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Vancouver CoastalHealth Research Institute
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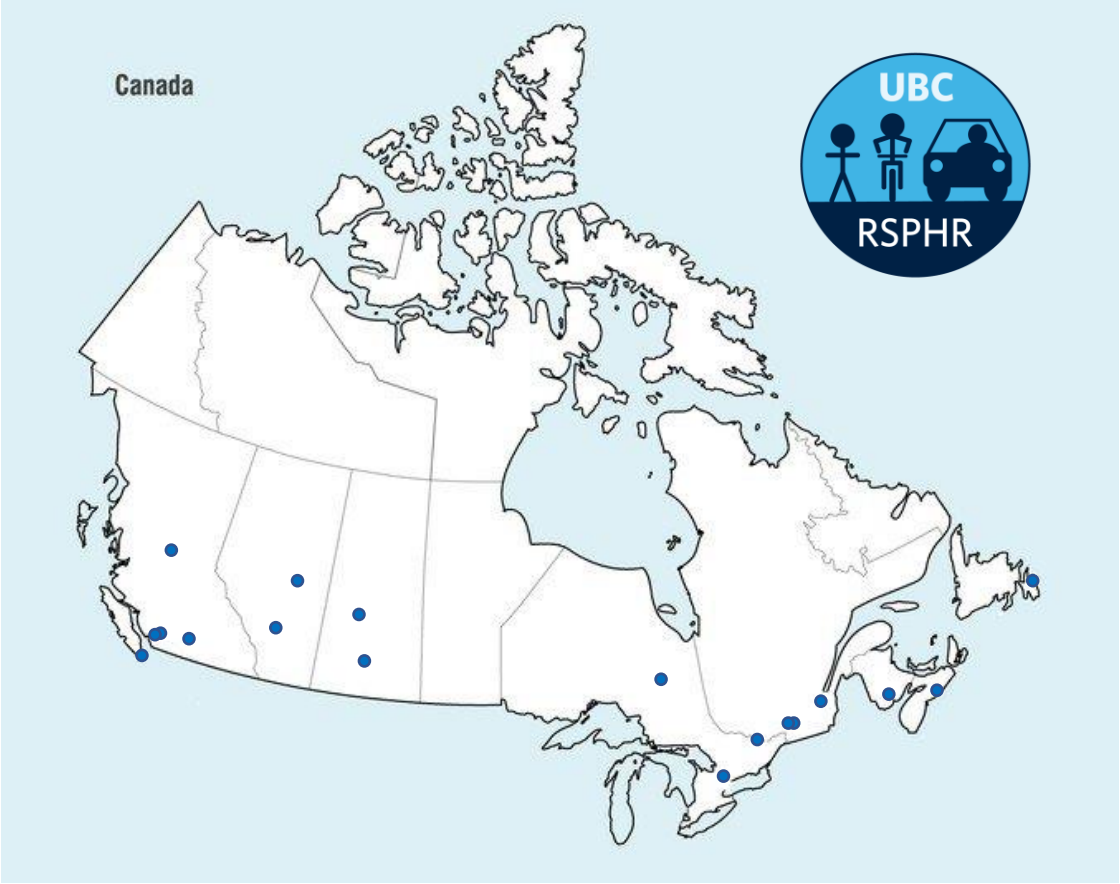
National Drug Driving Study 2024



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Contributions of medical lab personnel, research assistants and coordinators at each hospital site have made this project possible and successful across Canada.

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Terminology and Definitions

Drug driving and Drug impaired Driving

"Drug-impaired driving" means that the driver is impaired by drugs, where "impaired" means that those drugs interfere with safe driving ability. When drivers have positive tests for drugs, we often do not know if they were actually engaging in "drug-impaired driving." This is because the presence of drugs in body fluids indicates prior drug use but not necessarily impairment. When drugs are detected within a driver's body fluids, but we do not know whether that driver was actually impaired at the time of testing, we use the term "drug driving."

Psychomotor Skills

Safe driving involves the application of a number of psychomotor skills. These refer to the skills we use to perceive sensory information, interpret its meaning, and respond through physical actions." Examples of psychomotor skills applied to driving include reaction time, tracking ability (e.g. ability to drive a car in a straight line without weaving), coordination, and tasks that require attention.

Cannabinoids

Cannabis and Marijuana

The term "Cannabis" refers to all products derived from the plants Cannabis sativa and Cannabis indica that contain various amount of THC (delta-9-tetrahydrocannabinol) whereas Marijuana refers specifically to plant products (dried flowers, leaves, stems and seeds). Throughout this report, we use the term "Cannabis".

Cannabis contains over 60 active compounds known as cannabinoids such as THC, CBD, CBN. When absorbed into the blood, cannabinoids exert their effects by binding to receptors in the brain and throughout the body.

THC (delta-9-tetrahydrocannabinol)

THC is the main psychoactive compound found in cannabis and is responsible for most of its impairing effects.

THC Levels

The term "THC level" refers to the amount of THC within a person's body after smoking, vaporizing or eating a cannabis product. There are different ways to measure THC levels. The best way to understand if someone has used cannabis recently is to look at the THC level in their blood. However, interpreting the precise time that someone took cannabis – and importantly, whether or not they are still experiencing its effects – is complicated. Immediately after smoking a "joint", whole blood THC levels typically peak at >100 ng/mL within 15 minutes and then drop rapidly so that, in occasional users, THC is usually <2ng/mL (i.e., the legislated limit associated with a summary offence in Canada) within 4 hours after a single acute exposure.[1] However, in habitual cannabis users, THC accumulates in body fat and is then slowly released back into the blood. As a result, habitual users can have THC levels in the range of 1 -3 ng/mL for days or even weeks after last use.[2] In most cases, however, THC > 5 ng/mL (i.e., the legislated limit associated with a hybrid offence in Canada) indicates recent use. After smoking a marijuana joint, the psychotropic (impairing) effects typically peak at 20–30 minutes and resolve by 4 hours. Ingesting cannabis delays the onset and extends the duration of effect.

COOH-THC (11-nor-9-carboxy-delta-9-tetrahydrocannabinol)

The main metabolite (breakdown product) of THC. COOH-THC does not cause impairment and persists in blood and urine long after impairment has resolved. Thus COOH-THC provides evidence of previous cannabis exposure but does not necessarily indicate impairment or recent use.

Other commonly detected Cannabinols

11-Hydroxy-delta-9-tetrahydrocannabinol, commonly known as 11-hydroxy-THC, is the major active metabolite of THC. It has similar psychotropic effects as THC although some users claim that it is more potent. 11-hydroxy-THC is formed in the liver after cannabis is consumed through inhalation or orally; however, the level of 11-hydroxy-THC is generally higher when cannabis is consumed orally.

Cannabidiol (CBD) is the second most prevalent bioactive compound found in the Cannabis sativa plant. CBD itself does not produce euphoric effects (“high”). CBD is typically used in medical cannabis formulations for controlling refractory seizures, managing symptoms such as anxiety, depression and arthritis, and alleviating pain from cancer or nerve damage. It is also used to treat opioid addiction in some occasions.

Cannabinol (CBN) is less commonly used in medical cannabis formulations but has gained popularity in recent years. It is used primarily for sleep and pain management. Similar to CBD, it does not produce psychotropic effects.

Central Nervous System Depressants

Many prescription medications cause sedation either as a desired therapeutic effect or as an unwanted side effect. In the Drug Evaluation and Classification System, these drugs would be classified as CNS (central nervous system) depressants. Common sedating medications include:

Benzodiazepines

These are mild sedatives most commonly prescribed as “sleeping pills” or to treat anxiety.

Anticonvulsants

Anticonvulsants, more commonly known as antiepileptic drugs, may cause sedation, dizziness, and cognitive changes.

Antihistamines

Antihistamines cause sedation as an unwanted side effect. Over the counter antihistamines are used to treat allergies (e.g. diphenhydramine - “Benadryl”), or motion sickness (e.g. dimenhydrinate - “Gravol”).

Antidepressants

Antidepressants, especially the older antidepressants, have sedation as a side effect.

Antipsychotics

Sedation is a common side effect of antipsychotic drugs.

Muscle relaxants

Muscle relaxants may have sedative effects such as drowsiness. People are generally advised not to drive or operate heavy machines while under the effects of muscle relaxants.

Non-benzodiazepine hypnotics

Also known as “Z-drugs”. These drugs are sedatives that act like benzodiazepines and are prescribed mostly as sleep aids. In Canada the most common non-benzodiazepine hypnotic is zopiclone.

Opioids

Opioids are narcotic analgesics (pain killers) that can cause marked sedation or even coma along with respiratory depression. Opioids include prescription medications such as codeine, hydromorphone, oxycodone, and morphine. The street drug heroin is also an opioid.

Central Nervous System Stimulants

CNS stimulants are drugs, such as cocaine or amphetamines, that cause CNS stimulation. Intoxication with these drugs is characterized by restlessness or agitation, pressured speech, anxiety, paranoia and aggressive behaviour. Judgement may be impaired. Blood pressure and pulse are increased and pupils are dilated.

Polysubstance Use

People who use drugs often take more than one substance at the same time. This is referred to as polysubstance use. Taking several drugs in combination can lead to worse impairment than would be seen from either substance taken alone.

Liquid chromatography/tandem mass spectrometry (LC-MS/MS)

An advanced laboratory technology that is used to detect and/or quantify a wide range of drugs using standards of known substances and concentrations.

Gas Chromatography-Flame Ionization Detection

A standard laboratory technique used for measuring blood alcohol levels.

Phlebotomists

Specially trained technicians who obtain blood samples from patients.

Background

The epidemiology and risk of crashing in drinking drivers is well understood as a result of intense research conducted over the past 50 years.[3-6] This knowledge has facilitated the development of effective measures targeting alcohol-impaired driving. Alcohol-impaired driving and related fatalities are declining as a result of visibly enforced laws, administrative licensing sanctions, and social marketing campaigns.[7-11] Drug driving is also viewed as a major threat to road safety,[12] and the prevalence of drug driving may be increasing.[13] In fact, there is evidence that *drug driving has become as common as driving after drinking alcohol in Canada*.[14-18] With cannabis legalization, there is concern that the prevalence of drug driving, especially driving after using cannabis, will increase. Cannabis legalization could also result in more drivers combining cannabis with alcohol or other drugs, resulting in additive impairment.[19-21]

The effect of alcohol on driving and road safety is well-studied and understood. Experimental and epidemiological studies have made it possible to predict how driving will be affected at different breath and blood alcohol concentrations (BAC). For example, the risk of crashing approximately doubled at a BAC between 0.05% and 0.08%.[6] However, drugs tend to have more complicated pharmacokinetics and pharmacodynamics than alcohol. Unlike alcohol, it is often not possible to predict how driving will be affected at different drug blood alcohol concentrations. This issue makes it difficult to differentiate drug-driving (i.e., positive for drugs but absent of impairment) from drug-impaired driving (i.e., positive for drugs and active impairment) in epidemiological studies, and it makes it difficult to extrapolate the results of experimental studies focused on drug-impaired driving to real world safety. For example, we know that *many drugs impair the psychomotor skills and/or judgment required for safe driving*. Cannabis intoxication causes attention deficits, slows reaction time and impairs tasks such as tracking ability (*e.g.*, staying within a lane) or monitoring the speedometer.[19, 22-26] Several expert panels compared experimental studies of impairment from THC with that from alcohol, in both males and females, and concluded that a blood alcohol concentration (BAC) of 0.05% causes a similar degree of psychomotor impairment as THC levels in whole blood of 2-5ng/mL.[27-29] However, habitual cannabis users may develop tolerance to some of the impairing effects of cannabis. [30-32] Differences in tolerance between users calls into question the ability to reliably infer impairment for any given user based on a specific THC level. In particular, a conservative THC limit imposed on all drivers may be inequitable for habitual users, who may be more likely to have cannabis in their system at any given time, yet less likely to experience impairment at that THC level. Additionally, although cannabis-impaired driving is very topical, it is important to realize that many other drugs also cause psychomotor skill impairment. Stimulants, such as cocaine and amphetamines, impair judgment, impair inhibitory control (ability to “tune out” and not react to irrelevant stimuli), and alter mood.[33-40] Sedating medications, such as benzodiazepines, antihistamines, antidepressants, Z-drugs (non-benzodiazepine sedatives such as zopiclone), and opioids, cause drowsiness, slow reaction time, impair cognitive function and impair tracking ability.[41-51] For these reasons, *many drugs are suspected to increase the risk of crashing*. Several recent meta-analyses all concluded that cannabis increases the risk of crashing, albeit to a lesser extent than alcohol.[52-55] There is epidemiological evidence that other drugs (amphetamines, cocaine, benzodiazepines, antihistamines, antidepressants and opioids) also increase crash risk. In fact, the crash risk with many of these drugs, although lower than that with alcohol, appears to be as high as or even higher than the risk associated with cannabis.[55-58]

The prevalence of drug driving in Canada is poorly studied. Previous research on the prevalence of drug use in Canadian drivers is based on roadside surveys, coroner’s reports, police crash reports, or self-

reported surveys.[14, 16, 59-61] These methods have significant limitations. In *roadside surveys*, police pull over drivers and direct them to a safe parking spot. Researchers then ask the drivers about drug and alcohol use and obtain samples for drug testing. Roadside surveys are limited by high refusal rates which could result in selection bias if drivers who used drugs are more likely to refuse than other drivers. For practical reasons, roadside surveys use saliva rather than blood. However, blood THC levels are considered more informative than saliva THC levels because THC crosses freely from the blood into the brain,[62] whereas saliva THC represents deposition of THC in the mouth during smoking and is poorly correlated with blood THC concentrations.[63] For logistic reasons, roadside surveys typically sample a large number of drivers over a few days during the summer (when weather is good) making these surveys poorly suited for long term monitoring of drug driving. Another limitation is that, because of high cost and logistic challenges, roadside surveys are seldom performed. *Coroner's data* provide another estimate of the prevalence of drug use in drivers. In 2016, 82.7% of fatally injured Canadian drivers were tested for drugs and 46.7% were positive for an impairing drug other than alcohol, including 23.1% who tested positive for cannabis. Females were less likely than males to be positive for alcohol but almost as likely to test positive for drugs (41.7% in females versus 48.2% in males).[64] Coroner's data are useful but can be susceptible to selection bias if drug testing is based on suspicion of drug use and not performed routinely on all drivers. In Canada, the percentage of fatally injured drivers tested for drugs (2008) varies by province, ranging from 10% to 100%. The toxicology testing protocols used by coroners differ from province to province - with different protocols detecting different drugs. Coroner's data often fail to between distinguish between drug exposure that last occurred within the hours, days or weeks prior to the crash because some coroners measure inactive drug metabolites (which can persist in the body for long periods) rather than active drug. If fatally injured drivers survive the crash for a period of time, drug levels will decline with metabolism, making toxicology testing unreliable. Interpreting drug levels from coroner's data is further complicated by postmortem redistribution. For some drugs (such as cannabis), postmortem redistribution of drug concentrations within the body can lead to significant differences between the measurable drug level immediately prior to death (which is more representative of the actual drug level at the time of the crash) and the drug level measurable some time later after death.[65-69] As driving while impaired by drugs is illegal, *police crash reports* allow police to record their suspicion that a driver is impaired by drugs. However, these reports provide unreliable estimates of cannabis/other drug use as police only identify a small fraction of drivers who use cannabis or other drugs.[70] *Self-report surveys* ask questions about driving after using cannabis or other drugs.[71] Surveys are subject to selection, recall and reporting biases. In addition, self-report surveys typically lack precision because they ask about drug use before driving in a given time period (*e.g.*, previous month) instead of before a specific driving episode.

This is a national drug driving project that studies drug use in injured drivers who present to hospital and have bloodwork obtained within six hours of a motor vehicle collision. To address the limitations of prior research, we study a relevant population (injured drivers) and measure a wide range of impairing drugs in blood within six hours of a crash. Hence, this research has several advantages over other methods of studying drug driving. We aim to provide relevant data that policy makers and injury prevention groups can use to inform policy and programs designed to prevent people from driving after using drugs.

The study is ongoing, and this report covers national data collected up to June 2023. Additional blood samples from 2023 will be analyzed and included in future reports. Note that data collection for this study began in Vancouver, British Columbia in April 2008. Starting in January 2018 research has expanded to include trauma centres from outside British Columbia. Only data from 2018 onward are included in this report.

