressive behavior among drivers and, on the other hand, to the publicity of the problem by the mass media. Road aggression is a complex concept, and thus, its relationship with risk is ambiguous. Assuming that aggression is a real (or intended) behavior [32] through which the perpetrator intends to cause physical or psychological harm to the victim, it should be noted that the driver is fully aware and assumes that their behavior will have negative consequences on other road users. This type of behavior carries the risk of causing a threat to road safety. It can therefore be assumed that aggression is a primary phenomenon in relation to risk; however, risky behavior may arouse emotions, which may result in aggressive behavior. It seems, therefore, that it is a system of feedback in which both cause and effect relationships should be taken into account and in which certain phenomena specific to a given category should be distinguished.

Based on the above theoretical implications, an analysis of risky and aggressive behaviors (observed and presented) by drivers was conducted. The following research hypotheses were formulated:

- 1. There is a correlation between the perception of risky behavior and the tendency to engage in such behavior.
- 2. There is a correlation between age and the tendency to engage in risky and aggressive behavior.
- 3. There is a correlation between the assessment of one's own skills and the tendency to engage in risky behavior.
- 4. There is a correlation between gender and the tendency to engage in risky behavior and aggressive behavior.

A research methodology was developed in order to check these assumptions, taking into account both elements of aggressive and risky behavior on the road in the context of their observation and action, depending on age, gender, and skills assessment.

## 2. METHODOLOGY

The study involved 211 drivers, including 92 women and 118 men (with an average age of M=40.25 years). Participants included drivers who drive a car every day (64 respondents), as well as several times a week (66 respondents), or occasionally - several times a month (38 respondents) and less often (43 respondents). Nearly 60% of the respondents admitted that they exceeded the speed limit by 10-20 km/h, and as much as 24% exceeded the speed limit by 20-50 km/h. Over 40% of the respondents consider themselves to be good drivers, and over 10%, in their opinion, are doing well on the road. This result is important because, in addition, 63% of respondents claimed that they enjoy driving fast, and only 37% do not derive satisfaction from it. This situation is confirmed by the number of penalty points held for traffic offenses. Nearly 80% declare no penalty points, but as many as 20% have them. The vast majority of the respondents (148 respondents) have never caused a collision, 30% of the respondents (63 respondents) have had such an event, and only 2.5% of the respondents caused an accident. The respondents were also asked about feeling tired while driving; 17% did not feel such a state, nearly 50% rarely feel it, and over 30% declared feeling tired only sometimes. Less than 1% of respondents often experience this condition.

All drivers who took part in the study were of Polish nationality. The research was conducted in three provincial cities in Poland, which are large agglomerations (cities with over 300,000 inhabitants).

Based on the theoretical premises, a study was planned to analyze the behavior in road traffic undertaken by drivers, taking into account the occurring so-called awareness gap (i.e., a situation in which the declared aversion to a given behavior does not accompanied by the ability to refrain from it). An original questionnaire was developed containing elements of the evaluation of one's own and other drivers' behavior in terms of risk and aggression, as well as a declaration of behaving in a certain way. In the first part of the study, drivers were asked about typical behavior in road traffic (observed by others and presented by themselves). Then, the respondents were asked to assess a given behavior in terms of aggression and risk. The respondents answered the questions in writing. Each respondent completed the survey individually.

The study was conducted under the standards of anonymity, drivers were informed about the possibility of withdrawing from the study at each stage, and the data was analyzed quantitatively. The subjects were recruited using the snowball method, maintaining the need to differentiate according to sex, education, and age. The condition for participation in the study was to have a driving license of at least category B for at least three years and to actively participate in road traffic.

Due to the diagnostic difficulties resulting from the determination of aggression and risk in road traffic, the drivers were additionally asked which behaviors and road maneuvers they consider risky and which they identify with aggressive behavior.

#### 3. RESULTS

In the first stage of the analysis of the respondents, the differences between the behaviors observed by the surveyed drivers on the road (undertaken by other road users) and their own behaviors were determined. They are depicted in the charts below.

As shown, 63% of the surveyed drivers observed "exceeding the speed limit" every day, and 20.4% admitted to engaging in this behavior. The respondents observed "sudden maneuvers" in 31.8% of other drivers, while they indicated that they perform them very rarely (54.5% of responses) or not at all (22.7%). Behaviors such as "abusing the horn," cutting in front of other drivers," and "tailing" were observed in others at least once a week. The perspective of their own behavior is definitely optimistic, as they rarely or never noticed the above-mentioned behaviors in themselves.

