

## **FACTORS OF RISKY DRIVING WITHIN CHANGING SOCIETY. CASE STUDY ON POLISH DRIVERS.**

### **Introduction**

Motor insurance is the predominant part of non-life insurance markets all over the world. In 2015 in Poland motor insurance premiums represented 49.9% of the non-life insurance market, whereas gross payments and benefits represented up to 69.9% of this market. The gross claim ratio for motor insurance was 89,49% [1]. Loss prediction is then a life issue.

In 2015, about 21 million cars were registered in Poland and more than 11 million of foreign cars come to Poland. Police recorded 33 thousands of car accidents with 2938 fatalities and 39,8 thousands of injured and 406 thousands of collisions. The last ones are usually not recorded by the police, so the actual number of collisions is several times bigger [17]. Insurance companies recorded 1 419 910 claims in compulsory third part liability insurance of owners of motor vehicles [9].

Many different factors influence the number and size of incurred losses in motor insurance. These are economic-related, road-related, vehicle-related and personal-related factors among others. In this paper the last one will be analysed. The relationship between psychological and behavioural characteristics and risky driving has been analysed since the end of the 1940s. Many theoretical and empirical studies have been published since then. Nonetheless, an increasing population density, a broad use of vehicles and the improving quality of life are the reasons for changes in the related impact of the particular factors of risky driving. This advocates the consecutive research on this topic.

In this paper two samples of drivers have been analysed. The first one consisted of 12573 drivers examined in 2007, and the other with 22182 units examined in 2015. The data came from the Social Diagnosis project. The project has been carried out in Poland since 2000. The aim of the project is to diagnose Poles' living conditions and the quality of life as they report it themselves. The project covers a broad range of aspects related to the situation of households and their individual members. The social factors it considers may be divided into three general categories: household demographic and social structure, household living conditions in terms of their material situation and the citizens' quality of life, lifestyle and individual characteristics. Since 2007 the database comprises information about car collisions caused by the respondents during the previous year.

The aim of this study is to identify the factors of risky driving among Polish drivers. A broad range of respondents' personal characteristics and the information about the situation of their households available in the above mentioned database allow to verify many theories related to the personal factors of road accidents. In particular, on the basis of the *Problem Behaviour Theory* psychological and behavioural correlates of risky driving will be identified. Then, the theory of two

personality subtypes among high-risky drivers described by Donovan, Umlauf and Salzberg (2002) [11] will be verified on the present data. Risk takers do not only cause more car accidents, but are also more prone to financial troubles [3]. Therefore, the correlation of the households financial situation and the frequency of car collisions will be verified. In the dataset there are drivers with and without driving licenses. The potential differences in risky driving factors between these two groups will be analysed. According to the authors of Social Diagnosis, both Poles' life conditions, and the quality have improved in recent years. The 2015 report indicated the signs of the development of civil society and the changes in the value system. A comparison of risky-driving factors that were significant in 2007 with their equivalents in 2015 will allow to answer the question if the changes in society trigger the changes in the set and impact risky-driving factors.

A correlation between causing the car accidents by respondents and identified factors of risky drivers will be statistically verified with the use of the chi-square. The correspondence analysis will be applied to display factors of risky driving in a multidimensional way. To the knowledge of the author of this paper, the data gathered in the Social Diagnosis study haven't been extensively analysed in the context of risky driving factors so far.

## **DATA AND METHODS**

The Social Diagnosis research is a panel study developed and conducted in Poland by the Council for Social Monitoring. It is a non-government association of scientists and experts in such areas as: economy, psychology, demography, sociology and so on. The aim of the project is to collect information about households and the quality of life of their members. The first wave of the study was conducted in 2000. Subsequent waves were carried out every second year since 2003. So far, eight waves have been conducted with 2015 wave as the last one. Two questionnaires have been used in each wave of the study. The first questionnaire is a source of information about a household, living conditions and about the demographic and social features of its individual members. The other questionnaire is completed by all available members of a given household aged 16 or more and contributes information about individual persons' quality of life [20]. The main structure of the questionnaire is consistent within the waves however some of the questions are being changed or modified. There is an open access to the data gathered from the two questionnaires and all waves of study<sup>1</sup>.