Methods

Inclusion and Exclusion Criteria

We include all moderately or severely injured drivers of motorized vehicles (e.g. cars, motorcycles, trucks) who visited the emergency department (ED) of a participating hospital between 2018 and 2023 and had blood samples obtained within 6 hours of the crash. As of March 2024, 18 hospital sites have obtained research ethics and operational approval and are participating in this study. Seventeen of these hospitals contributed to this report, data from one hospital has not yet been analyzed. These trauma centres are located in BC, Alberta, Saskatchewan, Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland. Injury severity is defined pragmatically as the need to obtain blood for clinical purposes (moderate injury), or need for overnight hospital admission (severe injury). Potentially eligible drivers are identified by daily review of ED visit logs and eligibility is confirmed through chart review. We exclude drivers with minor injuries who do not require blood testing for clinical purposes, drivers under 16 years of age, cases in which blood was first obtained more than 6 hours after the crash, cases in which no excess blood remains after clinical use, and cases in which the quantity of excess blood was insufficient for toxicology testing of all substances. We also exclude cases with insufficient ED chart data.

Chart Review

ED records of eligible drivers are reviewed, and relevant data is abstracted and entered in REDCap, a secure web application for building and managing online surveys and databases. ED records include ambulance records (filled by paramedics), emergency physician notes, nursing notes, laboratory results including blood alcohol concentration (BAC), and consultant notes (if applicable). The abstracted data includes age, sex, first three digits of postal code, crash time (4-hour blocks) and date (month-year), crash type (single vs multiple), vehicle type, blood draw time, prescription medications used in last 30 days, medical history, documentation of alcohol or drug use, disposition and medications given as part of clinical care prior to blood draw (we exclude “post-crash” medications when reporting toxicology results).

Blood Handling

Blood availability is determined by research assistants through review of medical records (to identify drivers who had blood samples drawn) followed by a visit to the hospital laboratory to see if excess blood remains. Excess blood is relabeled with study ID number replacing the clinical label and frozen at -40º C for future analysis. Freezing is important as significant losses of THC/other drugs will occur by two months if blood is stored at room temperature. As blood concentrations of certain drugs, such as cocaine and THC, drop rapidly after use, it is important that time from crash until blood draw is carefully recorded. The time of crash is determined through chart reviews (usually recorded on the ambulance record), and phlebotomists record the time of blood draw. Blood samples are stored in a specimen freezer at each site before shipment on dry ice by overnight courier to the central laboratory in Vancouver where samples are stored at -40º C until ready for analysis.

Toxicology Analysis

In participating hospitals, blood from injured drivers is usually tested for alcohol as part of routine trauma care. When clinical alcohol levels were not available, alcohol was measured at the Provincial Toxicology Centre using Gas Chromatography-Flame Ionization Detection with a detection limit of 0.01%. In addition, broad spectrum drug screens were performed on each patient’s blood using liquid chromatography/tandem mass spectrometry (LC-MS/MS). Beginning in April 2023, alcohol and toxicology analyses are performed

by our own Road Safety & Public Health Research Toxicology Lab. The extraction process recovers both acidic and basic drugs and is able to detect illicit drugs and their metabolites (cannabinoids, cocaine, amphetamines including their major analogues, and opioids) as well as psychotropic pharmaceuticals (including antihistamines, benzodiazepines, other hypnotics, and sedating antidepressants). The method has detection limits of 0.2 ng/mL for THC and 1 ng/mL for most other substances. When samples are positive for cannabinoids, we quantify both THC (active ingredient) and COOH-THC (inactive metabolite). Beginning in 2023, 11-OH-THC, CBD and CBN are also quantified. For other drugs, the LC-MS/MS screen will provide a quantitative measure of drug concentration using ISO-certified reference calibrators. Over 95% of excess blood samples in this study consisted of whole blood. When plasma is available but whole blood was not, we adjust plasma toxicology results to equivalent whole blood results according to previously published studies.

Results

Between January 2018 and April 2024, we screened over 32,540 injured ED motorists including approximately 28,540 drivers (about 830 were off-road vehicle drivers) and 4000 passengers. Of the 28,540 drivers, about 13,700 on-road drivers met the inclusion criteria with blood samples collected. This report includes data from 10,322 drivers who were injured between January 2018 and June 2023 in British Columbia, Alberta, Saskatchewan, Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland and had complete chart review and toxicology analysis data. Toxicology results and chart data from the remaining drivers (approximately 1,780) up to June 2023 are not yet available. Findings from passengers and off-road vehicle drivers are not included in this report. The most common reasons for exclusion from the study were either no blood work required or exceeding the 6-hour time frame between crash and blood draw.

Overall, one in six (16.6%) drivers in this report tested positive for THC, including one in fourteen (7%) with THC ≥ 2 ng/mL and one in thirty (3.2%) with THC ≥ 5 ng/mL). Since 2023, 11-OH-THC, CBD and CBN have been added in our cannabinoid screening panel. Of the 2006 injured drivers tested for the additional cannabinoids, 16.8% tested positive for 11-OH-THC, 13.7% for CBD and 3.9% for CBN.

We also found that one in six (16.0%) drivers tested positive for alcohol, including one in eight (12.2%) with BAC ≥ 0.08%. Opiates were detected in one in ten (10.4%) drivers, recreational drugs (cocaine, amphetamines) in one in eight (12.1%), and sedating medications (including the common over the counter antihistamine) in one in four (26.9%) of injured drivers.

These results, broken down by age, sex and crash characteristics are shown in Tables 1 and 2 in Appendix A and in Figures 1 to 15 in Appendix B. For comparison purposes, Table 3 in Appendix A summarizes results (since January 2018) from all participating hospitals in British Columbia, Alberta, Saskatchewan, Ontario, Quebec and the Atlantic provinces. Results between provinces cannot be directly compared without adjusting for age, sex, injury severity and type of crash (singe versus multi-vehicle). Within these limitations, it appears that injured drivers from Atlantic provinces are more likely to have used cannabis (26.3% VS. 16.6% national average), and more likely to have been drinking (22.0% VS. 16.0% national average) and to have a blood alcohol level exceeding the legal limit of 0.08% (16.5% VS. 12.2% national average).

Table 4 in Appendix A and Figures 16 and 17 in Appendix B show polysubstance use, the percentage of drivers who used various combinations of alcohol and cannabis (Figure 16) or other drug combinations (Figure 17). Overall 4.5% drivers used cannabis and alcohol together. In this national sample, CNS depressants (sedatives) were often used together with alcohol (4.7% of all drivers) or cannabis (4.7% of all drivers). The prevalence of drivers who used at least 2 and 3 or more different categories of substances at the same time were 14.7% and 6.2% respectively.

There were 266 drivers of off-road vehicles (ATVs, dirt bikes, snow mobiles, etc.) that were excluded from the main analysis. We report substance prevalence for these drivers in Table 5 of Appendix A. The results show similar demographic trends as for on-road drivers but a higher prevalence of substance use.

Discussion

In this sample of 10322 injured drivers treated in 17 partcipating trauma centre(s) across Canada since 2018, about one in two drivers (53.6%) tested positive for at least one impairing substance. The most common single substance detected was cannabis, with about one in six drivers (16.6%) testing positive for THC, the main psychotropic ingredient in cannabis, followed by alcohol (16.0%). In the following section, we discuss the prevalence of cannabis, alcohol, and the three other classes of substances (i.e., recreational drugs, sedating drugs and opiates) in turn.

Cannabis. Overall, the majority THC positive drivers (991/1716, 57.8%) had low THC levels (< 2 ng/mL) which does not necessarily reflect recent use of cannabis or increased risk of crashing. However, 7% of all drivers had THC ≥ 2 ng/mL which usually indicates recent use of cannabis, and 3.2% had THC ≥ 5 ng/mL which indicates recent use and is often associated with impairment. In terms of age differences, driving positive for any amount of THC was highest in the age 19-24 group (28.3%), followed by the age 25-34 group (23.6%) and the age 16-18 group (22.7%). Cannabis use was also more common in male than in female drivers (19.1% vs 11.5%). Similar demographic trends are also found for 11-OH-THC, CBD and CBN. It should be noted that these estimates may change as more cases are collected and analyzed. The current state of knowledge indicates that the risk of crashing after using cannabis remains poorly defined but is lower than that for alcohol.[24, 72] Several recent meta-analyses concluded that cannabis increases crash risk, with estimated Odds Ratios (ORs) ranging from 1.36 to 2.66[52, 54]. A recent Canadian study suggests that drivers with THC levels < 5 ng/mL do not have an increased risk of crashing[72]. However, it is worth monitoring the prevalence of drivers with THC ≥ 5 ng/mL over time to analyze whether cannabis impaired driving may be an emerging problem in Canada, especially in young adult male drivers.

Alcohol. Overall, 16.0% had been drinking (BAC > 0), and 12.2% had a BAC ≥ 0.08% making alcohol the second most detected impairing substance in this sample of drivers. Driving after any alcohol use was most common in drivers aged 19-24 years and 25-34 years (22.9% and 23.0% respectively) and in male drivers (18.8% male vs 10.2 female drivers). It is well known that drivers with BAC > 0.08%, especially younger drivers, have a very high crash risk[6, 72, 73]. Current data supports the conclusion that alcohol impaired driving remains a bigger problem than cannabis impaired driving in Canada.

Recreational drugs, sedating medications, and opiates. CNS stimulants (cocaine, amphetamines) were detected in one in eight injured drivers (12.1%). The highest prevalence of CNS stimulants was found in drivers between the ages of 25 to 44 with increased prevalence in males (13.8%) compared to females (8.6%). CNS depressants (including over-the-counter antihistamines) were found in approximately one in four drivers (26.9%) with a greater prevalence in females (33.6%) than males (23.6%). The highest prevalence of CNS depressants was found in drivers over the age of 55 (31.8%). These results are not surprising since sedating medication use is typically more common in older age groups. Opiates were detected in one in nine drivers (10.4%) and were detected slightly more commonly in males (10.9%) than females (9.3%) in this sample of drivers. Cocaine, amphetamines, sedating medications and opiates are known to impair the psychomotor skills required for safe driving. [55, 74] The crash risk associated with these substances is also poorly defined but appears to be less than that associated with alcohol and in the range of that associated with cannabis. [72]

Strengths

Our methods have several advantages. We measured drugs in blood, which, for THC and most other drugs, correlates better with impairment and/or recent use than drug levels measured in saliva or urine. Our methods quantify alcohol, THC and over 80 other impairing drugs and medications. Further, we use blood obtained shortly after the crash, in most cases within 2 hours, so our toxicology results closely approximate drug levels at time of crash.[18] This short time interval between crash and blood draw simplifies interpretation of toxicology findings. Third, the decision to obtain blood is *not* based on suspicion of drug use: blood is obtained when clinically indicated for managing the patient's injuries, based on crash mechanism and/or physical examination. This process eliminates the selection bias that would occur if drug testing was based on suspicion of drug use. Also, because this study has ethics approval for waiver of consent due to our innovative methods of anonymizing linked data, we avoid the bias that would arise if drivers who used drugs were less likely to consent for testing, as might be the case in roadside surveys. Most important, we study recent drug use in a relevant population (drivers injured in a crash).

Limitations

There are also several limitations to this study. Because we rely on blood that was obtained for clinical purposes, we do not have control over which drivers are actually tested. As a result, our sample does not include minimally injured drivers even if they caused a crash that seriously injured another road user. It is also possible that the decision to obtain blood tests varies from hospital to hospital which may make results from different hospitals difficult to compare. Although we aim to exclude "post-crash" medications, these medications may not always be listed in ED records. In particular, we exclude ketamine from this report since it is commonly administered as part of clinical care in the prehospital setting and we suspect it is not always documented in the available medical charts. Ketamine was detected in 880 (8.5%) of injured drivers, but three-quarters of these drivers (n=665; 75.6%) had Ketamine documented as given prior to blood draw. We are uncertain how often ketamine was actually used prior to the collision in the 215 drivers (2.1%) who tested positive for ketamine but had no documentation of it being given medically. Another limitation is that our toxicology analysis is unable to measure inhalants (such as toluene). We suspect that inhalant abuse is rare but are unable to prove that this is the case. A final limitation is that we do not examine, or interview injured drivers and are unable to assess their whether drivers are actually impaired.

Summary

Driving after cannabis use appears to be an emerging problem in Canada and may now be more common than driving after drinking alcohol. However, given the very high crash risk associated with alcohol, and the fact that most "cannabis positive" drivers had low THC levels, it can be concluded that driving after drinking remains a bigger problem in Canada. Sedating medications, opiates, and other recreational drugs were also commonly detected. Another striking feature of this study was the prevalence of polysubstance use, with approximately one in five drivers (21.0%) testing positive for more than one impairing substance. Social marketing campaigns or traffic policy designed to prevent impaired driving should continue to target alcohol as well as cannabis and other drugs and should be sensitive to the fact that many drivers use combinations of multiple impairing substances. The high prevalence of sedating medications, in multiple age ranges, suggests the need for better education on prescription practices and on use of sedating medications by drivers (including over the counter antihistamines).

Appendix A: Tables

Table 1. Count (percent) of injured drivers who test positive for impairing substances by age and sex.

Data on all injured drivers available to date		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	10322 (100%)	375 (100%)	1366 (100%)	2305 (100%)	1752 (100%)	1554 (100%)	2970 (100%)	3356 (100%)	6966 (100%)
Alcohol									
BAC > 0	1649 (16.0%)	56 (14.9%)	313 (22.9%)	529 (23.0%)	308 (17.6%)	207 (13.3%)	236 (7.9%)	341 (10.2%)	1308 (18.8%)
0 < BAC < 0.05%	274 (2.7%)	12 (3.2%)	47 (3.4%)	73 (3.2%)	46 (2.6%)	29 (1.9%)	67 (2.3%)	53 (1.6%)	221 (3.2%)
0.05% ≤ BAC < 0.08%	120 (1.2%)	9 (2.4%)	21 (1.5%)	31 (1.3%)	21 (1.2%)	18 (1.2%)	20 (0.7%)	15 (0.4%)	105 (1.5%)
BAC ≥ 0.08%	1255 (12.2%)	35 (9.3%)	245 (17.9%)	425 (18.4%)	241 (13.8%)	160 (10.3%)	149 (5.0%)	273 (8.1%)	982 (14.1%)
Cannabinoids									
COOH-THC > 0	3036 (29.4%)	148 (39.5%)	616 (45.1%)	945 (41.0%)	519 (29.6%)	342 (22.0%)	466 (15.7%)	732 (21.8%)	2304 (33.1%)
THC > 0	1716 (16.6%)	85 (22.7%)	387 (28.3%)	543 (23.6%)	272 (15.5%)	192 (12.4%)	237 (8.0%)	385 (11.5%)	1331 (19.1%)
THC ≥ 2 ng/mL	725 (7.0%)	37 (9.9%)	178 (13.0%)	233 (10.1%)	116 (6.6%)	60 (3.9%)	101 (3.4%)	166 (4.9%)	559 (8.0%)
THC ≥ 5 ng/mL	326 (3.2%)	15 (4.0%)	80 (5.9%)	114 (4.9%)	55 (3.1%)	21 (1.4%)	41 (1.4%)	71 (2.1%)	255 (3.7%)
Other substances									
CNS stimulants	1251 (12.1%)	31 (8.3%)	168 (12.3%)	408 (17.7%)	310 (17.7%)	187 (12.0%)	147 (4.9%)	289 (8.6%)	962 (13.8%)
CNS depressants	2773 (26.9%)	70 (18.7%)	271 (19.8%)	547 (23.7%)	496 (28.3%)	445 (28.6%)	944 (31.8%)	1128 (33.6%)	1645 (23.6%)
Opioids	1074 (10.4%)	23 (6.1%)	110 (8.1%)	223 (9.7%)	212 (12.1%)	178 (11.5%)	328 (11.0%)	312 (9.3%)	762 (10.9%)
Any substance	5532 (53.6%)	186 (49.6%)	796 (58.3%)	1370 (59.4%)	1010 (57.6%)	783 (50.4%)	1387 (46.7%)	1692 (50.4%)	3840 (55.1%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 1.1. Demographics: Count (percent) of injured drivers who test positive for impairing substances by age and sex in 2018

