# RISK FACTORS ANALYSIS OF DISTRACTION ACTIONS FROM DRIVING

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**The issues related to the study of risk factors that are associated with the commission of non-driving actions by drivers, which are factors that increase the likelihood of a road traffic accident, are considered. Studies on the frequency of activities secondary to driving, associated risks and factors influencing the frequency of different types of such activities have been carried out in various countries. One of the most common traffic violations committed by drivers is using a smartphone while driving. The studies were carried out in the following ways: by interviewing, by observing the driver with a video camera installed inside the vehicle he is driving, and by observing passing vehicles from the outside. In this paper, we propose an approach using the methods of mathematical statistics to assess the correlation between side effects that distract from driving and factors that affect the frequency of such actions.**

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## 1. Introduction

As noted in [1], side effects that are not permitted by the road traffic regulations are a risk factor for road accidents. The frequency of such side effects is subject to constant research through interviews and observations.

One of the main causes of road traffic accidents is the driver's distraction caused by the commission of secondary actions [2], [3]. However, in order to better assess the risk of a road traffic accident, more accurate information is needed on the frequency of secondary actions and the degree of their danger [1] - [3]. Several country reports have been issued on the results of studies of the frequency of secondary actions, but there are differences between the frequency of types of secondary actions for different countries [4].

As noted in [1], the fundamental problem of research using surveys is that the quality of the data depends on the completeness and honesty of the respondents' answers are often subjective due to their susceptibility to inaccurate understanding of the concept of binary activity and memory errors. The question arises to what extent the data reflect real secondary activity. How much the driver can remember his secondary actions depends on the situation. Rare actions and actions perceived as stressful, such as talking on the phone, may be less remembered [3]. Rather rare actions and actions perceived as stressful, such as talking on the phone, may be remembered better than actions less exciting and more frequent, such as changing the radio channel, [3]. Observing the style of driving in the flow allows you to explore the problems associated with the peculiarities of human memory. Therefore, observation is used with the use of built-in data collection systems, for example, with the help of cameras located in the vehicle [5], [6] (naturalistic research of driving). However, naturalistic research allows one to see the driver's actions (for example, intense reflection) that are not visible from the outside, and gives an understanding that the driver is distracted. Another type of research into driving distractions is observations from stationary points located on highways during the observation period. Each method has its own advantages and disadvantages, complementing and testing each other.

Traffic safety and environmental issues were considered in [7] – [15].

In [16] – [19] the questions of influence of psychophysiological type and condition of drivers on the nature of their behavior are investigated. This nature can be taken into account when setting the parameters of the corresponding mathematical traffic model.

The issues of traffic management on sections of highways at road intersections and modeling of traffic flows on such sections were considered in [20] – [25].

This paper proposes an approach based on the methods of mathematical statistics that allows, using data such as those given in [1], [26], the results of studies on the use of a smartphone while driving, to assess the impact of factors related to driver characteristics such as road or travel time on the frequency of using smartphones in general or certain types of use.

Section 2-5 presents the results of studies on the frequency of side effects, the risk associated with these actions, and the factors influencing this frequency, given in [1], and describes the methodology for conducting these studies.

Section 6 describes the approach proposed in this work for the statistical study of the strength of the influence of factors on the frequency of side effects while driving.

Section 7 provides examples of the use of the approach outlined in Section 3.

## 2. Methodology and survey results

In [1], a methodology for conducting a survey of drivers in order to study the frequency of secondary actions is described. To obtain a representative sample, quotas were determined for four German cities (Braunschweig, Chemnitz, Mainz, Regensburg) in proportion to the number of license holders by sex and four age groups (under 25, 25 to 44, 45 to 64, 65 years) [27]. Surveys were conducted over 6 days from 8 am to 8 pm, in the city center or in shopping centers near highways and near car service centers. 1,072 drivers were interviewed about secondary actions they performed during the last 30 minutes of the trip. In addition, drivers assessed the level of danger and the degree of distraction when performing a secondary action, and also answered questions about their use of a mobile phone [28]. The survey lasted an average of 20 minutes. The following secondary actions were considered: a telephone conversation with a telephone in hand; hands-free telephone conversation; a set of text messages; reading text messages; use of the Internet; use of the navigation system; driving equipment (eg seat, mirror); internal devices (e.g. radio); communication with the passenger; spontaneous actions (self-talk, singing, intense reflection); hygiene; change of clothes (or glasses); food / drink; smoking; finding or moving things; cleaning; distraction to external vehicles.