In a wave of 2007, respondents in the individual questionnaire have been asked, for the first time, about perpetration of a road collision or accident during last year. This question with connection to other features of the respondents and their households allows to draw some information about personal and socio-behavioural characteristics of risky driving.

In this paper as a risky driver is considered respondent aged 16 or more who admitted to cause a road collision or an accident during the last year.

In 2007, 5532 households were examined and individually 12641 members of these households. After removing incomplete data in relation to questions about age and road accidents, 12573 units were used in the present study. In 2015, 11740 households were examined with members and individually 22208 members of these households. After removing incomplete data in relation to

---

<sup>1</sup> Data are available at: [www.diagnoza.com](http://www.diagnoza.com)

questions about age and road accidents 22182 units were used in the present study. In order to make the data obtained during the research representative for the population of Poles cross-sectional wages for individual respondents were applied.

Authors of the Social Diagnosis in the reports [20, 21] identified main socio-demographic features of risky drivers among adults (18 years and more). The highest risk group were identified as young and the middle-aged (up to 44) men, residents of the large cities, with higher education, relatively well-off and who work in private sector or were private entrepreneurs. Correlation between causing car collisions and being involved in other braking law incidences were also displayed.

In the present study, analysis were extended to all respondents in the age 16 years or more because according to many empirical studies teenagers are very often perpetrators of car accidents and collisions. As the result percentages given in this study marginally differ from the findings in Social Diagnosis report where only adults aged 18 and more were considered.

In 2007, 179 drivers who caused collisions or road accidents were recorded in the sample (1,53%). Among them there were 22 persons without driving license. In 2015, 273 drivers admitted to cause a collision or an accident (1,65%), 38 of them did not have a driving license.

In the article we hypothesize that people who decide to drive a car without driving license in spite of the possible law consequences have different behavioural characteristics than other drivers. Group of drivers without driving license that caused accidents will be then analysed separately.

### **Personal factors of risky driving according to behavioural theories**

Some of the behavioural theories give guidelines about personality of a driver that is prone to cause an accident. Type A and type B personality theory developed by Friedman and Rosenman (1974) distinguishes two opposed personality types. Type A is a complex of traits, including a chronic sense of time urgency, impatience, aggressiveness and hostility towards others, tendency to rival behaviour and excessive competitive drive. Individuals displaying this pattern are usually high-stressed workaholics [3],[2]. Type B personality characterizes individuals devoid of the characteristic features of type A personality. Many empirical studies proved that drivers who scored high on the Type A scale tend to cause more accidents and collect more tickets than these with Type B personality [17],[15].

Problem-behaviour theory developed by Jessor in 1977 [12] states that problem behaviour is the result of person-environment interaction. Problem behaviour is defined as behaviour undesirable by the society, usually deplored by the law. People with problem behaviour have excessive egoism, tend to impress others, are irresponsible, strive for independence [3]. Problem behaviours are such activities as: alcohol use and problem drinking, smoking, using drugs, general illegal activity and risky driving. Engage in one problem behaviour increases the likelihood of being involved in other problem behaviours.

Donovan, Umlauf and Salzberg in their research in 1988 identified two types of high risky drivers [7]. First group consists of individuals with high level of anger, aggressiveness, impulsiveness,

sensation seeking and antisocial behaviour. Second group is characterized by high level of depression, emotional distress, resentment, acting out these suppressing feeling while driving.

According to empirical researches drivers who cause more accidents and engage in risky driving tend to be more angry in general, aggressive, impulsive, sensation seeking [6].

Brockett and Golden 2007 referred to several studies proving relation between bad credit history and driving accidents [3],[24].

## Results

According to the results of Social Diagnosis in 2007, 51% of adults in Poland had a driving licence. In 2015, this rate increased to 63%. In the same time the percentage of Poles causing road accidents or traffic collisions increased from 1,53% of population to 1,65%, as we limit the population to drivers with driving licence these rates will be respectively 2,69% and 2,35%. To detect which drivers are more prone to cause accidents, chi-square test with the significance level of 5% have been used. Significant predictors are displayed in table 1.

