

How the Influence of Psychoactive Substances Impacts the Road Safety of Drivers [†]

Emese Sánta ^{1,*}, Petra Katalin Szűcs ¹, Gábor Patocskai ² and István Lakatos ³ 

¹ Faculty of Health and Sport Sciences, Széchenyi István University, 9026 Győr, Hungary; petraszucs@gmail.com

² Special Group in Traumatology, Orthopaedics and Hand Surgery, Petz Aladár University Teaching Hospital, 9024 Győr, Hungary; patocskaig@gmail.com

³ Department of Road and Rail Vehicles, Széchenyi István University, 9026 Győr, Hungary; lakatos@sze.hu

* Correspondence: santa.emese@sze.hu; Tel.: +36-704083223

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Abstract

In Hungary, the consumption of any alcoholic beverage before driving is illegal. A person is considered drunk if they have a blood alcohol concentration of 0.5 g per liter or more. The situation regarding drug use is also disappointing. This research analyses these effects on transport and their “outcome” by evaluating analyses based on police data, driver training data, and experimental data. The research aims to further raise awareness of the public health importance of this problem through a case-control study. Descriptive and correlational, statistical calculations were performed with a significance value of $p < 0.05$. Between 2019 and 2023, there were 10–13,000 drunk driving offenses and 1,000–1,300 drunk-driving accidents on the roads each year, most of which occurred in the capital and caused minor injuries. The results will be used to discover synergies to improve road safety.

Keywords: road safety; drunk driving; drug use; young people



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1. Introduction

Traffic accidents are a major public health problem worldwide, although there has been some improvement in recent years. According to the latest figures from the World Health Organization (WHO) for 2023, 1.19 million people die on the roads each year, which is a slight 5% decrease compared to the 2010 statistics [1].

In 2023, the estimated number of fatal road accidents in the EU-27 countries was 20,380, representing a 25% decrease compared to 2010. The victims of these accidents are predominantly car users (45%), comprising drivers and passengers, followed by two-wheeled vehicle users (26%) and pedestrians (21%). In 2018, 28% of road fatalities occurred among individuals aged 65 and over, primarily pedestrians, who are mainly at risk as pedestrians. However, it is important to note that the age group most at risk is children and young people aged 5–29, where road accidents are the leading cause of death. It is estimated that 13% of road fatalities in the EU involve those between 18 and 25 years old (64% as drivers or passengers and only 8% as pedestrians), representing 8% of the population, so it seems that young people may be disproportionately likely to be the victims of fatal road accidents. Therefore, this age group deserves special attention [2].

In 2024, the road fatality rate in our country was 52 lethal accidents per million inhabitants, an increase of 5% compared to the previous year. In terms of area, the region most affected is Central Hungary [3,4].

Over the past 15 years, the number of traffic accidents in Győr-Moson-Sopron County involving personal injury has been decreasing (824 cases in 2010; 605 cases in 2020; 710 cases in 2024). However, the rate has experienced a notable slowdown in recent years, reflecting a significant 14% decrease from 2019 to 2024. The total number of fatal collisions in 2019 was 42, whereas in 2024 it was 27 (a reduction of 36%). Most accidents occurred in May and June, while the fewest were recorded in January, October, and November. In 2024, 238 (33.5%) of the 710 injury accidents involved individuals aged 60 and over. The most prevalent causes of personal injury accidents in 70–80% of cases were identified as inappropriate speeding on the part of the driver (22% of cases in 2023, 30% of cases in 2024), failure to yield the right of way, a change in direction, pedestrian error, overtaking, and other causes.

Several factors can cause road accidents, but research shows that the most common are:

- Speeding: 30–40% of accidents worldwide are caused by some form of speeding.
- Inattention, e.g., due to mobile phone use.
- Failure to give priority.
- Turning and lane-change errors.
- Lack of driving experience, incompetence, or overconfidence.
- Fatigue, falling asleep at the wheel.
- Inadequate car conditions.
- Weather conditions.
- Pedestrian or cyclist errors, e.g., entering a road unexpectedly, running a red light, poor visibility [5].