Data on drivers involved in crashes in 2018		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	1994 (100%)	71 (100%)	298 (100%)	431 (100%)	307 (100%)	311 (100%)	576 (100%)	633 (100%)	1361 (100%)
Alcohol									
BAC > 0	308 (15.4%)	14 (19.7%)	70 (23.5%)	95 (22.0%)	56 (18.2%)	32 (10.3%)	41 (7.1%)	61 (9.6%)	247 (18.1%)
0 < BAC < 0.05%	47 (2.4%)	2 (2.8%)	9 (3.0%)	17 (3.9%)	9 (2.9%)	2 (0.6%)	8 (1.4%)	6 (0.9%)	41 (3.0%)
0.05% ≤ BAC < 0.08%	30 (1.5%)	0 (0.0%)	7 (2.3%)	6 (1.4%)	8 (2.6%)	6 (1.9%)	3 (0.5%)	3 (0.5%)	27 (2.0%)
BAC ≥ 0.08%	231 (11.6%)	12 (16.9%)	54 (18.1%)	72 (16.7%)	39 (12.7%)	24 (7.7%)	30 (5.2%)	52 (8.2%)	179 (13.2%)
Cannabinoids									
COOH-THC > 0	533 (26.7%)	29 (40.8%)	133 (44.6%)	152 (35.3%)	79 (25.7%)	59 (19.0%)	81 (14.1%)	110 (17.4%)	423 (31.1%)
THC > 0	362 (18.2%)	21 (29.6%)	93 (31.2%)	105 (24.4%)	50 (16.3%)	45 (14.5%)	48 (8.3%)	65 (10.3%)	297 (21.8%)
THC ≥ 2 ng/mL	131 (6.6%)	9 (12.7%)	40 (13.4%)	38 (8.8%)	18 (5.9%)	10 (3.2%)	16 (2.8%)	26 (4.1%)	105 (7.7%)
THC ≥ 5 ng/mL	49 (2.5%)	3 (4.2%)	12 (4.0%)	20 (4.6%)	7 (2.3%)	2 (0.6%)	5 (0.9%)	10 (1.6%)	39 (2.9%)
Other substances									
CNS stimulants	194 (9.7%)	8 (11.3%)	31 (10.4%)	64 (14.8%)	37 (12.1%)	34 (10.9%)	20 (3.5%)	46 (7.3%)	148 (10.9%)
CNS depressants	405 (20.3%)	11 (15.5%)	36 (12.1%)	87 (20.2%)	68 (22.1%)	63 (20.3%)	140 (24.3%)	148 (23.4%)	257 (18.9%)
Opioids	169 (8.5%)	5 (7.0%)	17 (5.7%)	40 (9.3%)	29 (9.4%)	24 (7.7%)	54 (9.4%)	54 (8.5%)	115 (8.4%)
Any substance	964 (48.3%)	37 (52.1%)	171 (57.4%)	238 (55.2%)	161 (52.4%)	135 (43.4%)	222 (38.5%)	265 (41.9%)	699 (51.4%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 1.2. Demographics: Count (percent) of injured drivers who test positive for impairing substances by age and sex in 2019

Data on drivers involved in crashes in 2019		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	2228 (100%)	57 (100%)	276 (100%)	514 (100%)	357 (100%)	358 (100%)	666 (100%)	704 (100%)	1524 (100%)
Alcohol									
BAC > 0	343 (15.4%)	9 (15.8%)	61 (22.1%)	114 (22.2%)	63 (17.6%)	51 (14.2%)	45 (6.8%)	68 (9.7%)	275 (18.0%)
0 < BAC < 0.05%	45 (2.0%)	2 (3.5%)	6 (2.2%)	12 (2.3%)	9 (2.5%)	7 (2.0%)	9 (1.4%)	7 (1.0%)	38 (2.5%)
0.05% ≤ BAC < 0.08%	25 (1.1%)	3 (5.3%)	5 (1.8%)	7 (1.4%)	4 (1.1%)	2 (0.6%)	4 (0.6%)	3 (0.4%)	22 (1.4%)
BAC ≥ 0.08%	273 (12.3%)	4 (7.0%)	50 (18.1%)	95 (18.5%)	50 (14.0%)	42 (11.7%)	32 (4.8%)	58 (8.2%)	215 (14.1%)
Cannabinoids									
COOH-THC > 0	755 (33.9%)	22 (38.6%)	152 (55.1%)	240 (46.7%)	108 (30.3%)	88 (24.6%)	145 (21.8%)	176 (25.0%)	579 (38.0%)
THC > 0	435 (19.5%)	8 (14.0%)	108 (39.1%)	139 (27.0%)	67 (18.8%)	48 (13.4%)	65 (9.8%)	80 (11.4%)	355 (23.3%)
THC ≥ 2 ng/mL	182 (8.2%)	5 (8.8%)	45 (16.3%)	57 (11.1%)	24 (6.7%)	17 (4.7%)	34 (5.1%)	38 (5.4%)	144 (9.4%)
THC ≥ 5 ng/mL	85 (3.8%)	2 (3.5%)	19 (6.9%)	31 (6.0%)	12 (3.4%)	5 (1.4%)	16 (2.4%)	18 (2.6%)	67 (4.4%)
Other substances									
CNS stimulants	239 (10.7%)	2 (3.5%)	35 (12.7%)	75 (14.6%)	57 (16.0%)	34 (9.5%)	36 (5.4%)	52 (7.4%)	187 (12.3%)
CNS depressants	644 (28.9%)	10 (17.5%)	80 (29.0%)	120 (23.3%)	105 (29.4%)	116 (32.4%)	213 (32.0%)	230 (32.7%)	414 (27.2%)
Opioids	258 (11.6%)	8 (14.0%)	28 (10.1%)	58 (11.3%)	40 (11.2%)	37 (10.3%)	87 (13.1%)	67 (9.5%)	191 (12.5%)
Any substance	1263 (56.7%)	30 (52.6%)	185 (67.0%)	309 (60.1%)	220 (61.6%)	192 (53.6%)	327 (49.1%)	354 (50.3%)	909 (59.6%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 1.3. Demographics: Count (percent) of injured drivers who test positive for impairing substances by age and sex in 2020

Data on drivers involved in crashes in 2020		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	1157 (100%)	40 (100%)	136 (100%)	269 (100%)	211 (100%)	172 (100%)	329 (100%)	406 (100%)	751 (100%)
Alcohol									
BAC > 0	188 (16.2%)	7 (17.5%)	34 (25.0%)	59 (21.9%)	38 (18.0%)	27 (15.7%)	23 (7.0%)	47 (11.6%)	141 (18.8%)
0 < BAC < 0.05%	40 (3.5%)	2 (5.0%)	7 (5.1%)	8 (3.0%)	7 (3.3%)	5 (2.9%)	11 (3.3%)	12 (3.0%)	28 (3.7%)
0.05% ≤ BAC < 0.08%	10 (0.9%)	0 (0.0%)	2 (1.5%)	4 (1.5%)	1 (0.5%)	2 (1.2%)	1 (0.3%)	6 (1.5%)	4 (0.5%)
BAC ≥ 0.08%	138 (11.9%)	5 (12.5%)	25 (18.4%)	47 (17.5%)	30 (14.2%)	20 (11.6%)	11 (3.3%)	29 (7.1%)	109 (14.5%)
Cannabinoids									
COOH-THC > 0	361 (31.2%)	17 (42.5%)	64 (47.1%)	121 (45.0%)	67 (31.8%)	41 (23.8%)	51 (15.5%)	101 (24.9%)	260 (34.6%)
THC > 0	191 (16.5%)	7 (17.5%)	43 (31.6%)	66 (24.5%)	33 (15.6%)	17 (9.9%)	25 (7.6%)	61 (15.0%)	130 (17.3%)
THC ≥ 2 ng/mL	107 (9.2%)	4 (10.0%)	25 (18.4%)	37 (13.8%)	16 (7.6%)	9 (5.2%)	16 (4.9%)	30 (7.4%)	77 (10.3%)
THC ≥ 5 ng/mL	54 (4.7%)	2 (5.0%)	11 (8.1%)	18 (6.7%)	9 (4.3%)	6 (3.5%)	8 (2.4%)	13 (3.2%)	41 (5.5%)
Other substances									
CNS stimulants	176 (15.2%)	5 (12.5%)	19 (14.0%)	56 (20.8%)	46 (21.8%)	29 (16.9%)	21 (6.4%)	37 (9.1%)	139 (18.5%)
CNS depressants	318 (27.5%)	9 (22.5%)	31 (22.8%)	65 (24.2%)	63 (29.9%)	47 (27.3%)	103 (31.3%)	140 (34.5%)	178 (23.7%)
Opioids	161 (13.9%)	1 (2.5%)	14 (10.3%)	34 (12.6%)	42 (19.9%)	31 (18.0%)	39 (11.9%)	55 (13.5%)	106 (14.1%)
Any substance	633 (54.7%)	19 (47.5%)	84 (61.8%)	165 (61.3%)	125 (59.2%)	89 (51.7%)	151 (45.9%)	210 (51.7%)	423 (56.3%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 1.4. Demographics: Count (percent) of injured drivers who test positive for impairing substances by age and sex in 2021

Data on drivers involved in crashes in 2021		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	2461 (100%)	103 (100%)	321 (100%)	569 (100%)	436 (100%)	332 (100%)	700 (100%)	790 (100%)	1671 (100%)
Alcohol									
BAC > 0	444 (18.0%)	12 (11.7%)	80 (24.9%)	145 (25.5%)	86 (19.7%)	50 (15.1%)	71 (10.1%)	99 (12.5%)	345 (20.6%)
0 < BAC < 0.05%	79 (3.2%)	3 (2.9%)	11 (3.4%)	21 (3.7%)	15 (3.4%)	9 (2.7%)	20 (2.9%)	19 (2.4%)	60 (3.6%)
0.05% ≤ BAC < 0.08%	27 (1.1%)	4 (3.9%)	2 (0.6%)	8 (1.4%)	5 (1.1%)	3 (0.9%)	5 (0.7%)	1 (0.1%)	26 (1.6%)
BAC ≥ 0.08%	338 (13.7%)	5 (4.9%)	67 (20.9%)	116 (20.4%)	66 (15.1%)	38 (11.4%)	46 (6.6%)	79 (10.0%)	259 (15.5%)
Cannabinoids									
COOH-THC > 0	752 (30.6%)	41 (39.8%)	141 (43.9%)	230 (40.4%)	155 (35.6%)	78 (23.5%)	107 (15.3%)	199 (25.2%)	553 (33.1%)
THC > 0	433 (17.6%)	24 (23.3%)	92 (28.7%)	128 (22.5%)	81 (18.6%)	42 (12.7%)	66 (9.4%)	115 (14.6%)	318 (19.0%)
THC ≥ 2 ng/mL	198 (8.0%)	10 (9.7%)	47 (14.6%)	60 (10.5%)	40 (9.2%)	17 (5.1%)	24 (3.4%)	43 (5.4%)	155 (9.3%)
THC ≥ 5 ng/mL	86 (3.5%)	5 (4.9%)	25 (7.8%)	20 (3.5%)	22 (5.0%)	6 (1.8%)	8 (1.1%)	15 (1.9%)	71 (4.2%)
Other substances									
CNS stimulants	332 (13.5%)	7 (6.8%)	41 (12.8%)	111 (19.5%)	96 (22.0%)	46 (13.9%)	31 (4.4%)	81 (10.3%)	251 (15.0%)
CNS depressants	704 (28.6%)	18 (17.5%)	62 (19.3%)	135 (23.7%)	142 (32.6%)	107 (32.2%)	240 (34.3%)	297 (37.6%)	407 (24.4%)
Opioids	275 (11.2%)	5 (4.9%)	27 (8.4%)	55 (9.7%)	63 (14.4%)	46 (13.9%)	79 (11.3%)	79 (10.0%)	196 (11.7%)
Any substance	1360 (55.3%)	50 (48.5%)	179 (55.8%)	337 (59.2%)	276 (63.3%)	178 (53.6%)	340 (48.6%)	437 (55.3%)	923 (55.2%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 1.5. Demographics: Count (percent) of injured drivers who test positive for impairing substances by age and sex in 2022 (additional data from 2022 is pending)

Data on drivers involved in crashes in 2022		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	2030 (100%)	83 (100%)	283 (100%)	429 (100%)	352 (100%)	313 (100%)	570 (100%)	667 (100%)	1363 (100%)
Alcohol									
BAC > 0	307 (15.1%)	13 (15.7%)	56 (19.8%)	95 (22.1%)	57 (16.2%)	38 (12.1%)	48 (8.4%)	58 (8.7%)	249 (18.3%)
0 < BAC < 0.05%	52 (2.6%)	2 (2.4%)	11 (3.9%)	12 (2.8%)	5 (1.4%)	5 (1.6%)	17 (3.0%)	6 (0.9%)	46 (3.4%)
0.05% ≤ BAC < 0.08%	23 (1.1%)	2 (2.4%)	3 (1.1%)	6 (1.4%)	3 (0.9%)	3 (1.0%)	6 (1.1%)	2 (0.3%)	21 (1.5%)
BAC ≥ 0.08%	232 (11.4%)	9 (10.8%)	42 (14.8%)	77 (17.9%)	49 (13.9%)	30 (9.6%)	25 (4.4%)	50 (7.5%)	182 (13.4%)
Cannabinoids									
COOH-THC > 0	532 (26.2%)	31 (37.3%)	105 (37.1%)	168 (39.2%)	93 (26.4%)	65 (20.8%)	70 (12.3%)	127 (19.0%)	405 (29.7%)
THC > 0	244 (12.0%)	22 (26.5%)	43 (15.2%)	84 (19.6%)	35 (9.9%)	34 (10.9%)	26 (4.6%)	54 (8.1%)	190 (13.9%)
THC ≥ 2 ng/mL	91 (4.5%)	8 (9.6%)	18 (6.4%)	35 (8.2%)	15 (4.3%)	6 (1.9%)	9 (1.6%)	24 (3.6%)	67 (4.9%)
THC ≥ 5 ng/mL	46 (2.3%)	3 (3.6%)	11 (3.9%)	23 (5.4%)	4 (1.1%)	2 (0.6%)	3 (0.5%)	14 (2.1%)	32 (2.3%)
Other substances									
CNS stimulants	252 (12.4%)	6 (7.2%)	36 (12.7%)	80 (18.6%)	57 (16.2%)	39 (12.5%)	34 (6.0%)	59 (8.8%)	193 (14.2%)
CNS depressants	586 (28.9%)	20 (24.1%)	57 (20.1%)	122 (28.4%)	91 (25.9%)	97 (31.0%)	199 (34.9%)	265 (39.7%)	321 (23.6%)
Opioids	175 (8.6%)	3 (3.6%)	19 (6.7%)	32 (7.5%)	29 (8.2%)	31 (9.9%)	61 (10.7%)	48 (7.2%)	127 (9.3%)
Any substance	1085 (53.4%)	43 (51.8%)	152 (53.7%)	269 (62.7%)	179 (50.9%)	161 (51.4%)	281 (49.3%)	358 (53.7%)	727 (53.3%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 1.6. Demographics: Count (percent) of injured drivers who test positive for impairing substances by age and sex in 2023 (additional data from 2023 is pending)

Data on drivers involved in crashes in 2023		Age group (years)						Sex	
	National	16-18	19-24	25-34	35-44	45-54	≥55	Female	Male
Total injured drivers	452 (100%)	21 (100%)	52 (100%)	93 (100%)	89 (100%)	68 (100%)	129 (100%)	156 (100%)	296 (100%)
Alcohol									
BAC > 0	59 (13.1%)	1 (4.8%)	12 (23.1%)	21 (22.6%)	8 (9.0%)	9 (13.2%)	8 (6.2%)	8 (5.1%)	51 (17.2%)
0 < BAC < 0.05%	11 (2.4%)	1 (4.8%)	3 (5.8%)	3 (3.2%)	1 (1.1%)	1 (1.5%)	2 (1.6%)	3 (1.9%)	8 (2.7%)
0.05% ≤ BAC < 0.08%	5 (1.1%)	0 (0.0%)	2 (3.8%)	0 (0.0%)	0 (0.0%)	2 (2.9%)	1 (0.8%)	0 (0.0%)	5 (1.7%)
BAC ≥ 0.08%	43 (9.5%)	0 (0.0%)	7 (13.5%)	18 (19.4%)	7 (7.9%)	6 (8.8%)	5 (3.9%)	5 (3.2%)	38 (12.8%)
Cannabinoids									
COOH-THC > 0	103 (22.8%)	8 (38.1%)	21 (40.4%)	34 (36.6%)	17 (19.1%)	11 (16.2%)	12 (9.3%)	19 (12.2%)	84 (28.4%)
THC > 0	51 (11.3%)	3 (14.3%)	8 (15.4%)	21 (22.6%)	6 (6.7%)	6 (8.8%)	7 (5.4%)	10 (6.4%)	41 (13.9%)
THC ≥ 2 ng/mL	16 (3.5%)	1 (4.8%)	3 (5.8%)	6 (6.5%)	3 (3.4%)	1 (1.5%)	2 (1.6%)	5 (3.2%)	11 (3.7%)
THC ≥ 5 ng/mL	6 (1.3%)	0 (0.0%)	2 (3.8%)	2 (2.2%)	1 (1.1%)	0 (0.0%)	1 (0.8%)	1 (0.6%)	5 (1.7%)
Other substances									
CNS stimulants	58 (12.8%)	3 (14.3%)	6 (11.5%)	22 (23.7%)	17 (19.1%)	5 (7.4%)	5 (3.9%)	14 (9.0%)	44 (14.9%)
CNS depressants	116 (25.7%)	2 (9.5%)	5 (9.6%)	18 (19.4%)	27 (30.3%)	15 (22.1%)	49 (38.0%)	48 (30.8%)	68 (23.0%)
Opioids	36 (8.0%)	1 (4.8%)	5 (9.6%)	4 (4.3%)	9 (10.1%)	9 (13.2%)	8 (6.2%)	9 (5.8%)	27 (9.1%)
Any substance	227 (50.2%)	7 (33.3%)	25 (48.1%)	52 (55.9%)	49 (55.1%)	28 (41.2%)	66 (51.2%)	68 (43.6%)	159 (53.7%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 2. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics

Data on all injured drivers available to date		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	10322 (100%)	6471 (100%)	3838 (100%)	3897 (100%)	6354 (100%)	6154 (100%)	4166 (100%)
Alcohol							
BAC > 0	1649 (16.0%)	863 (13.3%)	784 (20.4%)	1130 (29.0%)	502 (7.9%)	487 (7.9%)	1161 (27.9%)
0 < BAC < 0.05%	274 (2.7%)	132 (2.0%)	141 (3.7%)	139 (3.6%)	134 (2.1%)	115 (1.9%)	159 (3.8%)
0.05% ≤ BAC < 0.08%	120 (1.2%)	52 (0.8%)	68 (1.8%)	82 (2.1%)	35 (0.6%)	39 (0.6%)	81 (1.9%)
BAC ≥ 0.08%	1255 (12.2%)	679 (10.5%)	575 (15.0%)	909 (23.3%)	333 (5.2%)	333 (5.4%)	921 (22.1%)
Cannabinoids							
COOH-THC > 0	3036 (29.4%)	1771 (27.4%)	1259 (32.8%)	1329 (34.1%)	1683 (26.5%)	1550 (25.2%)	1485 (35.6%)
THC > 0	1716 (16.6%)	1002 (15.5%)	709 (18.5%)	771 (19.8%)	928 (14.6%)	865 (14.1%)	851 (20.4%)
THC ≥ 2 ng/mL	725 (7.0%)	410 (6.3%)	314 (8.2%)	326 (8.4%)	391 (6.2%)	361 (5.9%)	364 (8.7%)
THC ≥ 5 ng/mL	326 (3.2%)	197 (3.0%)	129 (3.4%)	148 (3.8%)	177 (2.8%)	155 (2.5%)	171 (4.1%)
Other substances							
CNS stimulants	1251 (12.1%)	726 (11.2%)	522 (13.6%)	569 (14.6%)	674 (10.6%)	530 (8.6%)	720 (17.3%)
CNS depressants	2773 (26.9%)	1671 (25.8%)	1099 (28.6%)	973 (25.0%)	1781 (28.0%)	1520 (24.7%)	1252 (30.1%)
Opioids	1074 (10.4%)	545 (8.4%)	528 (13.8%)	432 (11.1%)	636 (10.0%)	531 (8.6%)	543 (13.0%)
Any substance	5532 (53.6%)	3218 (49.7%)	2306 (60.1%)	2378 (61.0%)	3109 (48.9%)	2815 (45.7%)	2715 (65.2%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 2.1. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics in 2018

Data on drivers involved in crashes in 2018		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	1994 (100%)	1191 (100%)	799 (100%)	749 (100%)	1220 (100%)	1201 (100%)	793 (100%)
Alcohol							
BAC > 0	308 (15.4%)	167 (14.0%)	141 (17.6%)	214 (28.6%)	90 (7.4%)	83 (6.9%)	225 (28.4%)
0 < BAC < 0.05%	47 (2.4%)	22 (1.8%)	25 (3.1%)	24 (3.2%)	23 (1.9%)	22 (1.8%)	25 (3.2%)
0.05% ≤ BAC < 0.08%	30 (1.5%)	13 (1.1%)	17 (2.1%)	19 (2.5%)	10 (0.8%)	11 (0.9%)	19 (2.4%)
BAC ≥ 0.08%	231 (11.6%)	132 (11.1%)	99 (12.4%)	171 (22.8%)	57 (4.7%)	50 (4.2%)	181 (22.8%)
Cannabinoids							
COOH-THC > 0	533 (26.7%)	291 (24.4%)	239 (29.9%)	234 (31.2%)	292 (23.9%)	274 (22.8%)	259 (32.7%)
THC > 0	362 (18.2%)	199 (16.7%)	160 (20.0%)	172 (23.0%)	185 (15.2%)	180 (15.0%)	182 (23.0%)
THC ≥ 2 ng/mL	131 (6.6%)	66 (5.5%)	64 (8.0%)	64 (8.5%)	65 (5.3%)	68 (5.7%)	63 (7.9%)
THC ≥ 5 ng/mL	49 (2.5%)	24 (2.0%)	25 (3.1%)	25 (3.3%)	24 (2.0%)	27 (2.2%)	22 (2.8%)
Other substances							
CNS stimulants	194 (9.7%)	122 (10.2%)	70 (8.8%)	79 (10.5%)	113 (9.3%)	95 (7.9%)	99 (12.5%)
CNS depressants	405 (20.3%)	224 (18.8%)	180 (22.5%)	146 (19.5%)	254 (20.8%)	226 (18.8%)	179 (22.6%)
Opioids	169 (8.5%)	85 (7.1%)	83 (10.4%)	65 (8.7%)	104 (8.5%)	94 (7.8%)	75 (9.5%)
Any substance	964 (48.3%)	538 (45.2%)	422 (52.8%)	435 (58.1%)	517 (42.4%)	488 (40.6%)	476 (60.0%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 2.2. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics in 2019

Data on drivers involved in crashes in 2019		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	2228 (100%)	1337 (100%)	889 (100%)	841 (100%)	1362 (100%)	1331 (100%)	895 (100%)
Alcohol							
BAC > 0	343 (15.4%)	154 (11.5%)	188 (21.1%)	238 (28.3%)	97 (7.1%)	97 (7.3%)	245 (27.4%)
0 < BAC < 0.05%	45 (2.0%)	15 (1.1%)	30 (3.4%)	22 (2.6%)	23 (1.7%)	22 (1.7%)	23 (2.6%)
0.05% ≤ BAC < 0.08%	25 (1.1%)	9 (0.7%)	16 (1.8%)	17 (2.0%)	7 (0.5%)	9 (0.7%)	16 (1.8%)
BAC ≥ 0.08%	273 (12.3%)	130 (9.7%)	142 (16.0%)	199 (23.7%)	67 (4.9%)	66 (5.0%)	206 (23.0%)
Cannabinoids							
COOH-THC > 0	755 (33.9%)	426 (31.9%)	328 (36.9%)	313 (37.2%)	433 (31.8%)	394 (29.6%)	360 (40.2%)
THC > 0	435 (19.5%)	234 (17.5%)	200 (22.5%)	178 (21.2%)	253 (18.6%)	230 (17.3%)	205 (22.9%)
THC ≥ 2 ng/mL	182 (8.2%)	106 (7.9%)	76 (8.5%)	72 (8.6%)	108 (7.9%)	95 (7.1%)	87 (9.7%)
THC ≥ 5 ng/mL	85 (3.8%)	54 (4.0%)	31 (3.5%)	38 (4.5%)	47 (3.5%)	43 (3.2%)	42 (4.7%)
Other substances							
CNS stimulants	239 (10.7%)	123 (9.2%)	115 (12.9%)	103 (12.2%)	136 (10.0%)	113 (8.5%)	125 (14.0%)
CNS depressants	644 (28.9%)	348 (26.0%)	295 (33.2%)	238 (28.3%)	399 (29.3%)	366 (27.5%)	277 (30.9%)
Opioids	258 (11.6%)	123 (9.2%)	135 (15.2%)	101 (12.0%)	156 (11.5%)	129 (9.7%)	129 (14.4%)
Any substance	1263 (56.7%)	688 (51.5%)	573 (64.5%)	518 (61.6%)	729 (53.5%)	666 (50.0%)	595 (66.5%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 2.3. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics in 2020

Data on drivers involved in crashes in 2020		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	1157 (100%)	774 (100%)	382 (100%)	439 (100%)	707 (100%)	689 (100%)	468 (100%)
Alcohol							
BAC > 0	188 (16.2%)	104 (13.4%)	84 (22.0%)	122 (27.8%)	63 (8.9%)	65 (9.4%)	123 (26.3%)
0 < BAC < 0.05%	40 (3.5%)	17 (2.2%)	23 (6.0%)	23 (5.2%)	16 (2.3%)	17 (2.5%)	23 (4.9%)
0.05% ≤ BAC < 0.08%	10 (0.9%)	5 (0.6%)	5 (1.3%)	7 (1.6%)	3 (0.4%)	2 (0.3%)	8 (1.7%)
BAC ≥ 0.08%	138 (11.9%)	82 (10.6%)	56 (14.7%)	92 (21.0%)	44 (6.2%)	46 (6.7%)	92 (19.7%)
Cannabinoids							
COOH-THC > 0	361 (31.2%)	215 (27.8%)	146 (38.2%)	170 (38.7%)	185 (26.2%)	176 (25.5%)	185 (39.5%)
THC > 0	191 (16.5%)	119 (15.4%)	72 (18.8%)	93 (21.2%)	93 (13.2%)	86 (12.5%)	105 (22.4%)
THC ≥ 2 ng/mL	107 (9.2%)	65 (8.4%)	42 (11.0%)	49 (11.2%)	55 (7.8%)	43 (6.2%)	64 (13.7%)
THC ≥ 5 ng/mL	54 (4.7%)	34 (4.4%)	20 (5.2%)	27 (6.2%)	26 (3.7%)	22 (3.2%)	32 (6.8%)
Other substances							
CNS stimulants	176 (15.2%)	107 (13.8%)	69 (18.1%)	95 (21.6%)	79 (11.2%)	62 (9.0%)	114 (24.4%)
CNS depressants	318 (27.5%)	221 (28.6%)	97 (25.4%)	119 (27.1%)	195 (27.6%)	165 (23.9%)	153 (32.7%)
Opioids	161 (13.9%)	86 (11.1%)	75 (19.6%)	81 (18.5%)	79 (11.2%)	76 (11.0%)	85 (18.2%)
Any substance	633 (54.7%)	403 (52.1%)	230 (60.2%)	284 (64.7%)	341 (48.2%)	309 (44.8%)	324 (69.2%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 2.4. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics in 2021

Data on drivers involved in crashes in 2021		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	2461 (100%)	1557 (100%)	899 (100%)	926 (100%)	1525 (100%)	1417 (100%)	1044 (100%)
Alcohol							
BAC > 0	444 (18.0%)	237 (15.2%)	206 (22.9%)	293 (31.6%)	149 (9.8%)	129 (9.1%)	315 (30.2%)
0 < BAC < 0.05%	79 (3.2%)	44 (2.8%)	34 (3.8%)	35 (3.8%)	44 (2.9%)	31 (2.2%)	48 (4.6%)
0.05% ≤ BAC < 0.08%	27 (1.1%)	12 (0.8%)	15 (1.7%)	20 (2.2%)	6 (0.4%)	6 (0.4%)	21 (2.0%)
BAC ≥ 0.08%	338 (13.7%)	181 (11.6%)	157 (17.5%)	238 (25.7%)	99 (6.5%)	92 (6.5%)	246 (23.6%)
Cannabinoids							
COOH-THC > 0	752 (30.6%)	451 (29.0%)	299 (33.3%)	335 (36.2%)	415 (27.2%)	354 (25.0%)	398 (38.1%)
THC > 0	433 (17.6%)	266 (17.1%)	166 (18.5%)	194 (21.0%)	236 (15.5%)	203 (14.3%)	230 (22.0%)
THC ≥ 2 ng/mL	198 (8.0%)	108 (6.9%)	90 (10.0%)	92 (9.9%)	105 (6.9%)	93 (6.6%)	105 (10.1%)
THC ≥ 5 ng/mL	86 (3.5%)	51 (3.3%)	35 (3.9%)	33 (3.6%)	53 (3.5%)	38 (2.7%)	48 (4.6%)
Other substances							
CNS stimulants	332 (13.5%)	193 (12.4%)	139 (15.5%)	154 (16.6%)	174 (11.4%)	124 (8.8%)	208 (19.9%)
CNS depressants	704 (28.6%)	424 (27.2%)	279 (31.0%)	247 (26.7%)	454 (29.8%)	360 (25.4%)	344 (33.0%)
Opioids	275 (11.2%)	137 (8.8%)	138 (15.4%)	103 (11.1%)	168 (11.0%)	124 (8.8%)	151 (14.5%)
Any substance	1360 (55.3%)	787 (50.5%)	571 (63.5%)	586 (63.3%)	765 (50.2%)	649 (45.8%)	711 (68.1%)

Table 2.5. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics in 2022 (additional data from 2022 is pending)

Data on drivers involved in crashes in 2022		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	2030 (100%)	1274 (100%)	756 (100%)	764 (100%)	1266 (100%)	1200 (100%)	830 (100%)
Alcohol							
BAC > 0	307 (15.1%)	162 (12.7%)	145 (19.2%)	218 (28.5%)	89 (7.0%)	92 (7.7%)	215 (25.9%)
0 < BAC < 0.05%	52 (2.6%)	27 (2.1%)	25 (3.3%)	30 (3.9%)	22 (1.7%)	18 (1.5%)	34 (4.1%)
0.05% ≤ BAC < 0.08%	23 (1.1%)	10 (0.8%)	13 (1.7%)	15 (2.0%)	8 (0.6%)	9 (0.8%)	14 (1.7%)
BAC ≥ 0.08%	232 (11.4%)	125 (9.8%)	107 (14.2%)	173 (22.6%)	59 (4.7%)	65 (5.4%)	167 (20.1%)
Cannabinoids							
COOH-THC > 0	532 (26.2%)	313 (24.6%)	219 (29.0%)	231 (30.2%)	301 (23.8%)	290 (24.2%)	242 (29.2%)
THC > 0	244 (12.0%)	146 (11.5%)	98 (13.0%)	107 (14.0%)	137 (10.8%)	134 (11.2%)	110 (13.3%)
THC ≥ 2 ng/mL	91 (4.5%)	53 (4.2%)	38 (5.0%)	41 (5.4%)	50 (3.9%)	51 (4.2%)	40 (4.8%)
THC ≥ 5 ng/mL	46 (2.3%)	30 (2.4%)	16 (2.1%)	21 (2.7%)	25 (2.0%)	22 (1.8%)	24 (2.9%)
Other substances							
CNS stimulants	252 (12.4%)	133 (10.4%)	119 (15.7%)	108 (14.1%)	144 (11.4%)	109 (9.1%)	143 (17.2%)
CNS depressants	586 (28.9%)	369 (29.0%)	217 (28.7%)	190 (24.9%)	396 (31.3%)	321 (26.8%)	265 (31.9%)
Opioids	175 (8.6%)	96 (7.5%)	79 (10.4%)	67 (8.8%)	108 (8.5%)	82 (6.8%)	93 (11.2%)
Any substance	1085 (53.4%)	641 (50.3%)	444 (58.7%)	460 (60.2%)	625 (49.4%)	559 (46.6%)	526 (63.4%)

Table 2.6. Crash characteristics: Count (percent) of injured drivers who test positive for impairing substances by crash characteristics in 2023 (additional data from 2023 is pending)

Data on drivers involved in crashes in 2023		Injury severity		Crash time		Crash type	
	National	Treated and released	Admitted	Nighttime	Daytime	Multi-vehicle	Single-vehicle
Total injured drivers	452 (100%)	338 (100%)	113 (100%)	178 (100%)	274 (100%)	316 (100%)	136 (100%)
Alcohol							
BAC > 0	59 (13.1%)	39 (11.5%)	20 (17.7%)	45 (25.3%)	14 (5.1%)	21 (6.6%)	38 (27.9%)
0 < BAC < 0.05%	11 (2.4%)	7 (2.1%)	4 (3.5%)	5 (2.8%)	6 (2.2%)	5 (1.6%)	6 (4.4%)
0.05% ≤ BAC < 0.08%	5 (1.1%)	3 (0.9%)	2 (1.8%)	4 (2.2%)	1 (0.4%)	2 (0.6%)	3 (2.2%)
BAC ≥ 0.08%	43 (9.5%)	29 (8.6%)	14 (12.4%)	36 (20.2%)	7 (2.6%)	14 (4.4%)	29 (21.3%)
Cannabinoids							
COOH-THC > 0	103 (22.8%)	75 (22.2%)	28 (24.8%)	46 (25.8%)	57 (20.8%)	62 (19.6%)	41 (30.1%)
THC > 0	51 (11.3%)	38 (11.2%)	13 (11.5%)	27 (15.2%)	24 (8.8%)	32 (10.1%)	19 (14.0%)
THC ≥ 2 ng/mL	16 (3.5%)	12 (3.6%)	4 (3.5%)	8 (4.5%)	8 (2.9%)	11 (3.5%)	5 (3.7%)
THC ≥ 5 ng/mL	6 (1.3%)	4 (1.2%)	2 (1.8%)	4 (2.2%)	2 (0.7%)	3 (0.9%)	3 (2.2%)
Other substances							
CNS stimulants	58 (12.8%)	48 (14.2%)	10 (8.8%)	30 (16.9%)	28 (10.2%)	27 (8.5%)	31 (22.8%)
CNS depressants	116 (25.7%)	85 (25.1%)	31 (27.4%)	33 (18.5%)	83 (30.3%)	82 (25.9%)	34 (25.0%)
Opioids	36 (8.0%)	18 (5.3%)	18 (15.9%)	15 (8.4%)	21 (7.7%)	26 (8.2%)	10 (7.4%)
Any substance	227 (50.2%)	161 (47.6%)	66 (58.4%)	95 (53.4%)	132 (48.2%)	144 (45.6%)	83 (61.0%)