According to poll results, about 88% named at least one secondary action in the last 30 minutes of their trip. On average, the driver named two actions. These results are consistent with those of other studies [3]. The propensity for secondary actions decreases with increasing age of the driver. Men are more prone to secondary actions. As an answer to the question about the most frequently performed secondary actions, the following were named: communication of drivers with passengers (80% of drivers); actions with vehicle equipment (55%); spontaneous actions (31%). The most frequently named actions by drivers during the last 30 minutes of the trip were named as follows: communication with at least one passenger 20%); spontaneous actions (10%); food / drink (9%); actions related to vehicle equipment (9%); hands-free phone calls (9%). In terms of age, drivers under 25 are significantly more likely to use their smartphones to compose text messages. No driver over 65 years of age reported such actions. Infrastructure (highway or city) also affects the frequency of secondary activities. Hands-free calls, conversations with passengers, food / drink are significantly more likely to occur on a highway than in an urban environment. In general, the subjective perception of the danger of performing secondary actions is rather weak, except for clearly distracting actions (reading and typing, searching or cleaning, distraction by external vehicles). Drivers who reported a mobile phone addiction were more likely to use the phone in the last 30 minutes of the trip than drivers who did not have a phone addiction. In addition, drivers who reported their cell phone addiction reported a higher number of violations that distracted them from driving.

However, when answering questions, memory distortion may occur, and when observing, the subjective sense of distraction is lacking. The purpose of the project described in [1] is an attempt to provide a more accurate answer to the question of the frequency of driving distractions from driving in Germany. Another goal was to test the methods of interviewing and observation by comparing the results obtained using these methods.

The data from surveys and video surveillance were compared. Data on 76 drivers were analyzed. While good agreement was found between survey and observation results for conscious or infrequent activities (phone calls, reading / typing), there was relatively weak agreement for unconscious activities (operations with vehicle-related equipment; personal hygiene; changing clothes / points). The comparison shows that polling is a suitable method for investigating the frequency of conscious or infrequent secondary actions.

### 3. Methodology and results of naturalistic observation. Comparison with survey results

To assess the quality of the results obtained through surveys, sample results were compared with the results of naturalistic observation [1]. The experiments, conducted between March and August 2017, involved 94 drivers.

The behavior of the drivers was recorded for 3 days on two cameras installed in their vehicles – a camera for day and night observation. In order not to focus attention on the subject of secondary actions in a way that could reduce the frequency of such actions by drivers, drivers were misled about the purpose of the study. Comprehensive information about the true purpose of the study was provided to drivers at the end of the study. After the cameras were positioned, at least 30 minutes elapsed, the experimenter conducted a telephone survey. For technical reasons, video recordings of only 76 drivers could be used for the analysis. The survey results and video data were compared and analyzed.

In general, it is shown that the information provided in the surveys is in mediocre agreement with the results of naturalistic observation. Two types of errors are considered: the secondary action is visible in the video, but not mentioned in the survey; the secondary action is not visible in the video, but named in the survey. Analysis shows that video recordings usually show much more than what is called by drivers when interviewed, especially with regard to personal hygiene, clothing, objects related to vehicle equipment (mirror gel, radio, air conditioning). Such actions may not be remembered by drivers or perceived as secondary actions that distract from driving. When it comes to mobile phone use, there are only slightly more actions identified through video than identified by drivers. From this we can conclude that the actions related to the use of a mobile phone are very deliberate. However, the results indicate that there may be some overestimation of secondary actions. Some of the secondary actions called during interrogation are not visible in the video recordings (false alarm).