Furthermore, drunk driving and, more recently, driving under the influence of drugs, significantly affect reflexes, judgment, and concentration, and are a common cause of accidents, especially when combined with poor visibility. This phenomenon is particularly prevalent on weekends and among young people [6,7].

In 2023, there was a 7% decrease in the number of recorded incidents of driving under the influence of alcohol on a national scale. According to police reports, in 2020, 9.7% of personal injury accidents were attributed to individuals operating a vehicle under the influence of alcohol. In the same year, 65 deaths were caused by drunk driving on public roads; in 2021, that number fell to 51. Since 2008, Hungary has had a zero-tolerance policy, meaning the legal blood alcohol limit is 0.0 g/l—in other words, total prohibition for all drivers. In 2019, the police carried out 2.7 million breathalyzer tests, the highest rate in the EU. Drunk driving is punishable if a driver's blood alcohol level reaches 0.8 parts per thousand (0.8 g per liter) [8–10].

In recent years, there has been an alarming increase in the number of serious road accidents involving drugs in Hungary. Driving under the influence of psychoactive substances is a criminal offense if it can be proven that the substance impaired the driver's ability to operate the vehicle. In such cases, the offense is punishable by imprisonment for a period of 1 to 5 years, along with a fine [11,12].

The UN Road Safety Action Plan for 2021–2030 aims to reduce road deaths and injuries by at least 50%. In its 2020 strategy for sustainable and smart mobility, the EU set the goal of achieving zero fatalities on the roads by 2050, a vision referred to as the “zero concept” [13].

The key challenges associated with this objective include improving infrastructure, addressing gaps in the legislative framework, and enhancing vehicle safety.

2. Materials and Methods

A cross-sectional, quantitative survey was conducted in April–May 2025 among high school and university students. Non-random, convenience samples were taken voluntarily from first-year students of Nursing and Patient Care at the Faculty of Health and Sports Sciences of Széchenyi István University and, after parental consent, from second-year students of the Lukács Sándor Automotive and Mechanical Engineering Technical College of Győr SZC. The survey was conducted in compliance with the ethical rules of research, and the subjects' anonymity was guaranteed at all times. Data was collected using a self-administered questionnaire and a field assessment. The questionnaire consisted of a set of questions on sociodemographic factors, driving license and experience, and attitudes towards driving under the influence of psychotropic drugs. The data were analyzed using descriptive (mean, frequency) and correlational mathematical calculations (chi-square test, two-sample *t*-test, analysis of variance), with the significance level set at $p < 0.05$.

3. Results

3.1. Descriptive Data

A total of 50 participants took part in the study ($N = 50$). Of these, 21 participants (42%) were first-year nursing or midwifery students from the Faculty of Health and Sports Sciences at Széchenyi University, while 29 participants (58%) were second-year students from Lukács Sándor Automotive and Mechanical Engineering Technical College of Győr SZC. In the secondary school, there are only male students, while the university group included just 1 boy and 20 girls; therefore, we do not consider the influence of gender heterogeneity. The respondents have an average age of 18.28 ± 3.79 years, with the youngest student being 15 and the oldest 40 years old.

The majority of respondents live in a city (20 people, 40%), 16 (32%) in a village, 10 (20%) in the major town of a county, 3 (6%) in a civil parish, and 1 (2%) in the capital. A total of 29 (58%) do not yet have a driving license, 14 (28%) have a category B license, 5 (10%) have a moped/motorcycle license, and 2 (4%) have a license for both types of vehicles. On average, they have been driving for 3.05 ± 4.07 years—1 at the least and 20 years at the most ($n = 21$). A total of 13 (61.9%) drive weekly, while 7 (33.3%) drive daily and 1 (4.8%) monthly. On a self-reported Likert scale of 1 to 5 (1—Not at all; 5—Mostly), they consider themselves 3.81 ± 0.92 experienced drivers, 4.00 ± 0.71 technically good drivers, and 4.14 ± 0.91 safe drivers.