Car accidents are caused mainly by men in the age 25-34 years, however the second high risk group are young people below 24 years. Predominant education level is higher and post-secondary. These people live usually in big cities, are employed or self-employed in private sector. The risk increases if respondents have another activity after work such as evening, extramural studies or take part in additional courses and trainings. Most risky group are singles who do not run a household (usually children or grandchildren of the head of the household).

There are no significant differences between risky and non-risky drivers according to the most important prerequisite for happy and successful life in spite of importance of health. In 2007, 65,03% of people and in 2015 70,21% considered health to be one of the three most important prerequisites of happy life. In both years there were higher percentage of drivers in this group in comparison to the group that do not value the health as much.

In the Social diagnosis project Hobfoll's stress theory have been used to measure stress in life. According to the theory eight categories of stress in life were established: marital, parental, carer, financial, work-related, environmental stress related to housing conditions, neighbours and safety in the vicinity of the place of residence, health-related stress and administrative stress [11].

Marital and parental stress occurred to be one of the important correlates of risky driving. Sense of lack of authority among relatives translated into risky driving. In both analysed years these respondents that felt they do not meet the expectation of the spouse, committed more traffic incidences. The same effect was caused by problems in bringing up children such as losing influence on children, complaints about children, their disregard of parents and naughty behaviour. However, the scale of this problem in the population is low. There were less than 2 percent of respondents in the population with such family problems [table1].

Much bigger group is one comprised with respondents responsible for the health of older family members (40% in 2007 and 35% in 2015). Respondents who admitted to feel responsible for such relatives or were often worried about their health or state of mind were more risky drivers (carer stress). Financial problems of the family caused by any of their members had no influence on risky driving. Work stress was not the reason of higher percent of accidents in 2007 but it did in 2015.

**Table 1. Characteristics of risky drivers**

Features the risky drivers	% in population		% in population causing car accidents		% causing car accident among drivers with driving licence	
	2007	2015	2007	2015	2007	2015
place of residence: towns > 500 thd of citizens	10,59%	11,68%	3,36%	2,73%	5,68%	3,62%
age:						
up to 24 years	16,43%	12,59%	1,59%	2,64%	3,91%	4,24%
25 - 34 years	18,01%	19,39%	3,15%	2,79%	4,42%	3,45%
educational level: higher and post-secondary educational level	18,00%	25,67%	2,95%	2,79%	3,80%	3,23%
Private entrepreneurs	4,30%	4,69%	4,64%	2,56%	5,13%	2,77%
relations to the head of the household:						
Son in law or daughter in law	1,81%	1,94%	2,54%	1,91%	3,29%	1,57%
grandson or grand daughter	0,72%	0,64%	3,19%	3,62%	12,00%	1,69%
son or daughter	22,91%	21,59%	1,95%	2,08%	3,89%	3,07%
Marital status: single	25,75%	28,37%	1,94%	2,38%	3,89%	3,59%
Education services:						
attending crèche or kindergarten	0,16%	0,34%	4,76%	1,35%	11,10%	2,94%
evening, extramural student	4,31%	2,03%	5,18%	4,79%	7,41%	5,87%
additional courses, trainings	1,07%	0,93%	4,32%	1,49%	5,88%	1,27%
possession of mobile phone	65,68%	90,88%	2,11%	1,76%	3,28%	2,43%
main maintenance source: self-employment	3,69%	3,97%	5,22%	2,45%	5,72%	2,62%
Carrying any work within the last 7 days	47,23%	52,71%	2,38%	2,20%	3,16%	2,64%
private ownership of the institution being the main workplace	65,05%	4,21%	2,46%	2,26%	3,29%	2,80%
the main place of work not located in the place of residence	32,74%	35,90%	3,05%	2,25%*	3,72%	2,63%
any activity connected with improving his/her qualifications or other skills in the last 2 years	17,21%	12,61%	2,63%	3,12%	4,28%	3,94%
work abroad in the last 2 years	3,24%	2,32%	2,63%*	3,20%	3,53%	3,50%
health as one of the most important prerequisites for happy, successful life	65,03%	70,21%	1,75%	1,44%	3,19%	2,19%
types of stress:						
The expectations of your husband toward you were so great you were unable to meet them	2,40%	1,49%	3,28%	2,48%	5,92%	3,74%
Your husband was too extravagant in spending money that were your common property	1,76%	1,11%	3,14%	0,00%	6,00%	0,00%
You felt that you were losing influence on your children	1,7%	1,23%	3,74%*	1,89%	6,5%	1,73%
You did not have enough time for your child	4,49%	.	3,36%	.	4,29%	.
You felt responsible for caring for and ensuring well-being of your parents or older relative	39,86%	34,75%	2,08%	2,1%	3,23%	2,52%
You were worried about the health or state of mind of one of your parents or older relatives	16,61%	11,58%	2,16%	1,92%	3,45%	2,56%
Problems and worries of your parents, parents-in-law or other older relatives added to your troubles and made your life difficult	25,84%	.	2,03%	.	3,27%	.