Drivers were also asked about their behavior towards other road users, in particular those involving verbal and non-verbal aggression towards others. This form of aggression was treated as driving anger. The consequences of such emotions are often the cause of accidents, but their role is underestimated. The attitude to the analyzed issues is presented in the charts below.

Also, in this case, the respondents evaluated themselves much more leniently than other drivers, indicating that behaviors related to (verbal and non-verbal) aggression do not happen to them at all or very rarely, but they encounter the above-mentioned behaviors, albeit at different frequencies.

Overall, 51.2% of respondents never or very rarely (28.4%) "shout at others," and similar behavior was observed in other drivers very rarely (32.2%) or several times a month (28.9%). "Commenting on the driving of others" was observed by the respondents at a similar level (15.2%). However, such behavior was observed by 37% of the respondents at least once a week. The surveyed drivers rarely (40.3%) or never (35.1%) declared "moralizing the others," and 29.4% of respondents observed this behavior several times a month, 22.3% observed it once a week, and 11.4% observed it daily.

In addition, the respondents were asked about behaviors that are an expression of risk in road traffic (i.e., behaviors whose consequences carry a significant risk of causing an accident or collision).

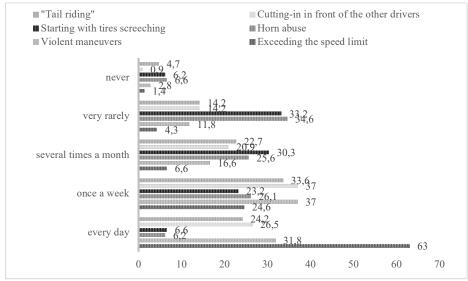


Fig. 1. Observations of aggressive behavior among other drivers

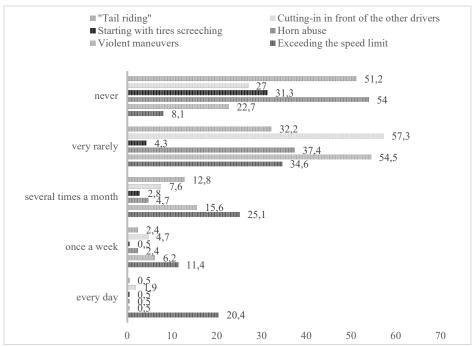


Fig. 2. Aggressive behaviors admitted by the surveyed drivers

In the case of risky behaviors in road traffic, "frequent lane changes" were observed once a week by 34.1% of respondents and every day by 29.4%. For the surveyed drivers, such behavior happens very rarely (41.7%) or never (16.6%). Many people observed "mobile phone calls" daily (38.4%) or weekly (30.3%). The respondents themselves admitted to this type of behavior very rarely (28.4%) or that they never do it (44.1%). "Not using turn signals" is a behavior that respondents also observed daily (28.4%) or once a week (25.1%). On the other hand, almost half of the respondents (49.3%) declared that they never or rarely act in this way (38.4%). Also, 56.9% of respondents did not admit to "setting a GPS" while driving, and 20.9% do it very rarely. However, drivers observed such behavior in others much more often: 25.6% several times a month, 26.1% once a week, and 16.6% every day.

In the next stage, the research hypotheses were verified. Statistical analyses were performed using IBM SPSS Statistics, version 27, under the MacOS operating system. Correlations between individual variables were assessed in order to verify these assumptions.

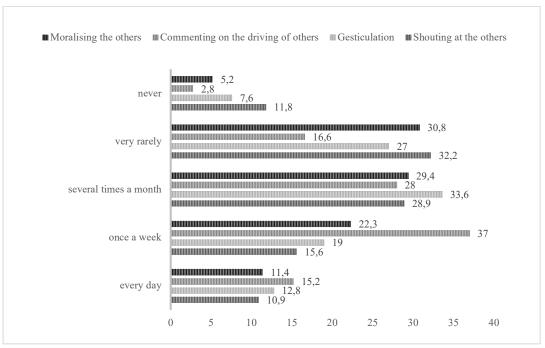


Fig. 3. Observations of behavior of other road users that involve verbal and non-verbal aggression towards others