The majority of students still use public transport (29; 58%) to get to school daily. A total of 13 (26%) arrive on foot, 6 by car as passengers and the remaining 2 by car as drivers. In terms of harmful addictions, 28 (56%) drink alcohol occasionally, 9 (18%) monthly, 6–6 (12–12%) weekly or never and 1 (2%) daily. A total of 21 (47.7%) self-reported drinking small amounts of alcohol (1 standard unit of alcohol: about 2.5 dl of beer, 1–2 dl of wine or 3 cl of spirits) on occasions ($n = 44$). A total of 15 respondents (34.1%) indicated medium (2–3 bottles of beer, 0.5–1 l of wine, 2–3 $\times$ 3 cl of distilled alcohol) while 8 respondents (18.2%) indicated high (more than 3 bottles of beer, more than 1 bottle of wine, more than 3 $\times$ 3 cl of distilled alcohol) consumption. A total of 22 respondents (50%) preferred distilled alcohols, 12 respondents (27.27%) beer, 8 respondents (18.2%) wine, and 2 respondents (4.54%) other drinks ($n = 44$). Only 1 person in the sample (2%) indicated that they had ever used drugs in their lifetime.

On a Likert scale of 1 to 5, respondents rate the severity of alcohol consumption as a health-deteriorating behavior (1—Not at all a problem; 5—Severe consequences) on average 2.24 ± 1.04 (min.: 1, max.: 5), and 4.5 ± 0.93 (min.: 1, max.: 5) (1—Not at all; 5—Very serious problem). 4.42 ± 1.16 (min.: 1, max.: 5) consider drug use to be a risk factor (1—Not at all a problem; 5—Serious consequences). The level of their condemnation of drug use is

rated on average 4.46 ± 0.99 (min: 1, max: 5) (1—Not at all; 5—Condemn). Respondents agreed with the statement, “The earlier a child starts drinking, the more likely he or she is to have a drinking problem,” with an average score of 3.42 ± 1.1 (1—Strongly disagree, 5—Strongly agree).

Next, we assessed young people’s knowledge of the law on alcohol consumption. (Table 1).

Table 1. Knowledge of laws related to alcohol consumption in the sample (N = 50).

Law, Decree, Regulation	YES, They Do Know	NO, They Do Not Know
“Zero tolerance for drink-driving means that there is no detectable level of alcohol that is so low that it is still permissible.”	35 people (70%)	15 people (30%)
“If the blood alcohol level in the body is less than 0.50 g per litre of blood alcohol or 0.25 milligrams per litre of air alcohol, the offence is not a criminal offence but a minor violation.”	28 people (56%)	22 people (44%)
“The penalty for drink-driving is usually a driving ban, which ranges from 1 month to 10 years, and a fine of several hundred thousand forints.”	37 people (74%)	13 people (26%)
“Alcohol consumption is detrimental to safe driving, negatively affects the driver’s ability to act, increases reaction time, reduces reaction speed and poses an increased risk to road safety and the life and physical safety of road users in all transport sectors, including road transport.”	42 people (84%)	8 people (16%)

A total of 32 people (64%) had not heard of the Dry November initiative (a community-building initiative alongside a month of alcohol abstinence), 4 people (8%) had heard of it but did not know exactly what it was, while 14 people (28%) named it exactly.

One person (2%) has admitted to getting behind the wheel drunk, while ten people (20%) have been a passenger of a drunk driver.

3.2. Practical Assessment

Before the assessment, the so-called Romberg test was performed on all subjects to test balance. This test was 100% negative (N = 50). During the test, the subject stands with their legs crossed and their hands pressed to their sides for one minute with their eyes closed. The test is positive if the subject loses their balance while standing.

Each participant then had to complete a 4-m obstacle course lined with cones. They had to complete the course first with glasses simulating drunkenness (heavy alcohol consumption and poor visibility) and then with glasses simulating drug intoxication (hallucinogenic drugs). They were considered to have completed the course intact if they could finish without touching the cones, with a small ball toss at the end of each run.

In the alcohol driving simulation, 21 participants (42%) managed to complete the course intact, while only 17 participants (34%) managed to complete the course while under the influence of drugs. Only 3 participants (6%) succeeded in throwing the ball into the target at the end. After the simulation, participants were asked to share their experiences regarding the exercise. (Table 2).