\*not significant at 5% level; (.) question not included in the questionnaire in 2015

In both years environmental stress and administrative stress were positively correlated with car accidents. In 2007 drivers under environmental or administrative stress caused more accidents, in 2015 this regularity disappeared.

Lack of concentration while driving can be caused not only by stress and problems but also due to distractors such as mobile phones. In 2007, 66% of respondents used mobile phones. The odds of causing traffic accidents among mobile users were 5 times of those in the group that didn't use it. In 2015 population of mobile phones users increased to 91%, whereas odds ratio increased to 8. The same negative influence of the use of modern means of communication on the road safety was observed in the case of using computer or Internet. In 2007, 47% of population used computer and odds ratio was 3.7. In 2015, percent of computer users increased to 67% and odds ratio raised to 3.9. In both years percent of car accidents perpetrators were increasing as the number of hours spent with computer or internet increased (figure 1). There are no information which drivers use mobiles and internet during driving, however just a fact of using them anytime, relevantly increases the risk of causing car accident. Taking into account that nowadays more and more people use computers, internet and mobiles, this could translate into the raise in car accident rate.

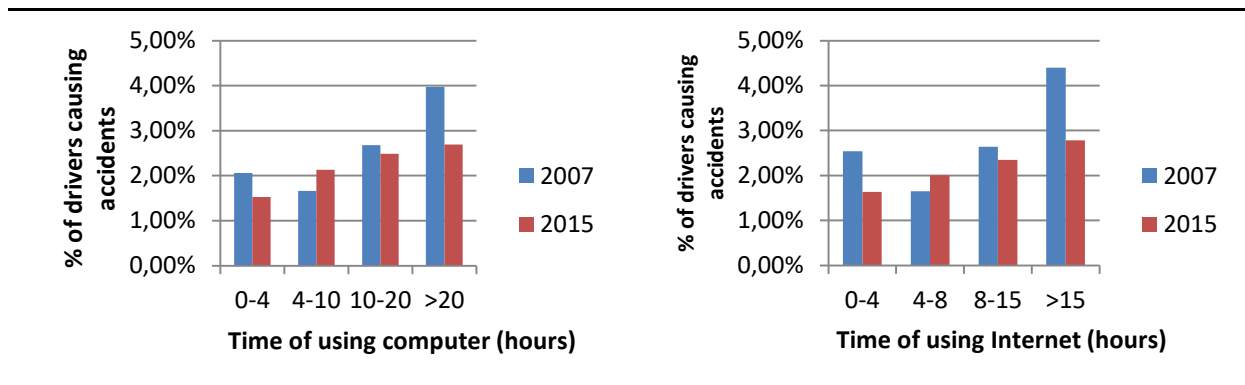


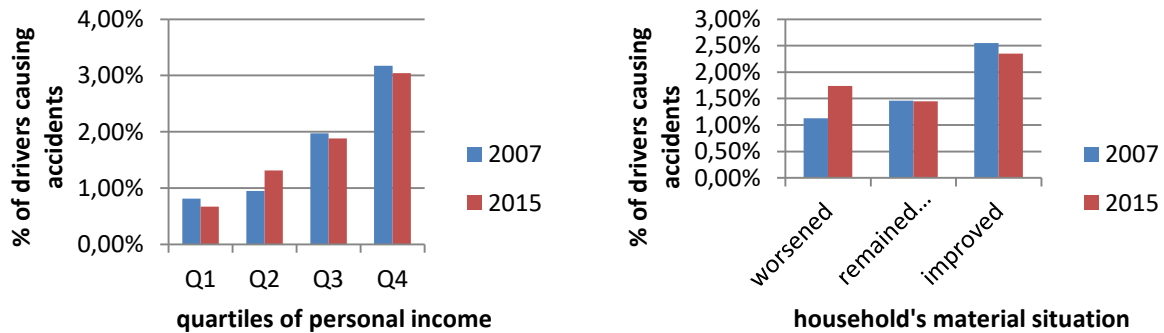
Figure 1. Risky driving and time spent on using computer and internet