This especially applies to the types of operations with the internal equipment of the vehicle, to spontaneous involuntary actions and distraction to objects external to the driver's vehicle. One of the reasons for this may be that the video recording always refers to the last 30 minutes of the trip, and the driver can name his earlier actions. Mobile phone related activities such as searching for the phone without following a conversation or typing may take place. Such an action may not be realized or remembered. Since this action occurs quite often, it is expected that in the future it is planned to include in the survey questionnaire a separate question about finding a phone without its subsequent use.

In [1], it is concluded that naturalistic observation is a useful and low-cost method for investigating the frequency of deliberate or infrequent distractions from driving (for example, phone calls, reading or typing text messages). In addition, the survey has the advantage over naturalistic observation that it gives an idea of the driver's subjective perception of the degree of distraction and his risk [29].

However, survey data are less reliable for data on secondary activities that drivers do not consider as driving distractions. This, in particular, applies to the installation of equipment in the vehicle (air conditioning, radio, etc.), to actions related to changing clothes, finding things in the vehicle. These actions, which are probably performed quite unconsciously and often enough, are not often named, even if there is a corresponding question in the questionnaire. Thus, it turns out that survey results underestimate the frequency of such poorly conscious actions. Therefore, in relation to the results of each survey, there should be an understanding of how the survey data correspond to the actual frequency of certain distractions from driving.

Studies show that factors that are not perceived by drivers as distracting from driving can increase the risk of a road traffic accident to a greater extent, for example, according to [30], eating / drinking increases the risk of a road traffic accident by 1.6 times, and mobile phone calls – 1.3 times.

The influence on the frequency of secondary influences of various factors related to the personality of drivers – gender, age, and to the infrastructure in which the vehicle travels – is investigated. With regard to the use of mobile phones, it is shown that people who use a mobile phone and tend to use the phone continuously continue to use it, even while in traffic. Young people especially often use the phone, which is often confirmed by research results. Overall, the results show that a variety of factors influence the frequency of secondary actions.

### 4. Results of a study of the frequency of various types of distractions

In [1], the results of studies of secondary actions during driving are presented and analyzed.

According to [3], secondary actions play a role in the number of cases, ranging from 10% to 30% of all road traffic accidents, and in 40% of these cases spontaneous actions take place (for example, talking to oneself or singing). According to the survey results, car drivers (in the city) spent 30% of the trip duration with secondary actions. For truck drivers (on the highway) it even took 50% of the trip [3]. According to a survey in which 600 drivers of cars and trucks took part [31], about 20% of the duration of all trips was conducted with secondary actions. According to the survey [3], the most frequent secondary actions performed by drivers were the following: using equipment services in a vehicle (66%); interaction with fellow travelers (38%); spontaneous actions (36%), for example, talking to oneself, singing; distraction to outdoor objects (28%); food / drink (24%). In [32] the results of a survey (426 drivers) on secondary actions are also given. Briefly, the results of the survey can be summarized as follows: 92% of drivers were distracted by outdoor objects; 89% used indoor equipment such as a radio or air conditioner; 90% of drivers reported thinking about something unrelated while driving while driving; almost 85% of drivers answered that they communicated with fellow travelers while driving; about 52% of drivers reported that they often eat or drink while driving; over 43% said they typed while driving; 32% of drivers called with their phone in hand, and 25% of drivers called with their hands free. According to the survey participants, what actions they consider to be distracting from driving: 80% considered talking on the phone as a distraction; in second place is smoking, which was considered a distraction by half of the survey participants; a little more than a third (30%) named spontaneous use of the vehicle's interior equipment as a distraction; composing or reading text messages was named by 20%, and food / drink – by 9% of the survey participants; communication with fellow travelers was mentioned by 8% of the respondents. Telephone conversations appear to be clearly visible secondary activities, while food / drink or interaction with passengers is less frequently named. Typing text messages was also perceived by survey participants as one of the most dangerous types of distractions.