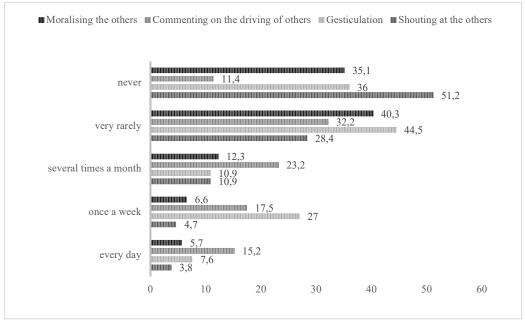


Fig. 4. Behaviors towards other road users that involve verbal aggression and non-verbal towards others

Pearson's r-correlation analysis showed that the observation of risky behaviors undertaken by other drivers on the road was positively related to risky activities undertaken by the respondents (r=.485, p=0.01), which means that the more risky behaviors a person observes, the more such behaviors he or she performs on the road.

The analysis also showed that the more driver behaviors were considered risky, the more often they described them as aggressive, but this was not related to observations and aggressive behaviors. However, it was noted that the tendency to evaluate behavior as an expression of aggression increases with age (r=.257, p=0.01) and is negatively correlated with speeding (r=.186, p=0.05).

The negative correlation between age and taking risky actions (r=-.356, p=0.01) confirms that the younger the respondent, the more risky behaviors he or she admits to conducting in road traffic. This is

especially worrying given that, in many cases, these behaviors are accompanied by a higher assessment of one's skills (r=-.356, p=0.01).

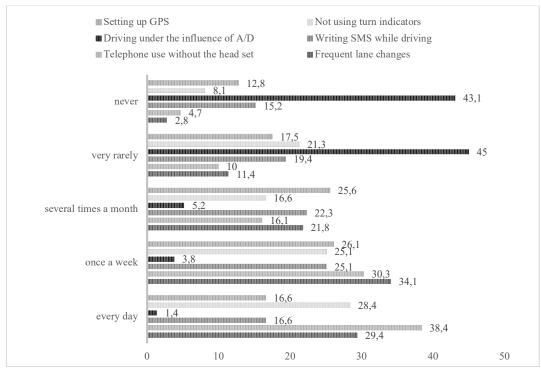


Fig. 5. Observations of risky behaviors in other drivers

An analysis was carried out using Student's t-test for independent samples in order to check the correlation between gender and aggressive and risky behaviors. The results show that gender does not determine whether a person perceives behavior as risky or aggressive on the road. Although the average of behaviors considered risky by women is higher than that of men, the differences are statistically insignificant. On the other hand, differences in the observation of risky behaviors and their performance depending on gender were significant. The averages were higher in men, which means that more risky behaviors are observed by men, t(200)=3.982; p<.001. They also perform more of them, t(200)=3.754; p<.001. These correlations are shown in the chart below.

Considering the above results, the differences in the scope of exceeding the speed limit were also checked. According to the declarations of the respondents, 13% of them did not exceed the speed limit, while nearly 60% of people exceed the speed limit by 10-20 km/h, 20% exceed it by 20-50 km/h, and 4% exceed it by more than 50 km/h. The analyses show that these values depend on the gender of the respondents (see the chart below). Women more often than men declared having no tendency to exceed the speed limit, and if they did, the values were lower. These differences were statistically significant to the disadvantage of men, t(207)=4.799; p<.001. Similar correlations were also observed in the case of such behaviors as cutting off while driving, making sudden maneuvers on the road, tailgating and symptoms of negative emotions toward other drivers.