### Financial risk taking and financial problems

Personal net monthly income was positively correlated with risk of accident. People with higher income more often caused accidents (figure 2). Drivers possessing savings had greater chance to cause car accident, the same applied to having loans or credits. Therefore people who didn't use any financial services were lower risk group. This could be correlated to their life style and probably these people more rarely drive a car.

Among those having any loans there were no differences concerning type of the creditor. In opposite to expectations there were no differences in risk among people who received credit from banks and from quasi-banks. Clients of quasi-banks, usually takes expensive, short-term loans in quasi-banks due to the refusal of the banks. According to the findings of Brockett and Golden 2007, people with bad credit history and make risky financial decisions are more prone to cause car accidents. In our study we didn't any correlation between financial problems or financial risk taking and risky driving. Therefore, financial decisions did not translate into risk of causing car accident. In

both years, respondents who admitted that their material status improved, caused relatively more accidents than those whose situation haven't changed or worsened (figure 2).



**Figure 2. Risky driving and personal income and changes of household's situation**

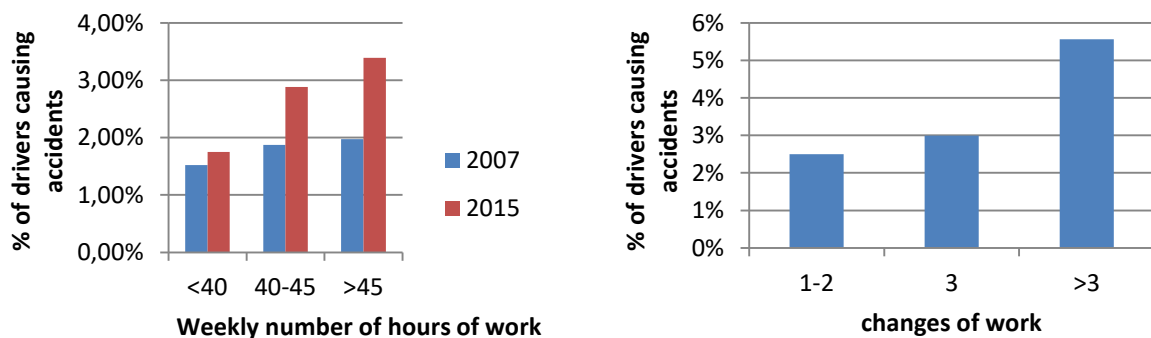
### Work

In 2007, if the place of work was located in another town than the place of residence it were increasing the risk of causing accident, however time spent in the way to work wasn't correlated to the risk of accident. In 2015, opposite situation was observed. Location of the place of work wasn't important in the opposite to time spent in a way to work.

In 2007, among people who worked within the last 7 days before interview there were no statistically significant correlation between number of worked hours and risk of causing accidents. However there were observed in the sample the tendency of increasing percentage of accidents with the increasing number of hours spent in work (figure 2). In 2015 correlation was statistically significant.

Interesting regularity was observed about working abroad. In 2007, 3% of respondents admitted to work abroad within last two years and 2% in 2015. In both years higher percent of these people caused accidents than those who didn't left the country to work.

People who changed work last two years tended to cause road accidents more often than those who worked in one place for a longer period of time . Risk was increasing with the number of changes (figure 3).



**Figure 3. Risky driving and attitude to work**

The odds for people who performed managerial functions were 2,7 times higher than for other employees.

Entrepreneurial people who started a better paid or an additional job, invested any money in production, trade or services, earned money in connection with the stocks, bonds or participation units in some fund, gained new qualifications or skills in order to have a chance of higher salary more often were causing accidents.