Table 3. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region

Data on all injured drivers available to date	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	10322 (100%)	3287 (100%)	2113 (100%)	678 (100%)	2339 (100%)	1281 (100%)	624 (100%)
Alcohol							
BAC > 0	1649 (16.0%)	378 (11.5%)	330 (15.6%)	141 (20.8%)	421 (18.0%)	242 (18.9%)	137 (22.0%)
0 < BAC < 0.05%	274 (2.7%)	70 (2.1%)	34 (1.6%)	28 (4.1%)	55 (2.4%)	55 (4.3%)	32 (5.1%)
0.05% ≤ BAC < 0.08%	120 (1.2%)	30 (0.9%)	23 (1.1%)	13 (1.9%)	34 (1.5%)	18 (1.4%)	2 (0.3%)
BAC ≥ 0.08%	1255 (12.2%)	278 (8.5%)	273 (12.9%)	100 (14.7%)	332 (14.2%)	169 (13.2%)	103 (16.5%)
Cannabinoids							
COOH-THC > 0	3036 (29.4%)	864 (26.3%)	601 (28.4%)	224 (33.0%)	729 (31.2%)	335 (26.2%)	283 (45.4%)
THC > 0	1716 (16.6%)	519 (15.8%)	293 (13.9%)	130 (19.2%)	357 (15.3%)	253 (19.8%)	164 (26.3%)
THC ≥ 2 ng/mL	725 (7.0%)	204 (6.2%)	124 (5.9%)	67 (9.9%)	139 (5.9%)	99 (7.7%)	92 (14.7%)
THC ≥ 5 ng/mL	326 (3.2%)	84 (2.6%)	61 (2.9%)	34 (5.0%)	54 (2.3%)	48 (3.7%)	45 (7.2%)
Other substances							
CNS stimulants	1251 (12.1%)	343 (10.4%)	272 (12.9%)	79 (11.7%)	264 (11.3%)	174 (13.6%)	119 (19.1%)
CNS depressants	2773 (26.9%)	747 (22.7%)	620 (29.3%)	205 (30.2%)	573 (24.5%)	364 (28.4%)	264 (42.3%)
Opioids	1074 (10.4%)	266 (8.1%)	303 (14.3%)	86 (12.7%)	228 (9.7%)	104 (8.1%)	87 (13.9%)
Any substance	5532 (53.6%)	1532 (46.6%)	1199 (56.7%)	407 (60.0%)	1228 (52.5%)	732 (57.1%)	434 (69.6%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 3.1. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region in 2018

Data on drivers involved in crashes in 2018	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	1994 (100%)	869 (100%)	508 (100%)	101 (100%)	516 (100%)		
Alcohol							
BAC > 0	308 (15.4%)	106 (12.2%)	99 (19.5%)	24 (23.8%)	79 (15.3%)		
0 < BAC < 0.05%	47 (2.4%)	20 (2.3%)	9 (1.8%)	6 (5.9%)	12 (2.3%)		
0.05% ≤ BAC < 0.08%	30 (1.5%)	12 (1.4%)	7 (1.4%)	3 (3.0%)	8 (1.6%)		
BAC ≥ 0.08%	231 (11.6%)	74 (8.5%)	83 (16.3%)	15 (14.9%)	59 (11.4%)		
Cannabinoids							
COOH-THC > 0	533 (26.7%)	205 (23.6%)	132 (26.0%)	25 (24.8%)	171 (33.1%)		
THC > 0	362 (18.2%)	142 (16.3%)	88 (17.3%)	20 (19.8%)	112 (21.7%)		
THC ≥ 2 ng/mL	131 (6.6%)	42 (4.8%)	30 (5.9%)	10 (9.9%)	49 (9.5%)		
THC ≥ 5 ng/mL	49 (2.5%)	15 (1.7%)	12 (2.4%)	3 (3.0%)	19 (3.7%)		
Other substances							
CNS stimulants	194 (9.7%)	79 (9.1%)	58 (11.4%)	8 (7.9%)	49 (9.5%)		
CNS depressants	405 (20.3%)	146 (16.8%)	123 (24.2%)	23 (22.8%)	113 (21.9%)		
Opioids	169 (8.5%)	63 (7.2%)	50 (9.8%)	6 (5.9%)	50 (9.7%)		
Any substance	964 (48.3%)	360 (41.4%)	276 (54.3%)	53 (52.5%)	275 (53.3%)		

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 3.2. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region in 2019

Data on drivers involved in crashes in 2019	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	2228 (100%)	755 (100%)	678 (100%)	157 (100%)	515 (100%)	60 (100%)	63 (100%)
Alcohol							
BAC > 0	343 (15.4%)	80 (10.6%)	116 (17.1%)	25 (15.9%)	103 (20.0%)	10 (16.7%)	9 (14.3%)
0 < BAC < 0.05%	45 (2.0%)	13 (1.7%)	15 (2.2%)	1 (0.6%)	15 (2.9%)	1 (1.7%)	0 (0.0%)
0.05% ≤ BAC < 0.08%	25 (1.1%)	5 (0.7%)	6 (0.9%)	3 (1.9%)	10 (1.9%)	0 (0.0%)	1 (1.6%)
BAC ≥ 0.08%	273 (12.3%)	62 (8.2%)	95 (14.0%)	21 (13.4%)	78 (15.1%)	9 (15.0%)	8 (12.7%)
Cannabinoids							
COOH-THC > 0	755 (33.9%)	234 (31.0%)	225 (33.2%)	71 (45.2%)	182 (35.3%)	13 (21.7%)	30 (47.6%)
THC > 0	435 (19.5%)	144 (19.1%)	120 (17.7%)	46 (29.3%)	92 (17.9%)	10 (16.7%)	23 (36.5%)
THC ≥ 2 ng/mL	182 (8.2%)	58 (7.7%)	55 (8.1%)	19 (12.1%)	31 (6.0%)	5 (8.3%)	14 (22.2%)
THC ≥ 5 ng/mL	85 (3.8%)	20 (2.6%)	29 (4.3%)	13 (8.3%)	13 (2.5%)	2 (3.3%)	8 (12.7%)
Other substances							
CNS stimulants	239 (10.7%)	75 (9.9%)	85 (12.5%)	18 (11.5%)	47 (9.1%)	7 (11.7%)	7 (11.1%)
CNS depressants	644 (28.9%)	207 (27.4%)	203 (29.9%)	52 (33.1%)	144 (28.0%)	20 (33.3%)	18 (28.6%)
Opioids	258 (11.6%)	68 (9.0%)	94 (13.9%)	25 (15.9%)	59 (11.5%)	8 (13.3%)	4 (6.3%)
Any substance	1263 (56.7%)	390 (51.7%)	413 (60.9%)	97 (61.8%)	291 (56.5%)	35 (58.3%)	37 (58.7%)

Notes:

1. “CNS Stimulants” include cocaine, methamphetamine, and other amphetamines.
2. “CNS Depressants” include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. “Any substance” refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 3.3. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region in 2020

Data on drivers involved in crashes in 2020	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	1157 (100%)	315 (100%)	223 (100%)	109 (100%)	126 (100%)	247 (100%)	137 (100%)
Alcohol							
BAC > 0	188 (16.2%)	45 (14.3%)	26 (11.7%)	18 (16.5%)	20 (15.9%)	42 (17.0%)	37 (27.0%)
0 < BAC < 0.05%	40 (3.5%)	9 (2.9%)	3 (1.3%)	2 (1.8%)	0 (0.0%)	20 (8.1%)	6 (4.4%)
0.05% ≤ BAC < 0.08%	10 (0.9%)	2 (0.6%)	2 (0.9%)	1 (0.9%)	1 (0.8%)	3 (1.2%)	1 (0.7%)
BAC ≥ 0.08%	138 (11.9%)	34 (10.8%)	21 (9.4%)	15 (13.8%)	19 (15.1%)	19 (7.7%)	30 (21.9%)
Cannabinoids							
COOH-THC > 0	361 (31.2%)	90 (28.6%)	54 (24.2%)	43 (39.4%)	41 (32.5%)	60 (24.3%)	73 (53.3%)
THC > 0	191 (16.5%)	36 (11.4%)	29 (13.0%)	24 (22.0%)	15 (11.9%)	41 (16.6%)	46 (33.6%)
THC ≥ 2 ng/mL	107 (9.2%)	20 (6.3%)	16 (7.2%)	15 (13.8%)	6 (4.8%)	27 (10.9%)	23 (16.8%)
THC ≥ 5 ng/mL	54 (4.7%)	10 (3.2%)	10 (4.5%)	8 (7.3%)	0 (0.0%)	16 (6.5%)	10 (7.3%)
Other substances							
CNS stimulants	176 (15.2%)	45 (14.3%)	31 (13.9%)	18 (16.5%)	17 (13.5%)	31 (12.6%)	34 (24.8%)
CNS depressants	318 (27.5%)	70 (22.2%)	77 (34.5%)	31 (28.4%)	25 (19.8%)	62 (25.1%)	53 (38.7%)
Opioids	161 (13.9%)	35 (11.1%)	40 (17.9%)	21 (19.3%)	19 (15.1%)	26 (10.5%)	20 (14.6%)
Any substance	633 (54.7%)	148 (47.0%)	134 (60.1%)	69 (63.3%)	59 (46.8%)	130 (52.6%)	93 (67.9%)

Notes:

1. “CNS Stimulants” include cocaine, methamphetamine, and other amphetamines.
2. “CNS Depressants” include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. “Any substance” refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 3.4. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region in 2021

Data on drivers involved in crashes in 2021	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	2461 (100%)	706 (100%)	383 (100%)	152 (100%)	454 (100%)	461 (100%)	305 (100%)
Alcohol							
BAC > 0	444 (18.0%)	88 (12.5%)	47 (12.3%)	35 (23.0%)	94 (20.7%)	103 (22.3%)	77 (25.2%)
0 < BAC < 0.05%	79 (3.2%)	19 (2.7%)	3 (0.8%)	5 (3.3%)	8 (1.8%)	20 (4.3%)	24 (7.9%)
0.05% ≤ BAC < 0.08%	27 (1.1%)	6 (0.8%)	3 (0.8%)	1 (0.7%)	9 (2.0%)	8 (1.7%)	0 (0.0%)
BAC ≥ 0.08%	338 (13.7%)	63 (8.9%)	41 (10.7%)	29 (19.1%)	77 (17.0%)	75 (16.3%)	53 (17.4%)
Cannabinoids							
COOH-THC > 0	752 (30.6%)	177 (25.1%)	102 (26.6%)	42 (27.6%)	162 (35.7%)	134 (29.1%)	135 (44.3%)
THC > 0	433 (17.6%)	98 (13.9%)	40 (10.4%)	23 (15.1%)	71 (15.6%)	130 (28.2%)	71 (23.3%)
THC ≥ 2 ng/mL	198 (8.0%)	45 (6.4%)	17 (4.4%)	13 (8.6%)	38 (8.4%)	40 (8.7%)	45 (14.8%)
THC ≥ 5 ng/mL	86 (3.5%)	19 (2.7%)	8 (2.1%)	6 (3.9%)	18 (4.0%)	17 (3.7%)	18 (5.9%)
Other substances							
CNS stimulants	332 (13.5%)	78 (11.0%)	49 (12.8%)	21 (13.8%)	56 (12.3%)	66 (14.3%)	62 (20.3%)
CNS depressants	704 (28.6%)	163 (23.1%)	110 (28.7%)	56 (36.8%)	106 (23.3%)	129 (28.0%)	140 (45.9%)
Opioids	275 (11.2%)	58 (8.2%)	67 (17.5%)	21 (13.8%)	44 (9.7%)	35 (7.6%)	50 (16.4%)
Any substance	1360 (55.3%)	316 (44.8%)	204 (53.3%)	98 (64.5%)	230 (50.7%)	285 (61.8%)	227 (74.4%)

Notes:

1. “CNS Stimulants” include cocaine, methamphetamine, and other amphetamines.
2. “CNS Depressants” include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. “Any substance” refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 3.5. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region in 2022 (additional data from 2022 is pending)

Data on drivers involved in crashes in 2022	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	2030 (100%)	449 (100%)	321 (100%)	122 (100%)	585 (100%)	434 (100%)	119 (100%)
Alcohol							
BAC > 0	307 (15.1%)	42 (9.4%)	42 (13.1%)	32 (26.2%)	104 (17.8%)	73 (16.8%)	14 (11.8%)
0 < BAC < 0.05%	52 (2.6%)	6 (1.3%)	4 (1.2%)	11 (9.0%)	17 (2.9%)	12 (2.8%)	2 (1.7%)
0.05% ≤ BAC < 0.08%	23 (1.1%)	3 (0.7%)	5 (1.6%)	4 (3.3%)	6 (1.0%)	5 (1.2%)	0 (0.0%)
BAC ≥ 0.08%	232 (11.4%)	33 (7.3%)	33 (10.3%)	17 (13.9%)	81 (13.8%)	56 (12.9%)	12 (10.1%)
Cannabinoids							
COOH-THC > 0	532 (26.2%)	123 (27.4%)	88 (27.4%)	33 (27.0%)	138 (23.6%)	105 (24.2%)	45 (37.8%)
THC > 0	244 (12.0%)	74 (16.5%)	16 (5.0%)	15 (12.3%)	52 (8.9%)	63 (14.5%)	24 (20.2%)
THC ≥ 2 ng/mL	91 (4.5%)	31 (6.9%)	6 (1.9%)	10 (8.2%)	10 (1.7%)	24 (5.5%)	10 (8.4%)
THC ≥ 5 ng/mL	46 (2.3%)	16 (3.6%)	2 (0.6%)	4 (3.3%)	2 (0.3%)	13 (3.0%)	9 (7.6%)
Other substances							
CNS stimulants	252 (12.4%)	47 (10.5%)	49 (15.3%)	9 (7.4%)	77 (13.2%)	54 (12.4%)	16 (13.4%)
CNS depressants	586 (28.9%)	105 (23.4%)	107 (33.3%)	32 (26.2%)	154 (26.3%)	135 (31.1%)	53 (44.5%)
Opioids	175 (8.6%)	30 (6.7%)	52 (16.2%)	7 (5.7%)	44 (7.5%)	29 (6.7%)	13 (10.9%)
Any substance	1085 (53.4%)	217 (48.3%)	172 (53.6%)	68 (55.7%)	310 (53.0%)	241 (55.5%)	77 (64.7%)

Notes:

1. “CNS Stimulants” include cocaine, methamphetamine, and other amphetamines.
2. “CNS Depressants” include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. “Any substance” refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 3.6. Regional variation: Count (percent) of injured drivers who test positive for impairing substances by region in 2023 (additional data from 2023 is pending)

Data on drivers involved in crashes in 2023	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	452 (100%)	193 (100%)		37 (100%)	143 (100%)	79 (100%)	
Alcohol							
BAC > 0	59 (13.1%)	17 (8.8%)		7 (18.9%)	21 (14.7%)	14 (17.7%)	
0 < BAC < 0.05%	11 (2.4%)	3 (1.6%)		3 (8.1%)	3 (2.1%)	2 (2.5%)	
0.05% ≤ BAC < 0.08%	5 (1.1%)	2 (1.0%)		1 (2.7%)	0 (0.0%)	2 (2.5%)	
BAC ≥ 0.08%	43 (9.5%)	12 (6.2%)		3 (8.1%)	18 (12.6%)	10 (12.7%)	
Cannabinoids							
COOH-THC > 0	103 (22.8%)	35 (18.1%)		10 (27.0%)	35 (24.5%)	23 (29.1%)	
THC > 0	51 (11.3%)	25 (13.0%)		2 (5.4%)	15 (10.5%)	9 (11.4%)	
THC ≥ 2 ng/mL	16 (3.5%)	8 (4.1%)		0 (0.0%)	5 (3.5%)	3 (3.8%)	
THC ≥ 5 ng/mL	6 (1.3%)	4 (2.1%)		0 (0.0%)	2 (1.4%)	0 (0.0%)	
Other substances							
CNS stimulants	58 (12.8%)	19 (9.8%)		5 (13.5%)	18 (12.6%)	16 (20.3%)	
CNS depressants	116 (25.7%)	56 (29.0%)		11 (29.7%)	31 (21.7%)	18 (22.8%)	
Opioids	36 (8.0%)	12 (6.2%)		6 (16.2%)	12 (8.4%)	6 (7.6%)	
Any substance	227 (50.2%)	101 (52.3%)		22 (59.5%)	63 (44.1%)	41 (51.9%)	