As noted in [1], in Germany and in other countries, a large number of observations were made of the frequency of secondary actions by drivers. The behavior of the drivers was observed either from stationary points or with the help of a camera installed inside the vehicle, and then the resulting video was analyzed.

A UK observation [12] (10,984 drivers observed) from a stationary site on a two-lane highway showed that 17% of drivers were secondary activities. In accordance with the results of an earlier observation [33], 15% of drivers performed secondary actions. Companion interactions were reported in 8% of drivers and were the most frequently observed secondary effects. 2% of drivers were noticed using devices that are not related to driving, such as a mobile phone. About 2% of drivers were noticed smoking during the trip.

According to one of the more recent stationary observations (7979 drivers observed) in Iran, [34] the most frequent secondary activities were: interaction with fellow travelers (12%); use of non-driving devices including telephone (2%); use of devices related to driving (1%). As a result of another stationary observation (2015) [1], about 20% of the observed drivers from 6 English cities performed secondary actions. The data obtained were similar to those obtained in previous studies; interaction with fellow travelers was found for 11% of drivers; slightly more than 4% smoked during the trip; used non-driving devices 1% of drivers. A study in Alabama, USA, showed that the most common secondary activity was interaction with fellow travelers (54%); about 32% of drivers; 20% of drivers were distracted by objects outside; about 17% typed text messages or business documents on their phone. Research in Germany, reported in Ref. [35], focused on the frequency of mobile phone use. It found that 5% of drivers were text messages, which is more common than observed in other international studies; about 2% of drivers called while holding a phone in their hand; about 2% of drivers called with free hands.

In [36], data from naturalistic observation were analyzed and the proportion of time during which drivers performed non-driving activities was investigated.

The secondary action seen on the video for the longest time was the use of non-driving devices. Next in time was interacting with fellow travelers and then using non-driving devices such as a mobile phone. As noted in [1], the risk of road traffic accidents is especially high for young drivers. In this regard, in [37], the results of naturalistic studies are presented, in which the data obtained in naturalistic observations are analyzed only in cases of road accidents with young drivers (from 16 to 19 years old). They found that at least 76% of the videos had at least one side effect. Telephone use was found to be the most frequent distraction performed in a road traffic accident, with the second most frequent secondary action resulting in a road traffic accident, which appeared to be distraction to external objects; in about 16% of cases, drivers interacted with fellow travelers.

According to a survey conducted in Germany [3], [37] 85% of drivers traveling with passengers communicated with them. Interaction with passengers is the most frequently performed secondary activity. At the same time, the likelihood of interaction with passengers when traveling on a highway is significantly higher than in urban traffic, which may be explained by a more complex transport situation in the city, where the driver is forced to concentrate more on traffic and, accordingly, has fewer resources to communicate with fellow travelers. In [38], data from naturalistic studies on the secondary actions of novice drivers were used. 58% of all video segments showed at least one secondary action performed by the driver; the most frequently performed secondary action was communication with fellow travelers (20% of all drivers); self-starting actions were observed in 17% of drivers; distraction to external objects was noticed in 12% of drivers; phone use was visible on 5% of the video segments. The following was noted in [1] Summarizing the results of various studies, it can be argued that the most frequently observed secondary action is interaction with fellow travelers. This type of side effects in various stationary observations ranges from 8% to 54%, and in naturalistic studies it is observed in about 20% of drivers. In surveys, this type of secondary action is named by 40-50% of the respondents. The use of non-driving devices such as a mobile phone is the second most common side effect in videotaped naturalistic exploration and stationary observation. In the survey, this type of secondary action is named most often (it is called from 40% to 70%).

## 5. Risk of road accidents due to distraction from driving

As noted in [1], using a mobile phone while driving is the most studied secondary activity. The main reason for this is the associated risk of a road traffic accident [39], [40]. Polls in Germany, Austria and Sweden showed that there was a slight decrease in the number of people talking on the phone from 59% in 2011 to 51% in 2016 [40], [41]. This, however, can be explained by the fact [1] that drivers have become more likely to write text messages.