Table 2. Experience of the simulation in the sample (N = 50).

Statement	Average $\pm$ Standard Deviation	Min.	Max.
How did you feel your spatial perception was? (1—Fairly poor; 5—Fairly normal)	2.26 ± 1.10	1	5
How did you feel your coordination was? (1—Fairly poor; 5—Fairly normal)	2.54 ± 0.99	1	5
How did you feel your orientation was? (1—Fairly poor; 5—Fairly normal)	2.44 ± 1.13	1	5

Table 2. Cont.

Statement	Average $\pm$ Standard Deviation	Min.	Max.
How scary was it when wearing the glasses? (1—Not at all; 5—Very scary)	2.14 $\pm$ 1.34	1	5
How surprising was the experience? (1—Very surprising; 5—Not at all surprising)	2.44 $\pm$ 1.23	1	5
How safe do you think it is to drive while under the influence of alcohol or drugs after this experience? (1—not safe at all; 5—maximum safety; not dangerous).	1.14 $\pm$ 0.45	1	3
How likely are you to drive while under the influence of alcohol or drugs after this experience? (1—No way! I would never drive like that; 5—I would drive like that any time.)	1.26 $\pm$ 0.53	1	3
How has your attitude towards drink-driving changed since taking the test? (1—No change at all; I have the same opinion. 5—My opinion has changed completely.)	1.90 $\pm$ 1.33	1	5

3.3. Factors Affecting the Practical Results

Regarding the simulation assessment results, subjects with poorer spatial perception, coordination, and orientation found the experience less surprising and more frightening when wearing the glasses. Respondents who reported poorer coordination and orientation found the experience scarier. Surprisingly, the more unexpected the experience of the exercise was for respondents, the less dangerous they perceived driving in this state to be. The less safe someone perceives driving under the influence of a psychoactive drug to be, the less likely they are to get behind the wheel in such a state (Table 3).

Table 3. Interaction of experiences during the simulation in the sample (N = 50).

Factors Examined	Quality of Spatial Perception	Quality of Coordination	Quality of Orientation	How Frightening	How Surprising	Driving Safely While Drunk/Drugged	What Are the Chances to Drive Like This	Change in Attitude
Quality of spatial perception		$r = 0.670$ $p < 0.001$	$r = 0.77$ $p < 0.001$	$r = -0.412$ $p = 0.003$	$r = 0.290$ $p = 0.041$	$r = 0.089$ $p = 0.538$	$r = 0.291$ $p = 0.041$	$r = 0.116$ $p = 0.424$
Quality of coordination	$r = 0.670$ $p < 0.001$		$r = 0.567$ $p < 0.001$	$r = -0.456$ $p = 0.001$	$r = 0.235$ $p = 0.100$	$r = 0.192$ $p = 0.183$	$r = 0.215$ $p = 0.134$	$r = 0.026$ $p = 0.856$
Quality of orientation	$r = 0.677$ $p < 0.001$	$r = 0.567$ $p < 0.001$		$r = -0.447$ $p = 0.001$	$r = 0.240$ $p = 0.093$	$r = 0.237$ $p = 0.098$	$r = 0.223$ $p = 0.119$	$r = 0.030$ $p = 0.836$
How frightening	$r = -0.412$ $p = 0.003$	$r = -0.456$ $p = 0.001$	$r = -0.447$ $p = 0.001$		$r = -0.112$ $p = 0.438$	$r = -0.269$ $p = 0.059$	$r = -0.239$ $p = 0.094$	$r = 0.077$ $p = 0.596$
How surprising	$r = 0.290$ $p = 0.041$	$r = 0.235$ $p = 0.100$	$r = 0.240$ $p = 0.093$	$r = -0.112$ $p = 0.438$		$r = 0.217$ $p = 0.130$	$r = 0.515$ $p < 0.001$	$r = 0.165$ $p = 0.253$
Driving safely while drunk/drugged	$r = 0.089$ $p = 0.538$	$r = 0.192$ $p = 0.183$	$r = 0.237$ $p = 0.098$	$r = -0.269$ $p = 0.059$	$r = 0.217$ $p = 0.130$		$r = 0.557$ $p < 0.001$	$r = 0.058$ $p = 0.690$
What are the chances to drive like this	$r = 0.291$ $p = 0.041$	$r = 0.215$ $p = 0.134$	$r = 0.223$ $p = 0.119$	$r = -0.239$ $p = 0.094$	$r = 0.515$ $p < 0.001$	$r = 0.557$ $p < 0.001$		$r = 0.201$ $p = 0.161$
Change in attitude	$r = 0.116$ $p = 0.424$	$r = 0.026$ $p = 0.856$	$r = 0.030$ $p = 0.836$	$r = 0.077$ $p = 0.596$	$r = 0.165$ $p = 0.253$	$r = 0.058$ $p = 0.690$	$r = 0.201$ $p = 0.161$	