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in Canada

Data on all injured drivers available to date	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	10322 (100%)	3287 (100%)	2113 (100%)	678 (100%)	2339 (100%)	1281 (100%)	624 (100%)
Number of substances							
1	3368 (32.6%)	979 (29.8%)	726 (34.4%)	237 (35.0%)	774 (33.1%)	441 (34.4%)	211 (33.8%)
2	1519 (14.7%)	405 (12.3%)	343 (16.2%)	117 (17.3%)	316 (13.5%)	206 (16.1%)	132 (21.2%)
3 or more	645 (6.2%)	148 (4.5%)	130 (6.2%)	53 (7.8%)	138 (5.9%)	85 (6.6%)	91 (14.6%)
Alcohol and THC							
BAC > 0 & THC > 0	463 (4.5%)	107 (3.3%)	89 (4.2%)	47 (6.9%)	101 (4.3%)	73 (5.7%)	46 (7.4%)
BAC ≥ 0.05% & THC ≥ 2 ng/mL	145 (1.4%)	37 (1.1%)	25 (1.2%)	19 (2.8%)	30 (1.3%)	21 (1.6%)	13 (2.1%)
Alcohol and other substances							
BAC > 0 & CNS stimulants	378 (3.7%)	79 (2.4%)	71 (3.4%)	25 (3.7%)	95 (4.1%)	64 (5.0%)	44 (7.1%)
BAC > 0 & CNS depressants	483 (4.7%)	100 (3.0%)	103 (4.9%)	37 (5.5%)	106 (4.5%)	72 (5.6%)	65 (10.4%)
BAC > 0 & Opioids	176 (1.7%)	35 (1.1%)	40 (1.9%)	17 (2.5%)	43 (1.8%)	25 (2.0%)	16 (2.6%)
THC and other substances							
THC > 0 & CNS stimulants	354 (3.4%)	88 (2.7%)	56 (2.7%)	33 (4.9%)	73 (3.1%)	65 (5.1%)	39 (6.2%)
THC > 0 & CNS depressants	488 (4.7%)	124 (3.8%)	79 (3.7%)	44 (6.5%)	94 (4.0%)	72 (5.6%)	75 (12.0%)
THC > 0 & Opioids	204 (2.0%)	46 (1.4%)	44 (2.1%)	19 (2.8%)	44 (1.9%)	22 (1.7%)	29 (4.6%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4.1. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in 2018

Data on drivers involved in crashes in 2018	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	1994 (100%)	869 (100%)	508 (100%)	101 (100%)	516 (100%)		
Number of substances							
1	598 (30.0%)	224 (25.8%)	167 (32.9%)	28 (27.7%)	179 (34.7%)		
2	275 (13.8%)	102 (11.7%)	81 (15.9%)	22 (21.8%)	70 (13.6%)		
3 or more	91 (4.6%)	34 (3.9%)	28 (5.5%)	3 (3.0%)	26 (5.0%)		
Alcohol and THC							
BAC > 0 & THC > 0	103 (5.2%)	36 (4.1%)	34 (6.7%)	10 (9.9%)	23 (4.5%)		
BAC ≥ 0.05% & THC ≥ 2 ng/mL	31 (1.6%)	9 (1.0%)	9 (1.8%)	4 (4.0%)	9 (1.7%)		
Alcohol and other substances							
BAC > 0 & CNS stimulants	48 (2.4%)	13 (1.5%)	17 (3.3%)	3 (3.0%)	15 (2.9%)		
BAC > 0 & CNS depressants	75 (3.8%)	27 (3.1%)	27 (5.3%)	4 (4.0%)	17 (3.3%)		
BAC > 0 & Opioids	27 (1.4%)	9 (1.0%)	9 (1.8%)	1 (1.0%)	8 (1.6%)		
THC and other substances							
THC > 0 & CNS stimulants	63 (3.2%)	29 (3.3%)	11 (2.2%)	5 (5.0%)	18 (3.5%)		
THC > 0 & CNS depressants	82 (4.1%)	31 (3.6%)	25 (4.9%)	1 (1.0%)	25 (4.8%)		
THC > 0 & Opioids	42 (2.1%)	14 (1.6%)	12 (2.4%)	0 (0.0%)	16 (3.1%)		

Notes:

1. “CNS Stimulants” include cocaine, methamphetamine, and other amphetamines.
2. “CNS Depressants” include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. “Any substance” refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4.2. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in 2019

Data on drivers involved in crashes in 2019	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	2228 (100%)	755 (100%)	678 (100%)	157 (100%)	515 (100%)	60 (100%)	63 (100%)
Number of substances							
1	777 (34.9%)	250 (33.1%)	256 (37.8%)	49 (31.2%)	180 (35.0%)	22 (36.7%)	20 (31.7%)
2	345 (15.5%)	104 (13.8%)	115 (17.0%)	30 (19.1%)	75 (14.6%)	9 (15.0%)	12 (19.0%)
3 or more	141 (6.3%)	36 (4.8%)	42 (6.2%)	18 (11.5%)	36 (7.0%)	4 (6.7%)	5 (7.9%)
Alcohol and THC							
BAC > 0 & THC > 0	114 (5.1%)	25 (3.3%)	38 (5.6%)	15 (9.6%)	26 (5.0%)	3 (5.0%)	7 (11.1%)
BAC ≥ 0.05% & THC ≥ 2 ng/mL	26 (1.2%)	6 (0.8%)	8 (1.2%)	4 (2.5%)	4 (0.8%)	1 (1.7%)	3 (4.8%)
Alcohol and other substances							
BAC > 0 & CNS stimulants	78 (3.5%)	22 (2.9%)	26 (3.8%)	4 (2.5%)	20 (3.9%)	3 (5.0%)	3 (4.8%)
BAC > 0 & CNS depressants	114 (5.1%)	24 (3.2%)	41 (6.0%)	9 (5.7%)	32 (6.2%)	5 (8.3%)	3 (4.8%)
BAC > 0 & Opioids	44 (2.0%)	9 (1.2%)	15 (2.2%)	3 (1.9%)	15 (2.9%)	1 (1.7%)	1 (1.6%)
THC and other substances							
THC > 0 & CNS stimulants	76 (3.4%)	18 (2.4%)	24 (3.5%)	11 (7.0%)	16 (3.1%)	2 (3.3%)	5 (7.9%)
THC > 0 & CNS depressants	133 (6.0%)	41 (5.4%)	29 (4.3%)	21 (13.4%)	28 (5.4%)	4 (6.7%)	10 (15.9%)
THC > 0 & Opioids	47 (2.1%)	14 (1.9%)	11 (1.6%)	9 (5.7%)	11 (2.1%)	1 (1.7%)	1 (1.6%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4.3. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in 2020

Data on drivers involved in crashes in 2020	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	1157 (100%)	315 (100%)	223 (100%)	109 (100%)	126 (100%)	247 (100%)	137 (100%)
Number of substances							
1	358 (30.9%)	87 (27.6%)	87 (39.0%)	39 (35.8%)	33 (26.2%)	79 (32.0%)	33 (24.1%)
2	171 (14.8%)	40 (12.7%)	27 (12.1%)	20 (18.3%)	18 (14.3%)	37 (15.0%)	29 (21.2%)
3 or more	104 (9.0%)	21 (6.7%)	20 (9.0%)	10 (9.2%)	8 (6.3%)	14 (5.7%)	31 (22.6%)
Alcohol and THC							
BAC > 0 & THC > 0	48 (4.1%)	7 (2.2%)	6 (2.7%)	5 (4.6%)	4 (3.2%)	11 (4.5%)	15 (10.9%)
BAC ≥ 0.05% & THC ≥ 2 ng/mL	21 (1.8%)	5 (1.6%)	3 (1.3%)	2 (1.8%)	3 (2.4%)	4 (1.6%)	4 (2.9%)
Alcohol and other substances							
BAC > 0 & CNS stimulants	60 (5.2%)	12 (3.8%)	7 (3.1%)	7 (6.4%)	9 (7.1%)	11 (4.5%)	14 (10.2%)
BAC > 0 & CNS depressants	58 (5.0%)	14 (4.4%)	8 (3.6%)	1 (0.9%)	4 (3.2%)	12 (4.9%)	19 (13.9%)
BAC > 0 & Opioids	26 (2.2%)	4 (1.3%)	2 (0.9%)	5 (4.6%)	2 (1.6%)	8 (3.2%)	5 (3.6%)
THC and other substances							
THC > 0 & CNS stimulants	53 (4.6%)	7 (2.2%)	7 (3.1%)	9 (8.3%)	5 (4.0%)	9 (3.6%)	16 (11.7%)
THC > 0 & CNS depressants	67 (5.8%)	7 (2.2%)	10 (4.5%)	10 (9.2%)	7 (5.6%)	13 (5.3%)	20 (14.6%)
THC > 0 & Opioids	40 (3.5%)	6 (1.9%)	11 (4.9%)	4 (3.7%)	3 (2.4%)	7 (2.8%)	9 (6.6%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4.4. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in 2021

Data on drivers involved in crashes in 2021	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	2461 (100%)	706 (100%)	383 (100%)	152 (100%)	454 (100%)	461 (100%)	305 (100%)
Number of substances							
1	758 (30.8%)	189 (26.8%)	115 (30.0%)	60 (39.5%)	125 (27.5%)	158 (34.3%)	111 (36.4%)
2	412 (16.7%)	89 (12.6%)	71 (18.5%)	23 (15.1%)	70 (15.4%)	88 (19.1%)	71 (23.3%)
3 or more	190 (7.7%)	38 (5.4%)	18 (4.7%)	15 (9.9%)	35 (7.7%)	39 (8.5%)	45 (14.8%)
Alcohol and THC							
BAC > 0 & THC > 0	134 (5.4%)	23 (3.3%)	8 (2.1%)	11 (7.2%)	29 (6.4%)	42 (9.1%)	21 (6.9%)
BAC ≥ 0.05% & THC ≥ 2 ng/mL	50 (2.0%)	8 (1.1%)	4 (1.0%)	7 (4.6%)	13 (2.9%)	12 (2.6%)	6 (2.0%)
Alcohol and other substances							
BAC > 0 & CNS stimulants	108 (4.4%)	21 (3.0%)	10 (2.6%)	7 (4.6%)	19 (4.2%)	25 (5.4%)	26 (8.5%)
BAC > 0 & CNS depressants	142 (5.8%)	24 (3.4%)	13 (3.4%)	12 (7.9%)	26 (5.7%)	31 (6.7%)	36 (11.8%)
BAC > 0 & Opioids	44 (1.8%)	6 (0.8%)	8 (2.1%)	6 (3.9%)	5 (1.1%)	9 (2.0%)	10 (3.3%)
THC and other substances							
THC > 0 & CNS stimulants	88 (3.6%)	18 (2.5%)	8 (2.1%)	6 (3.9%)	13 (2.9%)	31 (6.7%)	12 (3.9%)
THC > 0 & CNS depressants	128 (5.2%)	28 (4.0%)	9 (2.3%)	8 (5.3%)	18 (4.0%)	35 (7.6%)	30 (9.8%)
THC > 0 & Opioids	53 (2.2%)	8 (1.1%)	7 (1.8%)	5 (3.3%)	7 (1.5%)	12 (2.6%)	14 (4.6%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4.5. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in 2022 (additional data from 2022 is pending)

Data on drivers involved in crashes in 2022	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	2030 (100%)	449 (100%)	321 (100%)	122 (100%)	585 (100%)	434 (100%)	119 (100%)
Number of substances							
1	721 (35.5%)	152 (33.9%)	101 (31.5%)	46 (37.7%)	217 (37.1%)	158 (36.4%)	47 (39.5%)
2	265 (13.1%)	50 (11.1%)	49 (15.3%)	17 (13.9%)	70 (12.0%)	59 (13.6%)	20 (16.8%)
3 or more	99 (4.9%)	15 (3.3%)	22 (6.9%)	5 (4.1%)	23 (3.9%)	24 (5.5%)	10 (8.4%)
Alcohol and THC							
BAC > 0 & THC > 0	51 (2.5%)	13 (2.9%)	3 (0.9%)	4 (3.3%)	16 (2.7%)	12 (2.8%)	3 (2.5%)
BAC ≥ 0.05% & THC ≥ 2 ng/mL	15 (0.7%)	7 (1.6%)	1 (0.3%)	2 (1.6%)	1 (0.2%)	4 (0.9%)	0 (0.0%)
Alcohol and other substances							
BAC > 0 & CNS stimulants	66 (3.3%)	7 (1.6%)	11 (3.4%)	3 (2.5%)	25 (4.3%)	19 (4.4%)	1 (0.8%)
BAC > 0 & CNS depressants	86 (4.2%)	10 (2.2%)	14 (4.4%)	10 (8.2%)	23 (3.9%)	22 (5.1%)	7 (5.9%)
BAC > 0 & Opioids	27 (1.3%)	5 (1.1%)	6 (1.9%)	0 (0.0%)	10 (1.7%)	6 (1.4%)	0 (0.0%)
THC and other substances							
THC > 0 & CNS stimulants	59 (2.9%)	12 (2.7%)	6 (1.9%)	2 (1.6%)	15 (2.6%)	18 (4.1%)	6 (5.0%)
THC > 0 & CNS depressants	68 (3.3%)	11 (2.4%)	6 (1.9%)	4 (3.3%)	12 (2.1%)	20 (4.6%)	15 (12.6%)
THC > 0 & Opioids	18 (0.9%)	3 (0.7%)	3 (0.9%)	0 (0.0%)	5 (0.9%)	2 (0.5%)	5 (4.2%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 4.6. Polysubstance use: Count (percent) of injured drivers who test positive for one or more types of impairing substance in 2023 (additional data from 2023 is pending)

Data on drivers involved in crashes in 2023	National	British Columbia	Alberta	Saskatchewan	Ontario	Quebec	Atlantic Provinces
Total injured drivers	452 (100%)	193 (100%)		37 (100%)	143 (100%)	79 (100%)	
Number of substances							
1	156 (34.5%)	77 (39.9%)		15 (40.5%)	40 (28.0%)	24 (30.4%)	
2	51 (11.3%)	20 (10.4%)		5 (13.5%)	13 (9.1%)	13 (16.5%)	
3 or more	20 (4.4%)	4 (2.1%)		2 (5.4%)	10 (7.0%)	4 (5.1%)	
Alcohol and THC							
BAC > 0 & THC > 0	13 (2.9%)	3 (1.6%)		2 (5.4%)	3 (2.1%)	5 (6.3%)	
BAC ≥ 0.05% & THC ≥ 2 ng/mL	2 (0.4%)	2 (1.0%)		0 (0.0%)	0 (0.0%)	0 (0.0%)	
Alcohol and other substances							
BAC > 0 & CNS stimulants	18 (4.0%)	4 (2.1%)		1 (2.7%)	7 (4.9%)	6 (7.6%)	
BAC > 0 & CNS depressants	8 (1.8%)	1 (0.5%)		1 (2.7%)	4 (2.8%)	2 (2.5%)	
BAC > 0 & Opioids	8 (1.8%)	2 (1.0%)		2 (5.4%)	3 (2.1%)	1 (1.3%)	
THC and other substances							
THC > 0 & CNS stimulants	15 (3.3%)	4 (2.1%)		0 (0.0%)	6 (4.2%)	5 (6.3%)	
THC > 0 & CNS depressants	10 (2.2%)	6 (3.1%)		0 (0.0%)	4 (2.8%)	0 (0.0%)	
THC > 0 & Opioids	4 (0.9%)	1 (0.5%)		1 (2.7%)	2 (1.4%)	0 (0.0%)	

Notes:

1. “CNS Stimulants” include cocaine, methamphetamine, and other amphetamines.
2. “CNS Depressants” include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. “Any substance” refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 5. Off-road vehicles: Count (percent) of injured drivers involved in off-road vehicle crashes who test positive for impairing substances by age and sex

Data on all injured drivers available to date		Age group (years)		Sex	
	National	<30	≥30	Female	Male
Drivers of off-road vehicles	266 (100%)	86 (100%)	180 (100%)	49 (100%)	217 (100%)
Alcohol					
BAC > 0	94 (35.3%)	34 (39.5%)	60 (33.3%)	14 (28.6%)	80 (36.9%)
0 < BAC < 0.05%	14 (5.3%)	10 (11.6%)	4 (2.2%)	3 (6.1%)	11 (5.1%)
0.05% ≤ BAC < 0.08%	12 (4.5%)	6 (7.0%)	6 (3.3%)	1 (2.0%)	11 (5.1%)
BAC ≥ 0.08%	68 (25.6%)	18 (20.9%)	50 (27.8%)	10 (20.4%)	58 (26.7%)
Cannabinoids					
COOH-THC > 0	81 (30.5%)	31 (36.0%)	50 (27.8%)	9 (18.4%)	72 (33.2%)
THC > 0	38 (14.3%)	16 (18.6%)	22 (12.2%)	5 (10.2%)	33 (15.2%)
THC ≥ 2 ng/mL	18 (6.8%)	7 (8.1%)	11 (6.1%)	2 (4.1%)	16 (7.4%)
THC ≥ 5 ng/mL	9 (3.4%)	6 (7.0%)	3 (1.7%)	2 (4.1%)	7 (3.2%)
Other substances					
CNS stimulants	26 (9.8%)	4 (4.7%)	22 (12.2%)	3 (6.1%)	23 (10.6%)
CNS depressants	90 (33.8%)	24 (27.9%)	66 (36.7%)	24 (49.0%)	66 (30.4%)
Opioids	34 (12.8%)	11 (12.8%)	23 (12.8%)	3 (6.1%)	31 (14.3%)
Any substance	185 (69.5%)	62 (72.1%)	123 (68.3%)	35 (71.4%)	150 (69.1%)

Notes:

1. "CNS Stimulants" include cocaine, methamphetamine, and other amphetamines.
2. "CNS Depressants" include antihistamines, antidepressants, anticonvulsants, antipsychotics, benzodiazepines, muscle relaxants, tricyclic antidepressants, and Z-drugs
3. "Any substance" refers to detection of any one (or more) of the following: Alcohol, THC (excludes COOH-THC), CNS stimulants, CNS depressants, and opioids.
4. Refer to Table 6 for the count of injured drivers who contributed data to this table by hospital site.
5. Refer to Table 7 for the complete list of drugs included in each substance category.