The risk of a road traffic accident when using a mobile phone increases by an average of two to five times compared to when the phone is not in use [42]. It was found in [43], [44] that manual selection of a number on a mobile phone increases the risk by about three times. Other studies have shown that telephone use even increases the risk of a road traffic accident by four times [30], [45]. In some studies, however, opposite results were obtained, according to which the thesis about the negative effect of using the telephone was not supported, as was not confirmed in the naturalistic study, the results of which are presented in [46].

It is natural to assume that the risk depends primarily on the type of telephone use, since different types require different resources. This would be the difference between the risk of using the phone with free hands and using it with at least one occupied hand. However, the literature review given in [39] shows that there is actually no difference between the risk of using the phone with hands free. This can be explained by the survey results given in [41]. It has been shown that even with a device allowing the use of a telephone with free hands, the eyes of drivers are averted from the road, which is critical for safety. Along with the visual component of finding a number on the phone, a mental distracting component also appears during a telephone conversation [47]. This additional stress on resources ultimately negatively affects important processes while driving. The negative influence of the visual search for a phone number is manifested due to the diversion of the gaze in an increase in the reaction by 0.5 seconds [48] – [50], in the deterioration of the driving process due to the weakening of control due to the weakening of control over the speed and direction of movement [51], in deterioration of the decision-making process [52], [53]. The results of naturalistic studies also show an increase in the reaction time during braking. Studies conducted in France [54] found that visual and manual interaction with a telephone begins primarily at a traffic light at which it is required to stop. Switching to green light interrupts this interaction.

According to a survey in Germany [42], approximately 20% of drivers write text messages on their mobile phones and 30% of drivers read messages, with these side effects being carried out primarily by young drivers, mostly men. Similar results were obtained from a survey conducted in 2010 in Austria. Here, 14% of drivers wrote messages on occasion and 32% read them. The fact that messages are written mainly by young drivers is especially dangerous because for this category the risk of a road accident is already increased.

As shown in [30], the use of navigation devices was a strong distraction at that time (2007). The research results presented in [56] showed that the use of electronic devices increases the risk of a road traffic accident by 6-7 times. It was possible to show [57] that the use of a visually hand-held navigation device is more distracting than a spoken device. The duration of gaze distraction when using a visual hand-held device as 50% of the duration of the trip [58]. Guided audio information reduces distraction.

When traveling, there is a need to use a number of devices with which the vehicle is equipped, such as, for example, a seat or mirror setting device, a radio or an air conditioner. According to data from [42], about 43% of drivers use a device to put on a belt, install a mirror or a seat. According to [5], controlling air conditioners causes distraction. This seemingly insignificant side effect leads to a waste of visual and mental resources, which ultimately increases the risk of a road traffic accident. In accordance with [42], control over the climate control increases the risk of a road traffic accident by 1.5 times.

Radio also has a negative impact on travel safety. Only listening to music appears to have no negative impact on travel safety [59].

For the frequency of secondary actions associated with personal hygiene and changing clothes, in [3], an estimate of 13% was obtained. In [42], a slightly lower value of the frequency of such actions was obtained: 6% of the respondents answered that while driving, they perform such actions as, for example, using cosmetics or shaving. Non-driving activities such as applying makeup or changing clothes lead to some aversion of the eyes or some weakening of contact with the steering wheel [59], which increases the risk of road accidents.

According to the data cited in [45], 11% of drivers communicate with fellow travelers, and according to [44], even about a third of all drivers communicate with fellow travelers while driving. Conversation with fellow travelers does not cause any distraction of the eye and does not weaken the control of the steering wheel [59]. The data of naturalistic observation, the results of which are given in [5], show that there is a high risk of getting into a traffic accident if the trip is made alone – by one driver.

According to the survey results in [44], about a quarter of all drivers ate or drank during the trip. Thus, these non-driving activities are widespread. According to [30], these actions are more likely to lead to road traffic accidents than, for example, telephone conversations (according to [30], talking on the phone increases the risk of a road traffic accident by 1.3 times, and food / drink in 1.6 times). However, not all studies are consistent with this. Thus, according to the results [5], food / drink activities do not increase the risk of a road traffic accident.