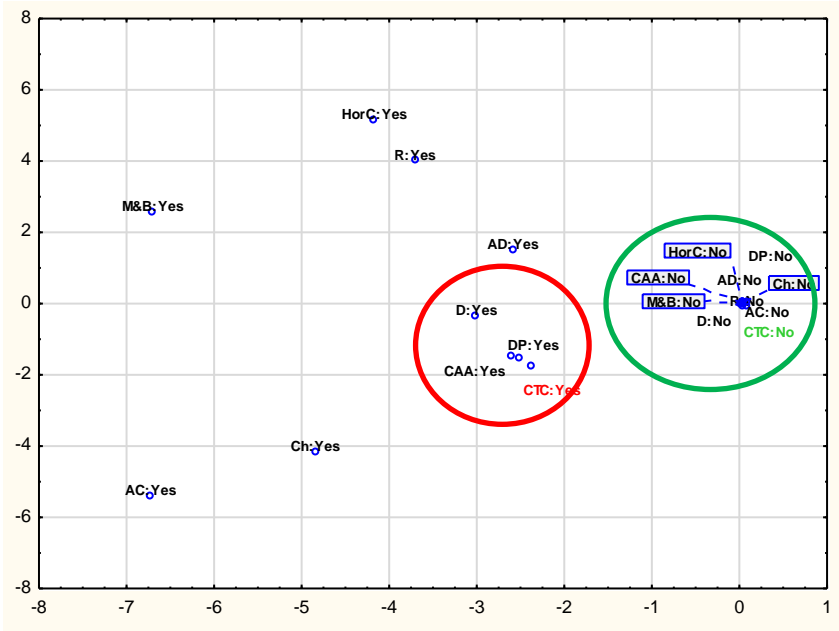
**Sport**

In 2015, the questionnaire in opposite to 2007, consisted questions about sport activity. 41% of Poles performed some form of sport. Sport activity were positively correlated to risk of causing accidents. Especially such forms of physical activity as jogging, gym, skiing, swimming, football and other team sports were significantly related to accident ratio. Whereas joga, aerobic and martial arts were not.

**Problem behaviour**

Percent of smoking in the population decreased from 29% in 2007 to 24% in 2015. In both years odds for causing accident by smoking driver were respectively 44% and 58% higher than for the non-smoker. Also people who admitted to drink too much alcohol or use drugs significantly more often were causing accidents.

Being a car accident perpetrator was correlated with being a victim of such crimes as being robbed, being mugged and beaten, have home or car broken into. Multidimensional relation between these variables have been shown by the correspondence analysis in Figure 4. In the two dimensional space, such breaking the law incidences as: causing car accidents, being detained by police, having a close acquaintance arrested and finally being discriminated lie close together what means that there are most correlated. On the other hand negations of all breaking the law experiences are very close to the location of the attribute: "not causing accidents".





R-robbed, M&B - mugged and beaten; HorC – home or car broken into; Ch-charged with criminal offence; DP- detained by police; AC- accused in civil court case; CTC- caused a traffic collision or accident; CAA- close acquaintance arrested; D-discriminated; AD – apartment damaged

**Figure 4.** Breaking the law experiences within drivers (correspondence analysis factor map)

### **Dealing with stress**

Questions with the same set of multiple-choice answers about dealing with stress were asked in 2007 and 2015. In 2007 people who were most prone to cause car accidents in the case of stress situation pull themselves together or started using alcohol or gave up not knowing what to do. It suggests that there were two opposite types of behaviour. In 2015, significant attitudes were: *asking others for help, pulling oneself together or starting using alcohol*. Percent of people who were able to ask others for help and pull themselves together increased in the population.

### **Accident perpetrators without driving licence**

In Poland it is obligatory for drivers to have a car driving licence. Person applying for a driving licence has to be at least 18 years old and pass a theoretical and practical exam. Obtaining the licence in Poland seems to be more difficult than in many other European countries, only 35% of people taking these exams pass them. In some situations such as speeding or drunk driving, driving licence can be temporary or permanently overruled. According to the police data in 2015 there were about 40 thousands drivers without driving licence revealed by the police. Such drivers, without enough qualifications, could be even more risky than those with driving licence who cause accidents.