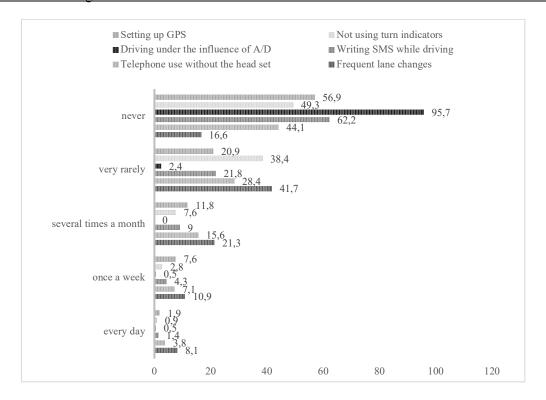


Fig. 6. Risk behaviors in road traffic

Table 1

The relationships between risky behaviors and aggression in road traffic,

age, and the assessment of driving skills

	Correlation table						
	Observation of risky behaviors	Risky actions	Aggression	Risk	Age	Evaluation of one's skills	Speeding
Behavior observation	1	.485**	.029	018	011	.124	.266**
Risky actions	.485**	1	064	079	356**	.186**	.535**
Aggression	.029	064	1	.311**	.257**	020	265**
Risk	-0.18	079	.311**	1	.110	.168*	043
Age	011	356**	.257**	.110	1	048	269**
Evaluation of one's skills	.124	.186**	020	.168*	048	1	.124
Speeding	.266**	.535**	265**	043	269	.124	1

<sup>\*\*</sup> Statistically significant correlation at the level of 0.01 (two-sided)

### 4. DISCUSSION

The analysis indicates that although drivers are aware of the phenomena of risk and road aggression by naming certain behaviors, this does not contradict the existence of the so-called "awareness gap." According to the assumptions, the drivers declared observing risky and aggressive behaviors much more often than they admitted to committing them. The studies controlled the driving evaluation indicators in road traffic. This applied both to the behaviors observed in other drivers and to their own behaviors. The respondents declared that the vast majority of dangerous behaviors, such as talking on the phone while driving without a hands-free set or driving after drinking alcohol, occur very rarely. The exceptions are

<sup>\*</sup> Statistically significant correlation at the level of 0.05 (two-sided)

speeding—which was reported by over 40% of people every day or at least once a week—and commenting on the driving of other drivers—which was reported by over one-third of the respondents. However, according to declarations, the values of these exceptions were relatively low and dependent on gender. Women declared exceeding the speed limit much less often than men, and if they did, the values were lower.

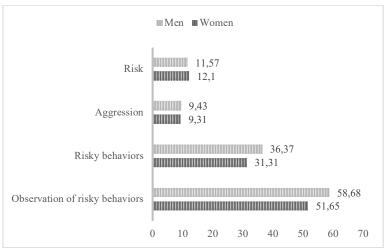


Fig. 7. Gender and risky and aggressive behaviors

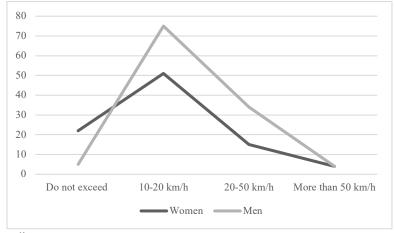


Fig. 8. Gender and speeding

According to their declarations, the respondents very rarely performed risky behaviors. This result was dependent on age, with older drivers less often indicating engaging in dangerous behavior. The analyses also show that the respondents' perception of dangerous behavior as aggressive was related to age. The respondents considered the most unambiguously aggressive behaviors to be cutting off other drivers, abusing the horn, tail riding, and driving after drinking alcohol. Not wearing a seatbelt, talking on the phone, and running yellow lights were assessed as the least aggressive. The older the respondents were, the more aggressive they perceived these behaviors.

A correlation between age and exceeding the speed limit was observed. Compared to older drivers, younger drivers more often declared exceeding the speed limit and considered less of the presented behaviors as aggressive and risky. In the context of aggression on the road, older drivers more often considered the behavior of others as aggressive and paid attention to it. Therefore, it was concluded that the tendency to evaluate behavior as an expression of aggression increases with age and is related to speeding. The more often the subjects declared that they exceeded the speed limit, the more risky behaviors they observed and admitted to committing themselves. This may also mean that a greater awareness of aggression and risk in road traffic affects the presentation of such behaviors. Thus, raising driver awareness in this area has the potential to influence their safe behavior.

Interestingly, risky behavior was related to the assessment of one's own driving skills. The analyses show that the higher the assessment of one's skills, the more risky behaviors the respondent presents. The effects of such thinking can be observed in the form of road accidents.