The number of drivers who smoke while driving is 1% according to the data cited in [42] and 20% according to the data cited in [3]. It was shown in [59] that smoking increases the risk of road traffic accidents by 1.5 times. The duration of the distraction is increased by lighting and extinguishing the cigarette. The duration of holding a cigarette is approximately equal to the time the eyes are distracted while holding the phone.

Other distractions include working with animals in a motor vehicle and handling, and activities such as reading or writing.

## 6. An approach to calculating the quantitative characteristics of assessing the influence of various factors on the frequency of using smartphones while driving

In [1], [26], there is no description of approaches related to mathematical statistics that allow one to quantify the impact on the frequency of violations associated with the use of a smartphone, such factors as the driver's age, driver gender, road type, time of day, region.

Let us describe the approach that allows one to calculate such a quantitative estimate in the form of a statistical indicator called the coefficient of determination [56].

As an effective sign, we consider the frequency of secondary action (food / drink or smoking). As factor signs, we consider qualitative signs expressing the conditions that the driver's characteristic, type of road, and travel time satisfies. Since there are three age categories, the attribute, in the terminology of mathematical statistics, has three levels (Fig. 1).

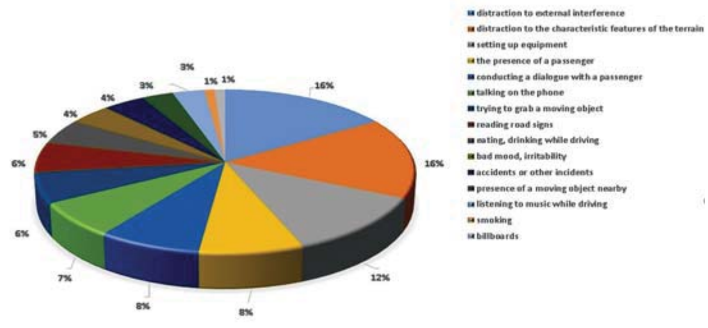


**Figure 1.** Levels of Observed Effective and Factor Signs [26]

Let's assume that there are $n$ observations (there is a sample size $n$). The number of levels of the effective indicator is equal to $m$. Let a confidence $j-th$ level conducted $n_j$ observations $j = 1,\dots,m$. As a result of observations at the $j-th$ level, the following values of the effective indicator were tained $x_{j1},\dots,x_{jn_j}, j = 1,\dots,m$.

The group average is defined as:

$$\bar{x}_j = (1/n_j)\sum_{j=1}^{m} x_{jk}, j = 1,\dots,m,$$

and the overall average as:

$$\bar{x} = (1/n)\sum_{j=1}^{m}\sum_{i=1}^{n_j} x_{jk}, j = 1,\dots,m.$$

Total variance:

$$\sigma^2 = \sum_{j=1}^{m}\sum_{i=1}^{n_i}(x_{ij} - \bar{x})^2.$$

Factorial variance:

$$\sigma_f^2 = \sum_{j=1}^{m} n_j(\bar{x}_j - \bar{x})^2.$$

The coefficient of determination is $\eta^2$ defined as the ratio of the factorial variance to the total. The coefficient of determination can be understood as follows: the value of the factor attribute in $\eta^2 \cdot 100$ percent determines the value of the effective attribute.

The square root of the coefficient of determination is called the empirical correlation ratio, which is thus calculated by the formula:

$$\eta = \sqrt{\frac{\sigma_f^2}{\sigma^2}}$$

## 7. Examples of calculating quantitative characteristics of assessing the influence of various factors on the frequency of secondary actions

On the basis of the data on the frequency of side effects during driving given in [26], obtained as a result of observations in Aachen and Braunschweig, the values of the group averages and the coefficient of determination presented below were calculated. The frequency of smartphone use is averaged over the observations of two observers.