Table 6. Injured drivers by trauma centre included in this report: Count of injured drivers with complete chart data and toxicology results as of April 2024

	Date range	Total injured drivers	Count of injured drivers by year					
			2018	2019	2020	2021	2022	2023
All sites in Canada	Jan 2018 to Jun 2023	10322	1994	2228	1157	2461	2030	452
British Columbia								
Kelowna	Jan 2018 to Mar 2022	318	78	88	50	91	11	-
New Westminster	Jan 2018 to Oct 2022	764	206	190	83	169	116	-
Prince George	Apr 2022 to Dec 2022	28	-	-	-	-	28	-
Vancouver	Jan 2018 to Jun 2023	1816	468	398	161	382	255	152
Victoria	Jan 2018 to May 2023	361	117	79	21	64	39	41
Alberta								
Calgary	May 2018 to Jul 2022	1336	334	484	104	261	153	-
Edmonton	Jun 2018 to Nov 2022	777	174	194	119	122	168	-
Saskatchewan								
Regina	Oct 2020 to May 2022	96	-	-	10	71	15	-
Saskatoon	Apr 2018 to May 2023	582	101	157	99	81	107	37
Ontario								
Ottawa	Mar 2018 to Mar 2023	1147	209	208	45	251	358	76
Sudbury	Nov 2022 to Apr 2023	53	-	-	-	-	15	38
Toronto	Feb 2018 to Feb 2023	1139	307	307	81	203	212	29
Quebec								
Montreal	Nov 2019 to Apr 2023	766	-	42	140	273	261	50
Quebec City	Nov 2019 to Mar 2023	515	-	18	107	188	173	29
Atlantic provinces								
Halifax	Jun 2019 to May 2022	300	-	63	65	135	37	-
Saint John	May 2020 to Jul 2022	212	-	-	69	112	31	-
St. John's	Dec 2020 to Dec 2022	112	-	-	<5	58	51	-

Table 7. List of drugs included in each substance category

Alcohol

Cannabinoids

THC
COOH-THC
11-OH-THC
CBD
CBN

CNS Stimulants

Amphetamine
- Amphetamine
- MDA
- MDMA

Cocaine
- Benzoylecgonine
- Cocaethylene
- Cocaine

Methamphetamine

Opioids

Acetylmorphine
Buprenorphine
Codeine
EDDP
Fentanyl
Hydrocodone
Hydromorphone
Meperidine
Methadone
Mitragynine
Morphine
Norfentanyl
Oxycodone
Tramadol

CNS Depressants

Anticonvulsant
- Carbamazepine
- Cyclobenzaprine
- Gabapentin
- Lamotrigine
- Phenytoin
- Topiramate
- Valproic acid*
- Phenobarbital*

Antidepressant
- Bupropion
- Citalopram
- Fluoxetine
- Hydroxybupropion
- Mirtazapine
- Norcitalopram*
- Norsertraline
- ODesmethylvenlafaxine
- Paroxetine
- Sertraline
- Trazodone
- Venlafaxine

Antipsychotic
- Chlorpromazine
- Clozapine
- Haloperidol
- Hydroxyrisperidone*
- Loxapine
- Olanzapine
- Quetiapine
- Risperidone
- Ziprasidone
- Zuclopenthixol*

Z-Drug
- Zolpidem
- Zopiclone

Antihistamine
- Cetirizine
- Chlorpheniramine
- Diphenhydramine
- Doxylamine
- Tripelennamine*

Benzodiazepine
- Alprazolam
- Aminoclonazepam
- Aminoflunitrazepam
- Aminonitrazepam
- Chlordiazepoxide
- Clonazepam
- Diazepam
- Etizolam
- Flunitrazepam
- Lorazepam
- Midazolam
- Nitrazepam
- Nordiazepam
- Oxazepam
- Temazepam

Muscle Relaxant
- Baclofen*
- Methocarbamol*

Tricyclic Antidepressant
- Amitriptyline
- Clomipramine
- Desipramine
- Doxepin
- Imipramine
- Nortriptyline
- Trimipramine*

Dextromethorphan

* Substance extremely rarely detected and has been removed from toxicology panel since January 2023

Table 8. Other cannabinoids: Count (percent) of injured drivers who tested positive for 11-OH-THC, CBD and CBN

Data on all injured drivers available to date		Age group (years)		Sex	
	National	<30	≥30	Female	Male
Tested for all cannabinoids	2006 (100%)	586 (100%)	1420 (100%)	630 (100%)	1376 (100%)
THC > 0	223 (11.1%)	111 (18.9%)	112 (7.9%)	42 (6.7%)	181 (13.2%)
THC ≥ 2 ng/mL	75 (3.7%)	41 (7.0%)	34 (2.4%)	17 (2.7%)	58 (4.2%)
THC ≥ 5 ng/mL	35 (1.7%)	24 (4.1%)	11 (0.8%)	6 (1.0%)	29 (2.1%)
COOH-THC > 0	498 (24.8%)	224 (38.2%)	274 (19.3%)	104 (16.5%)	394 (28.6%)
11-OH-THC > 0	338 (16.8%)	158 (27.0%)	180 (12.7%)	65 (10.3%)	273 (19.8%)
11-OH-THC ≥ 2 ng/mL	103 (5.1%)	64 (10.9%)	39 (2.7%)	23 (3.7%)	80 (5.8%)
11-OH-THC ≥ 5 ng/mL	38 (1.9%)	25 (4.3%)	13 (0.9%)	6 (1.0%)	32 (2.3%)
CBD > 0	274 (13.7%)	128 (21.8%)	146 (10.3%)	56 (8.9%)	218 (15.8%)
CBN > 0	78 (3.9%)	39 (6.7%)	39 (2.7%)	16 (2.5%)	62 (4.5%)

Since July 2023, our lab has been measuring 11-OH-THC, CBD and CBN. To date, these substances have been analyzed in blood samples from 2006 injured drivers. The results include only drivers for whom all of these cannabinoids were measured.

Appendix B: Figures

Figure 1. Prevalence of alcohol use among injured drivers, by age group.

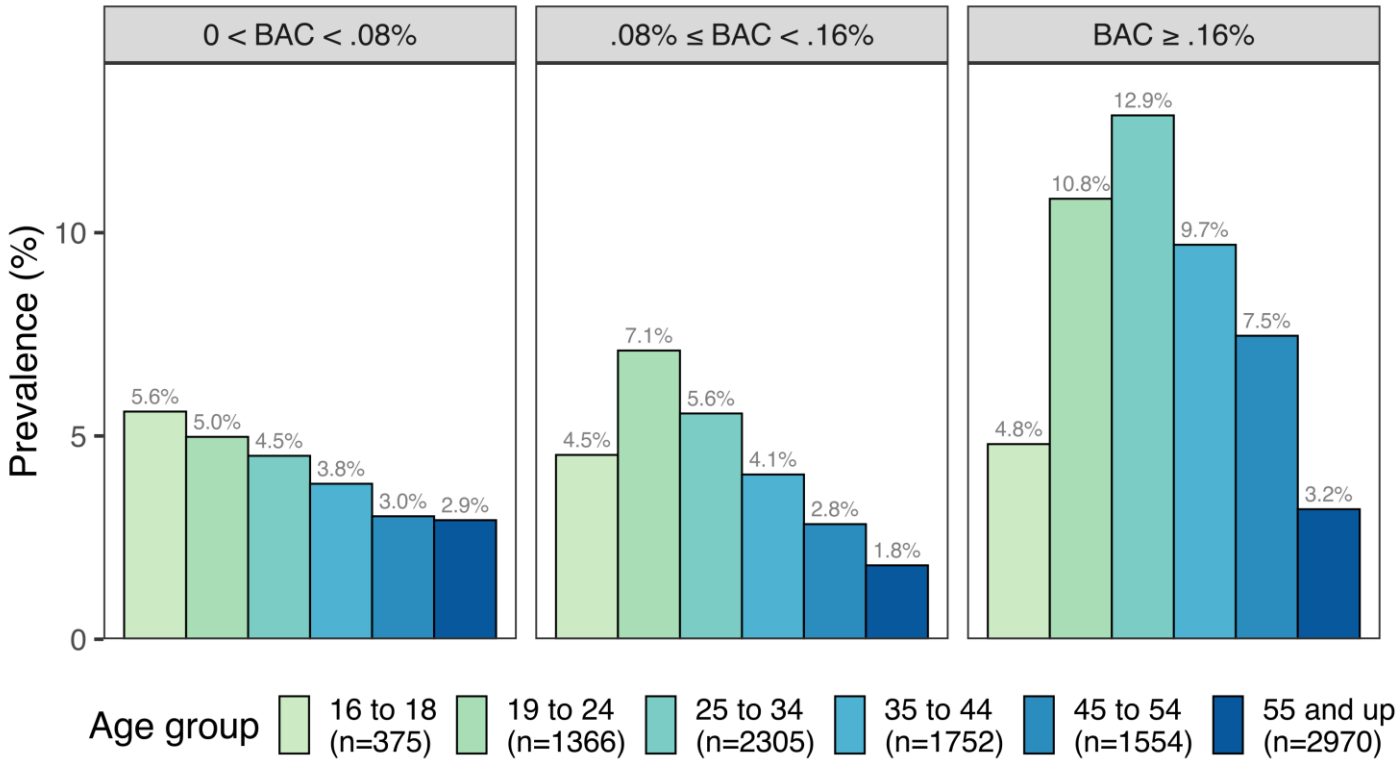


Figure 2. Prevalence of alcohol use among injured drivers, by sex.

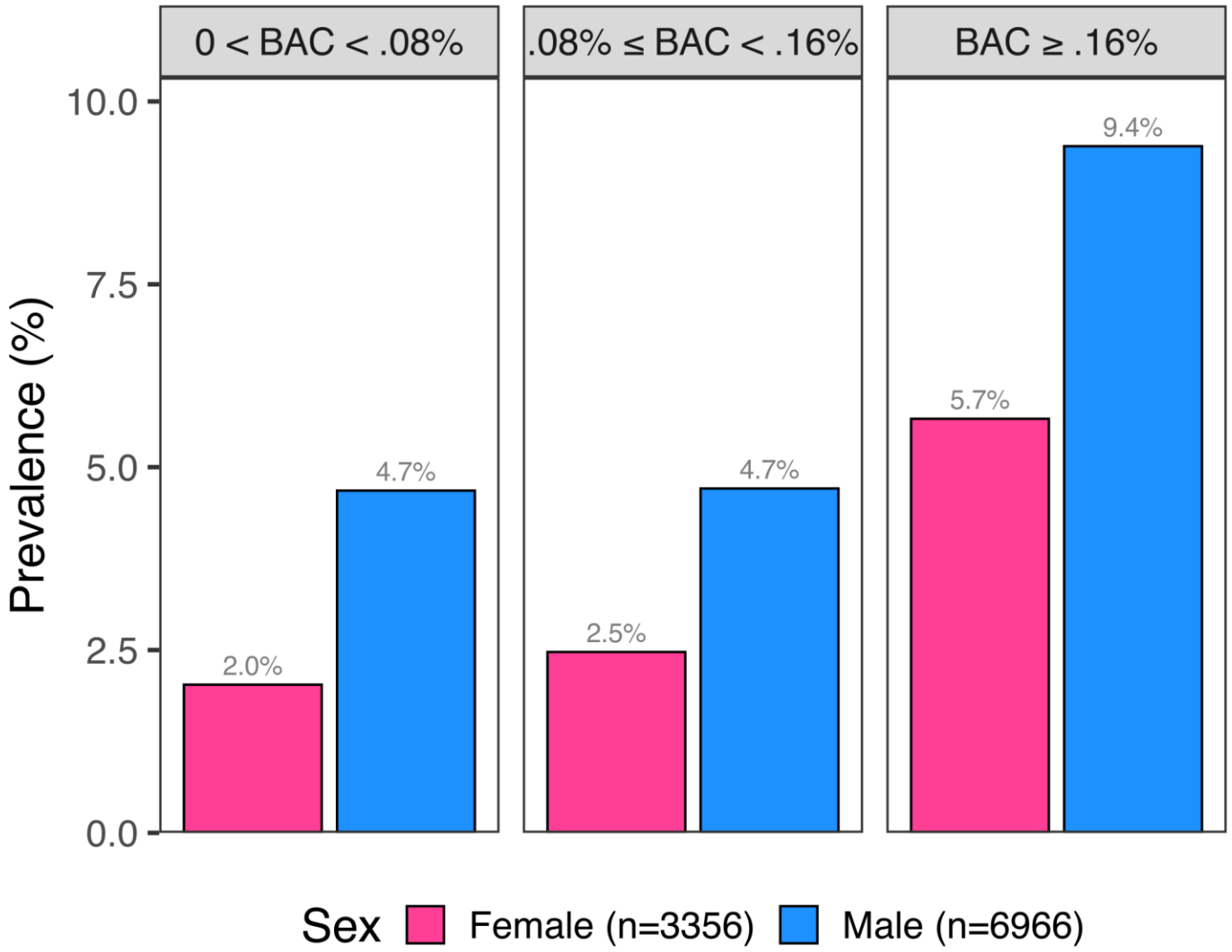


Figure 3. Prevalence of alcohol use among injured drivers, by disposition.