#### 5. CONCLUSIONS

Previous research showed that, under Polish conditions, over 80% of drivers declare that they observed aggressive behavior on the roads (e.g., dazzling other drivers with headlights, unsafe lane changes or overtaking, cutting off other road users, tailgating, excessively using the horn, starting abruptly, shouting insults) at least once a week. At the same time, only slightly more than 30% of the respondents admitted to performing such behaviors. These negative phenomena have been confirmed by the results of the analyses presented in the present study. It has been shown that Polish drivers still show a high tendency to engage in risky and aggressive behavior. According to the analyses, nearly 90% of the surveyed drivers consider shouting at road users as an expression of road aggression, but only 40% of them associate such behavior with risk. The remaining 50% do not consider potential threats of such behavior to be likely. This research also confirms the presence of the so-called awareness gap. Drivers perceive aggression in other road users, but they do not see their own aggression. Aggression in road traffic can have many sources, including the type of temperament predisposing a person to such behavior, the lack of an ability to cope with stress and emotions, and experiences of personal tension.

The research shows that the duplication of risky behaviors may be related to the fact that drivers who have repeatedly behaved carelessly or risky and have not suffered negative consequences consider risk to be an acceptable standard. Many are convinced that they always control the traffic situation and the risk of hazards, hence the declarations "I am a good driver" and "I drive fast but safely." Such risk is taken voluntarily. Sometimes, drivers justify a risky decision with situational compulsion. An awareness of the lack of consequences or their remoteness in time (distant effects of disease, lengthy lawsuits, etc.) is of great importance. These results show that Polish drivers have competencies regarding risk perception in some areas but that this knowledge is not high. Some of them have a big problem with both the perception of risk and admitting to inappropriate behavior. Moreover, they often do not know their risky or aggressive behaviors can lead to traffic accidents. This knowledge is necessary for safe functioning in road traffic and should be introduced as an essential component of young drivers' education.

#### References

- 1. Tyszka, T. Analiza decyzyjna i psychologia decyzji. PWN. 1986. [In Polish: Decision Analysis and Decision Processes].
- 2. Goszczyńska, M. Człowiek wobec zagrożeń. Psychospołeczne uwarunkowania oceny i akceptacji ryzyka. ŻAK Academic Publishing House. 1997. [In Polish: People toward threats, psychological conditions of risk assessment and acceptance].
- 3. Studenski, R. *Teorie przyczynowości wypadkowej i ich empiryczna weryfikacja*. Katowice: GIG, 1986. [In Polish: *Theories of accidental causation and their empirical verification*].
- 4. *Wypadki Drogowe Raporty Roczne*. Available at: http://statystyka.policja.pl/st/ruchdrogowy/76562,Wypadki-drogowe-raporty-roczne.html. [In Polish: *Road Accidents Annual Reports*].
- 5. Odachowska, E. Temperamentalne uwarunkowania zachowań ryzykownych na podstawie kierowców. *Logistyka*. 2012. Vol. 3. P. 1739-1746. [In Polish: Temperamental conditioning of hazardous behavior based on the analysis of drivers. *Logistics*].
- 6. Odachowska, E. & Gąsiorek, K. Psychologiczne determinanty agresji drogowej i możliwości prewencyjne. *Transport Samochodowy*. 2016. Vol. 3. P. 17-32. [In Polish: Psychological determinants of road aggression and preventive possibilities. *Motor Transport*].