Influence of road type on the frequency of food / drink disturbance: intracity roads - group average $\bar{x}_1 = 0.0165$; suburban roads – group average $\bar{x}_2 = 0.0097$; highways – group average $\bar{x}_1 = 0.0081$; the coefficient of determination: $R^2 = 0.277$ .

Influence of the factor of the region on the frequency of violations of the type of food / drink:

Aachen – group average $\bar{x}_1 = 0.0045$; Braunschweig – group average $\bar{x}_2 = 0.00179$; the coefficient of determination: $R^2 = 0.786$.

Influence of the time-of-day factor on the frequency of food / drink disturbances: from 8:00 am to 10:00 am – group average $\bar{x}_1 = 0.0045$; from 10:00 to 14:00 - group average $\bar{x}_2 = 0.0179$; the coefficient of determination: $R^2 = 0.296$.

Influence of the factor of the day of the week on the frequency of violation of the type of food / drink: Tuesday – group average $\bar{x}_1 = 0.0056$; Wednesday – group average $\bar{x}_2 = 0.0158$; Thursday – group average $\bar{x}_1 = 0.0131$; the coefficient of determination: $R^2 = 0.288$.

Influence of road type on smoking frequency: intracity roads – g oup average $\bar{x}_1 = 0.0148$; suburban roads – group average $\bar{x}_2 = 0.0081$; trunk – group average $\bar{x}_1 = 0.0081$ coefficient of determination: $R^2 = 0.155$.

Influence of the factor of the region on the frequency of smoking: Aachen – group average $\bar{x}_1 = 0.0104$; Braunschweig – group average $\bar{x}_2 = 0.01143$; the coefficient of determination: $R^2 = 0.024$.

Influence of the time-of-day factor on smoking frequency: from 8:00 to 10:00 am – group average $\bar{x}_1 = 0.0148$; from 10:00 to 14:00 – group average $\bar{x}_1 = 0.0104$; highways – group average $\bar{x}_2 = 0.01143$; the coefficient of determination: $R^2 = 0.024$.

Influence of the factor of the day of the week on the frequency of smoking: Tuesday – group average $\bar{x}_2 = 0.0081$; Wednesday – group average $\bar{x}_1 = 0.0328$; Thursday – group average $\bar{x}_1 = 0.0328$; the coefficient of determination: $R^2 = 0.155$.

## Conclusion

This paper describes an approach that allows using the methods of mathematical statistics in the analysis of research results, such as the observations described in [1], [26], carried out in order to assess the frequency of side effects by drivers, their risk and the influence of various factors on the frequency of side effects. The statistical indicator, calculated in accordance with our proposed approach, is the coefficient of determination, which estimates the closeness of the relationship between the factor attribute (for example, the age category to which the driver belongs) and the effective attribute (frequency).

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# АНАЛИЗ ФАКТОРОВ РИСКА ОТВЛЕКАЮЩИХ ОТ ВОЖДЕНИЯ ДЕЙСТВИЙ

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## Аннотация
Рассматриваются вопросы, относящиеся к исследованию факторов риска, которые связаны с совершением водителями не относящихся к вождению действий, которые являются факторами, повышающих вероятность дорожно-транспортного происшествия. Исследования по частоте вторичных по отношению к вождению действий, связанному с ними рисками и факторам, влияющих на частоту различных видов таких действий проводились в различных странах. Одним из наиболее распространенных совершаемых водителями видов нарушений правил движения является использование смартфона во время вождения. Исследования проводились следующими способами: с помощью опроса, путем наблюдения за водителем с помощью видеокамеры, установленной внутри транспортного средства, которое он ведет, и с помощью наблюдения за проезжающими автотранспортными средствами извне. В настоящей работе предложен использующий методы математической статистики подход к оценке корреляционной связи между побочными действиями, отвлекающими от вождения, и факторами, влияющими на частоту таких действий.

***Ключевые слова:*** *безопасность дорожного движения, факторы риска, корреляционная связь, факторный статистический анализ.*

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