In the dataset used in the present study it is not possible to identify drivers without driving licence who didn't cause accidents because in spite of declaration about causing car accidents there are no other questions connected to driving. Therefore, it is only possible to characterize the main features of the group of drivers who didn't possess driving licence but admitted to cause car accidents. There were respectively 22 and 38 such people in 2007 and 2015.

In 2007, most of drivers causing accidents without driving licence were men (13 persons) with vocational education (11), employed in private sector (7). They represented all age groups but were very often singles (10) who run their own household (10). They used to work in one place of work for a longer period of time (10), often 40 hours of week (7) as blue collar worker (5). Majority of them declared to have personal income. The level of the income was very diverse and proportional to the diversity in population. These drivers lived in the villages (7) or small towns (6) and had short distance to the place of their work. What is quite unforeseen, most of them (21) didn't use alcohol in stress situation.

In 2015, characteristics of drivers who caused accident without driving licence were very similar to those in 2007 in spite of two features: 17 of 38 such drivers were under 24 years and due to the young age, some of them were still living in their parents' household. Other features regognized for the year 2007 stayed unchanged.

## CONCLUSIONS

Empirical results display that the group of drivers causing accidents is not homogeneous according to the personal characteristics. On the one hand these people are well educated, wealthy, engaged in their work and achieve success at this point. On the other hand such characteristics as being involved in incidences of breaking law, being in stress related to the family life seem not to fit to the previous profile. This could confirm that there are two subgroups of risky drivers – one corresponding to the type A personality and second one comprising problem behaviour drivers. Taking into account the percentage of people in the population with particular personal characteristics describing these two groups we could expect more accidents caused by the first group. People who decide to drive without driving licence and cause accidents represent third group with many opposite features to the first two groups.

Interesting regularity was revealed about sport activity. In source literature it is underlined that high-risk sports are correlated to risky driving. In our analysis most of the sport activities were correlated to higher rate of causing car accidents. It would be worthwhile to confirm this observation in different populations.

In this study we presented only these features of drivers that occurred to be significant correlates of risky driving. However, thanks to the fullness of the Social Diagnosis project and the large quantity of questions in the questionnaires we could verify many of hypotheses based on the results of previous studies. We haven't found the correlation between risky driving and such characteristics as: depression, antisocial behaviour or financial risk taking.

Finally, the comparison of the structure of the population in 2007 and 2015 in respect of the features of risky drivers allowed to show that the changes in life style have influence on the risk of causing accidents. Increasing popularity of mobile phones and Internet is one of the factors that increase the risk of road accidents. To confirm these finding it would be worthwhile to extend this analysis to all waves of Social Diagnosis project.

## REFERENCES:

1. Annual Report of the Polish Insurance Association for 2015, Polish Insurance Association, Warsaw 2016
2. Fatima B., Munawar N., Arshad S., Type-A Behavior and Traffic Accidents, Pakistan Journal of Social and Clinical Psychology 4 (1-2)
3. Brockett P., Golden L., 2007, Biological and Psychobehavioral Correlates of Credit Scores and Automobile Insurance Losses: Towards an Explication of Why Credit Scoring Works, The Journal of Risk and Insurance, Vol. 74, No. 1, 23-63
4. Carpentier A. et al., 2014, The effect of family climate on risky driving of young novices: The moderating role of attitude and locus of control, Accident Analysis and Prevention, Vol. 73, 53-64
5. Chliaoutakis J., Darviri Ch., Demakakos P., 1999, The impact of young drivers' lifestyle on their road traffic accident risk in greater Athens area, Accident Analysis & Prevention, Volume 31, Issue 6, November, 771–780