- 7. Odachowska, E. Psychologia zachowań ryzykownych w ruchu drogowym. Warszawa: Wydawnictwo ITS. 2012. [In Polish: *Psychology of Risky Behavior in Road Traffic*. Warsaw: ITS Publishing House].
- 8. Odachowska, E. & Ucińska, M. Determinants of drivers' risky behaviour. *Journal of KONES Powertrain and Transport*. 2013. Vol. 20. No. 3. P. 283-289.
- 9. Brożyna, E. Czynnik ludzki a bezpieczeństwo w ruchu drogowym. *Autobusy: technika, eksploatacja, systemy transportowe.* 2017. Vol. 17. Nos. 7-8. P. 49-52. [In Polish: Human factor vs road traffic safety. *Buses. Technics, Exploitation. Transport Systems*].
- 10. Goniewicz, K. & Goniewicz, M. & Pawłowski, W. & Fiedor, P. & Lasota D. Road safety in Poland: magnitude, causes and injuries. *Medical Advances*. 2017. Vol. 70. P. 352-356.
- 11. Prawo o ruchu drogowym tekst jednolity zgodnie z Obwieszczeniem Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 8 czerwca sierpnia 2017 r. (*Dz.U.* 2017 poz. 1260). [In Polish: Road Traffic Act consolidated text in accordance with the Announcement of the Speaker of the Sejm of the Republic of Poland of June 8, 2017 (*Journal of Laws* 2017, item 1260)].
- 12. Łuczak, A. Współczesne problemy psychologii transportu i ruchu drogowego w badaniach międzynarodowych. *Transport Samochodowy*. 2016. Vol. 3. P. 5-15. [In Polish: Current problems of transport and traffic psychology in international studies. *Motor Transport*.].
- 13. Burghardt, T.E. & Pashkevich, A. & Piegza, M. Drivers' perception of horizontal road marking with high retroreflectivity. *Urban and Regional Transport*. 2017. Vol. 8. P. 5-10.
- 14. Ratajczak, Z. Kontrowersje wokół pojęcia ryzyka. Źródła i konsekwencje. In: Studenski, R. *Zachowanie się w sytuacji ryzyka*. Katowice: Publishing House of the University of Silesia. 2004. [In Polish: Controversies surrounding the concept of risk. Sources and consequences. *Behavior in risk situations*].
- 15. Smith, K. *Environmental Hazards: Assessing Risk and Reducing Disaster*. 2nd ed. Routledge, London/U.S.A./Canada. 1996.
- 16. Sayers, P.B. & Gouldby, J.D. & Simm, I. & Meadowcroft, I. & Hall, J. *Risk, Performance and Uncertainty in Flood and Coastal Defence A Review*. R&D Technical Report D2302/TR1 (HR Wallingford Report SR587) London, U.K. 2002a.
- 17. Sayers, P.B. & Hall, J. & Meadowcroft I. Towards risk-based flood hazard management in the UK. *Proceedings of the Institution of Civil Engineers*. 2002. Vol. 150(5). P. 36-42
- 18. Popiołek, K. *Człowiek w Sytuacji zagrożenia*. Stowarzyszenie Psychologia i Architektura. 2001. [In Polish: *People in danger*. Psychology and Architecture Association].
- 19. Brewer, N.T. & DeFrank, J.T. & Gilkey, M.B. Anticipated regret and health behavior: A meta-analysis. *Health Psychology*. 2016. Vol. 35(11). P. 1264-1275.
- 20. Wontorczyk, A. Problematyka ryzyka w psychologii transportu. Czasopismo Psychologiczne. 2010. Vol. 16. No. 2. P. 209-223. [In Polish: Problems of risk taking in transport and traffic psychology. *Psychological Journal*].
- 21. Studenski, R. *Ryzyko i ryzykowanie*. Katowice: Wydawnictwo Uniwersytetu Śląskiego. 2004. [In Polish: *Risk and risk-taking*. Publishing House of the University of Silesia].
- 22. Slovic, P. Cigarette smokers: Rational actors or rational fools? In: P. Slovic (ed.) *Smoking: Risk, perception, and policy.* Thousand Oaks, CA: Sage, 2001. P. 97-124.
- 23. Rhodes, N. & Pivik, K. Age and gender differences in risky driving: The roles of positive affect and risk perception. *Accident Analysis and Prevention*. 2011. Vol. 43. P. 923-931.
- 24. Brown, T.G. & Ouimet, M. C. & Eldeb, M. & Tremblay, J. & Vingilis, E. & Nadeau, L. & Pruessner, J. & Bechara, A. Personality, executive control, and neurobiological characteristics associated with different forms of risky driving. *PLoS ONE*. 2016. Vol. 11(2). e0150227.
- 25. Odachowska, E. & Ścigała, D. Kobieta i mężczyzna za kierownicą. Psychologiczne aspekty różnic płciowych w zachowaniu na drodze. *Transport Samochodowy*. 2014. Vol. 2. P. 45-71. [In Polish: Woman and man behind the steering wheel. Psychological aspects of sex differences in the behaviour on the road. *Motor Transport*].
- 26. Björklund, G.M. Driver irritation and aggressive behaviour. *Accident Analysis and Prevention*. 2008. Vol. 40. P. 1069-1077.