The more experienced a driver ($n = 21$) considers himself/herself to be, the more likely they are to consider their driving style to be both technical ($p = 0.001$) and safe ($p = 0.002$). We anticipated that this increased confidence on the road would be reflected in the performance of the practical tasks, but our sample did not support this assumption ($p < 0.05$). However, for the not-yet-driving group, the more poorly someone perceives their spatial perception, the worse they perceive their coordination ($p < 0.001$; $r = 0.654$), their orientation ($p = 0.001$; $r = 0.565$), and the more frightening they perceived the simulation ($p = 0.008$; $r = 0.481$).

Whether someone has had a drunk-driving experience as a driver (how likely they are to get behind the wheel $p = 0.132$; how much their attitude has changed $p = 0.499$) or as a passenger (how likely they are to get behind the wheel $p = 0.514$; how much their

attitude has changed $p = 0.292$) has no significant effect on future drunk driving or attitude among respondents.

3.4. Factors Influencing Attitudes Towards Addictions in the Sample

Sociodemographic factors in the sample do not have a statistically verifiable effect on respondents' perceptions of alcohol/drug use.

Among the respondents, occasional drinkers ($n = 28$) were the least likely to consider drinking alcohol as a risk factor for their health (mean 2 ± 0.86), while the least likely to consider drinking alcohol as a risk factor was the one respondent daily drinker (3 points), but this factor had no significant effect on their perception of drinking alcohol ($p = 0.431$).

The one daily drinker considers alcohol-related problems the most serious issue (5 points), while weekly drinkers consider it the least serious, although they also scored above 4 ($p = 0.577$). On average, all drinking frequency groups consider drug use to be a health risk ($p = 0.837$) and a condemnable behavior ($p = 0.823$) with an overall score above 4. In our sample, the frequency of drinking does not affect either the extent to which the respondents feel in danger the younger age group ($p = 0.564$) or the extent to which they think that drinking at an earlier age is an aggravating factor ($p = 0.387$). The amount and type of alcohol consumed on occasion, as well as drug use history, do not affect attitudes towards alcohol consumption in our sample in any of the questions ($p < 0.05$). Having a driving license does not influence knowledge of the law ($p < 0.05$).

4. Discussion

The survey was conducted with 50 young people, mostly aged between 15 and 18. Nearly 50% of them have held a driving license for 1 to 2 years. Despite their limited experience, they view themselves as very skilled, technical, and confident drivers. Additionally, 56% of the participants consume alcohol occasionally and some of them have also tried illegal drugs. While occasional alcohol consumption is considered less harmful to health than drug use (average 2.24 points), alcoholism is considered a serious problem as a disease, whereas drug use is considered a condemnable behavior. They are mostly well aware of the legal regulations surrounding driving under the influence of psychoactive drugs, as well as community-building initiatives. For most people, taking part in the practical simulation was a frightening and surprising experience, which changed their perception of drunk/drugged driving for the better and may discourage them in the future.

5. Conclusions

The use of psychoactive drugs may be behind an increasing number of serious and even fatal road accidents in our present. The first use of these drugs among young people is increasingly likely to occur at an earlier age, making this age group particularly vulnerable. Inexperienced but confident drivers may be discouraged by the simulation of driving while under the influence of alcohol or drugs, which has been shown to have a positive deterrent and attitude-forming effect.

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