6. Deffenbacher J., Richards T., Lynch R., Anger, Aggression, and Risky Behavior in High Anger Drivers, in: J.P. Morgan, Focus on Aggression Research, NovaScience Publishers, New York 2004
7. Donovan D., Umlauf R., Salzberg P., 1988, Derivation of Personality Subtypes Among High-Risk Drivers, *Alcohol, Drugs and Driving*, 4(3-4), 233-244
8. Grey E., Triggs T., Haworth N., Driver Aggression: The Role of Personality, Social Characteristics, Risk and Motivation, Human Factors Group, Department of Psychology, Monash University Report No. CR 81, Federal Office of Road Safety, online at: <http://www.monash.edu.au/muarc/reports/muarccr81.pdf>
9. Insurance Market Yearbook 2015, Polish Financial Supervision Authority, Warsaw 2016
10. Jackowska B., Wycinka E., 2013, The comparison of the effect of gender equal treatment on insurance in Poland and other selected European Union countries, *Insurance Review* 4/2013, Polish Insurance Association, Warsaw, 59-73
11. Jeffrey Jensen Arnett, Daniel Offer, Mark A. Fine, Reckless driving in adolescence: 'State' and 'trait' factors, *Accident Analysis & Prevention*, Volume 29, Issue 1, January 1997, Pages 57-63
12. Jessor, R., Jessor, S., 1977., Problem behavior and psychosocial development: A longitudinal study of youth. New York: Academic Press.
13. Kaulich S., Prössl S., Machata K., 2016, Are there alternatives to scrutinizing elderly drivers?, *Transportation Research Procedia*, Vol. 14, 4296-4303
14. Miller M., Smith R., 2003, The Relationship of Credit-Based Insurance Scores to Private Passenger Automobile Insurance Loss Propensity, Actuarial Study, Epic Actuaries online at <http://www.epicactuaries.com>
15. Miles D., Johnson G., 2003, Aggressive Driving Behaviors: Are There Psychological and Attitudinal Predictors?, *Transportation Research Part F*, 6, 147-161
16. Peplińska A. et al. , 2015, Who is a dangerous driver? Socio-demographic and personal determinants of risky traffic behaviour, *Current Issues in Personality Psychology*, Vol. 3 (3), 149-158
17. Perry A., 1986. Type A behavior pattern and motor vehicle driver behaviour, *Perceptual and motor skills*, 63, 875-878.
18. Road accidents in Poland in 2016. Police report, <http://statystyka.policja.pl/download/20/236480/Wypadki2016.pdf>, access: 10.05.2017
19. Rothengatter T., 2002, Drivers' illusions—no more risk, *Transportation Research Part F* 5, 249–258
20. Social Diagnosis 2007. Objective and Subjective Quality of Life in Poland, ed. by Czapiński J., Panek T., Contemporary Economics, The council for Social Monitoring, Warsaw 2007
21. Social Diagnosis 2015. Objective and Subjective Quality of Life in Poland. Report, ed. by Czapiński J., Panek T., Contemporary Economics, Quarterly of University of finance and Management in Warsaw, Vol. 9, No. 4, November 2015
22. STATISTICAL STATEMENT KNF-02, Polish Financial Supervision Authority, [https://www.knf.gov.pl/Images/V\\_Sprawozdanie\\_statystyczne\\_2015\\_tcm75-48226.xlsx](https://www.knf.gov.pl/Images/V_Sprawozdanie_statystyczne_2015_tcm75-48226.xlsx), access: 10.05.2017
23. Šucha M., Černochová D., 2016, Driver personality as a valid predictor of risky driving, *Transportation Research Procedia*, Vol. 14, 4286-4295

24. Tillmann W., Hobbs E., 1949, The Accident-Prone Automobile Driver: A Study of the Psychiatric and Social Background; *The American Journal of Psychiatry*; 106:321-331
25. Wang Z., Zheng Z., Fleiter J., 2016, Does family background impact driving attitudes and risky behaviours? An investigation on Chinese young drivers, *Accident Analysis and Prevention*, Vol. 95, Part A, 67-77
26. Wells S., Macdonald S., The relationship between alcohol consumption patterns and car, work, sports and home accidents for different age groups, *Accident Analysis and Prevention* 31 (1999) 663–665
27. Wu Ch., Guszczka J., 2003, Does Credit Score Really Explain Insurance Losses? Multivariate Analysis from a Data Mining Point of View, *Proceedings of the Casualty Actuarial Society*, 112-138
28. Zimbardo P., Keough K., Boyd J., 1997, Present Time Perspective as a Predictor of Risky Driving, *Personality and Individual Differences*, Vol. 23, No. 6, 1007-1023