- 27. Constantinou, E. & Panayiotou, G. & Konstantinou, N. & Loutsiou-Ladd, A. & Kapardis, A. Risky and aggressive driving in young adults: Personality matters. *Accident Analysis and Prevention*. 2011. Vol. 43(4). P. 1323-1331.
- 28. Cybulski, M. & Strzelecki, W. & Grzymisławska–Cybulska, M. & Głowacka, M.D. & Mojs, E. & Determinants of personality and risky road behaviors at work in drivers of medical transport vehicles in the Wielkopolska (Greater Poland). *Workers' Health and Safety*. 2014. Vol. 65(4). P. 485-496.
- 29. Hu, T.Y. & Xie, X. & Li, J. Negative or positive? The effect of emotion and mood on risky driving. *Transportation Research* Part F. 2013. Vol. 16. P. 29-40.
- 30. Dahlen, E.R. & Edwards, B.D. & Tubré, T. & Zyphur, M.J. & Warren, C.R. Taking a look behind the wheel: An investigation into the personality predictors of aggressive driving. *Accident Analysis and Prevention*. 2012. Vol. 45. P. 1-9.
- 31. James, L. & Nahl, D. Road rage and aggressive driving: Steering clear of highway warfare. Amherst, NY: Prometheus. 2000.
- 32. Tasca, L. A review of the literature on aggressive driving research. *Aggressive Driving Issues Conference*. 2010. Available at: http://www.stopandgo.org/research/aggressive/tasca.pdf.

# Attachment - Questionnaire

Below are the questions regarding functioning in the road traffic. Please respond to each question by selecting the correct answer (put a cross under your chosen answer). In some questions/statements, it is possible to select more than one answer. The study is anonymous, and the data will be used only for scientific purposes. We appreciate you providing honest answers.

1.	Age	
- •	5-	

2. Gender: Female / Male

3. Education

Dasic voca	illollal SC	Condary	riighei incomplete		ringher (including bachelor's degree)		
4. Driving license category							
A	В	С	D	B+E	C+E	D+E	

Higher (including bachelor's degree)

5. Which of the following behaviors of other drivers do you encounter, and how often?

Higher incomplete

Type of behavior	Every day	At least once a week	Several times per month	Very rarely	Never
Cutting in					
Speeding					
Sudden/unexpected maneuvers					
Tailgating					
Abusing the horn					
Starting off "burning rubber"					
Commenting on other drivers' behavior					
Instructing others					
Yelling at other road users					
Gesticulation towards others					
Frequent lane changing					
Not using turn indicators					
Talking on the phone (without a loud					
speaking set)					
Setting a GPS while driving					
Writing text messages, emails, etc.					
Not wearing a seat belt					
Driving after drinking alcohol					
Driving through a red light					
Other (specify)					

6. Which of the following behaviors happen to you, and how often?

Type of behavior	Every day	At least once a week	Several times per month	Very rarely	Never
Cutting off other drivers		WCCK	month	latery	+
Speeding					+
Sudden/unexpected maneuvers					+
Tailgating					+
Abusing the horn					+
Starting off "burning rubber"					+
Commenting on other drivers' behavior					+
Instructing others					1
Yelling at other road users					
Gesticulation towards others					
Frequent lane changing					
Not using turn indicators					
Talking on the phone (without a loud					
speaking set)					
Setting a GPS while driving					
Writing text messages, emails, etc.					
Not wearing a seat belt					
Driving after drinking alcohol					
Driving through a red light					
Other (specify)					

7. Which of the following behaviors of other drivers do you consider aggressive?

Type of behavior	Yes, I consider this behavior aggressive	No, I do not consider this behavior
		aggressive
Cutting off other drivers		
Speeding		
Tailgating		
Abusing the horn		
Yelling at other road users		
Gesticulation		
Frequent lane changing		
Starting off "burning rubber"		
Not wearing a seat belt		
Talking on the mobile phone		
Driving after drinking alcohol		
Driving through a yellow light		
Other (specify)		

8. Which of the following behaviors of other drivers do you consider risky?

Type of behavior	Yes, I consider this behavior risky	No, I do not consider this behavior risky
Cutting off other drivers		
Speeding		
Tailgating		
Abusing the horn		
Yelling at other road users		
Gesticulation		
Frequent lane changing		
Starting off "burning rubber"		
Not wearing a seat belt		
Talking on the mobile phone		
Driving after drinking alcohol		
Driving through a yellow light		
Other (specify)		