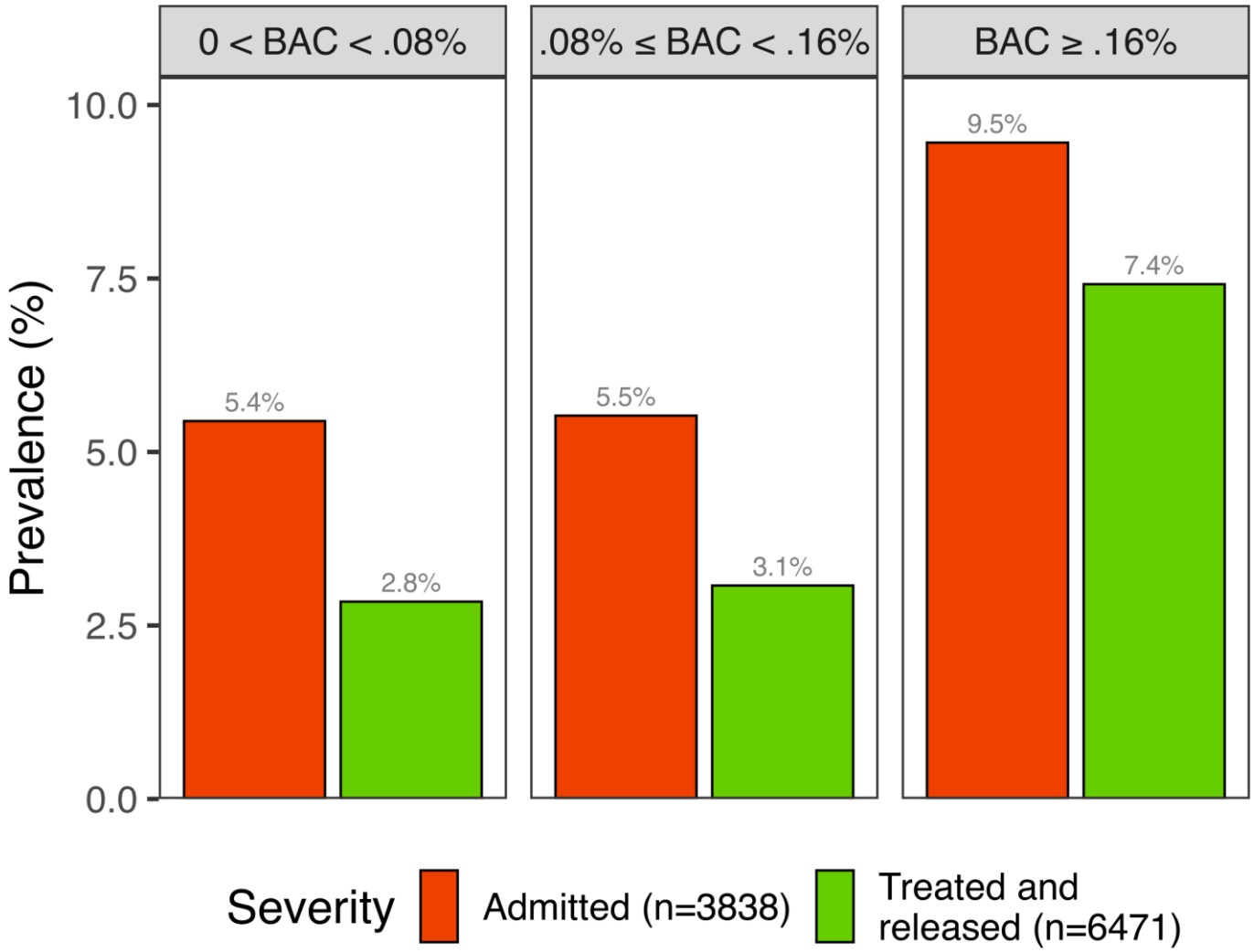


Figure 4. Prevalence of alcohol use among injured drivers, by time of crash.

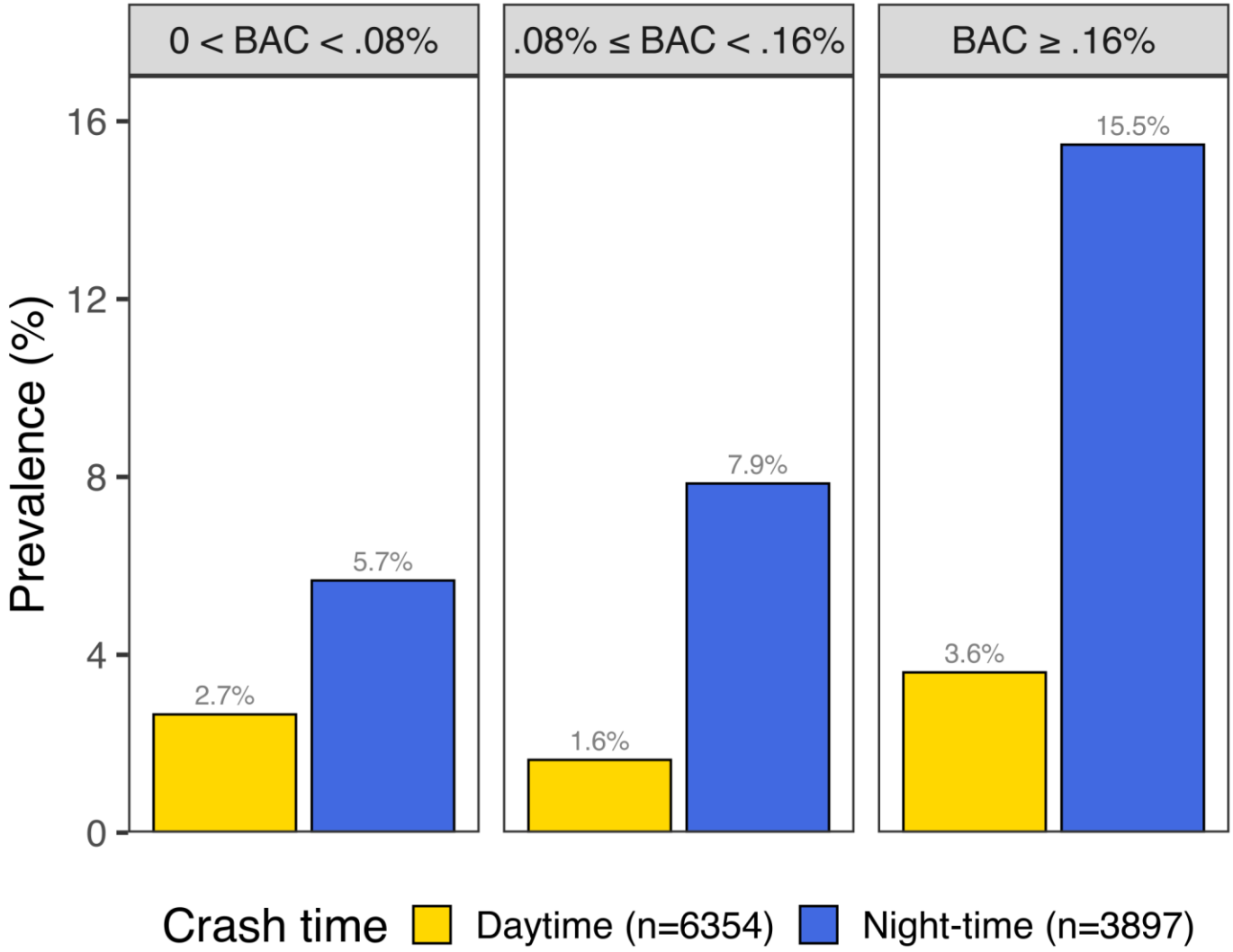


Figure 5. Prevalence of alcohol use among injured drivers, by number of vehicles involved in the crash.

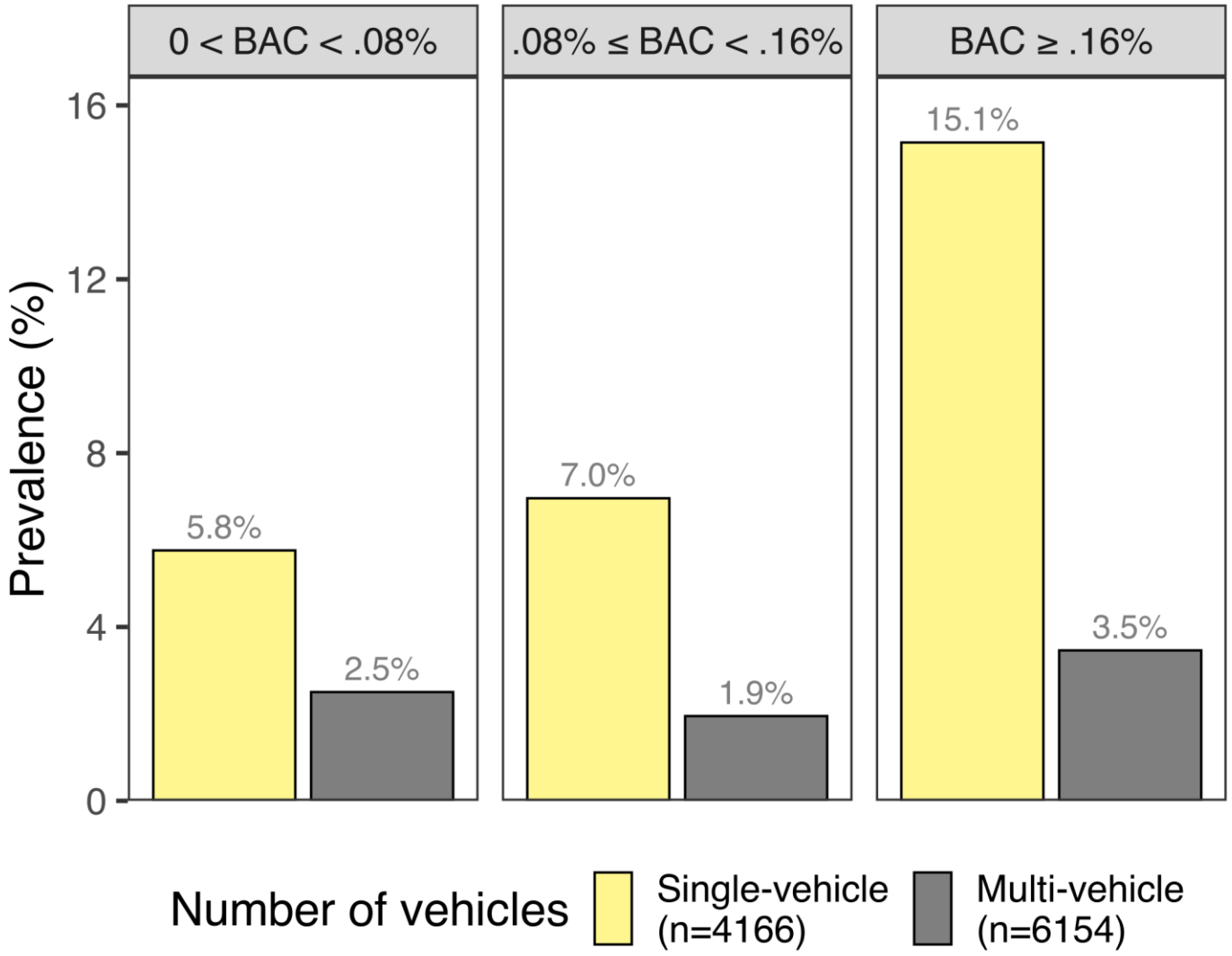


Figure 6. Prevalence of cannabinoids among injured drivers, by age group.

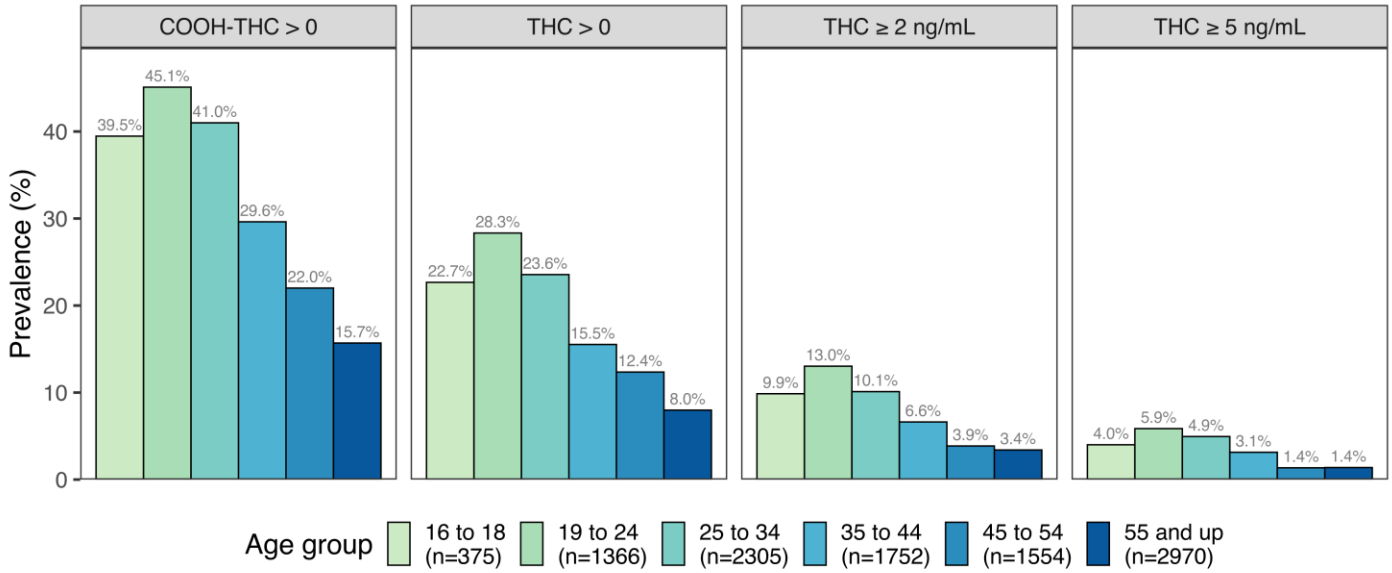


Figure 7. Prevalence of cannabinoids among injured drivers, by sex.

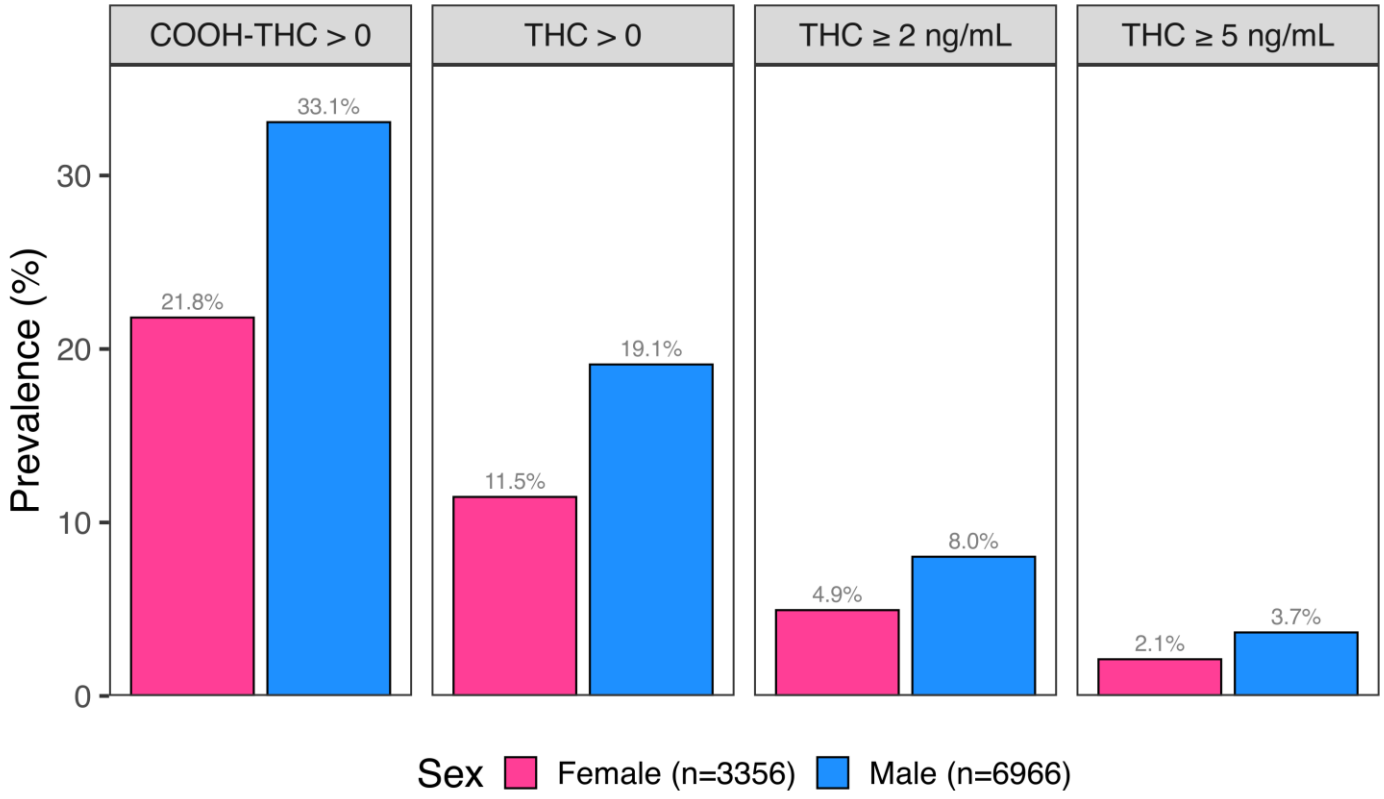


Figure 8. Prevalence of cannabinoids among injured drivers, by disposition.

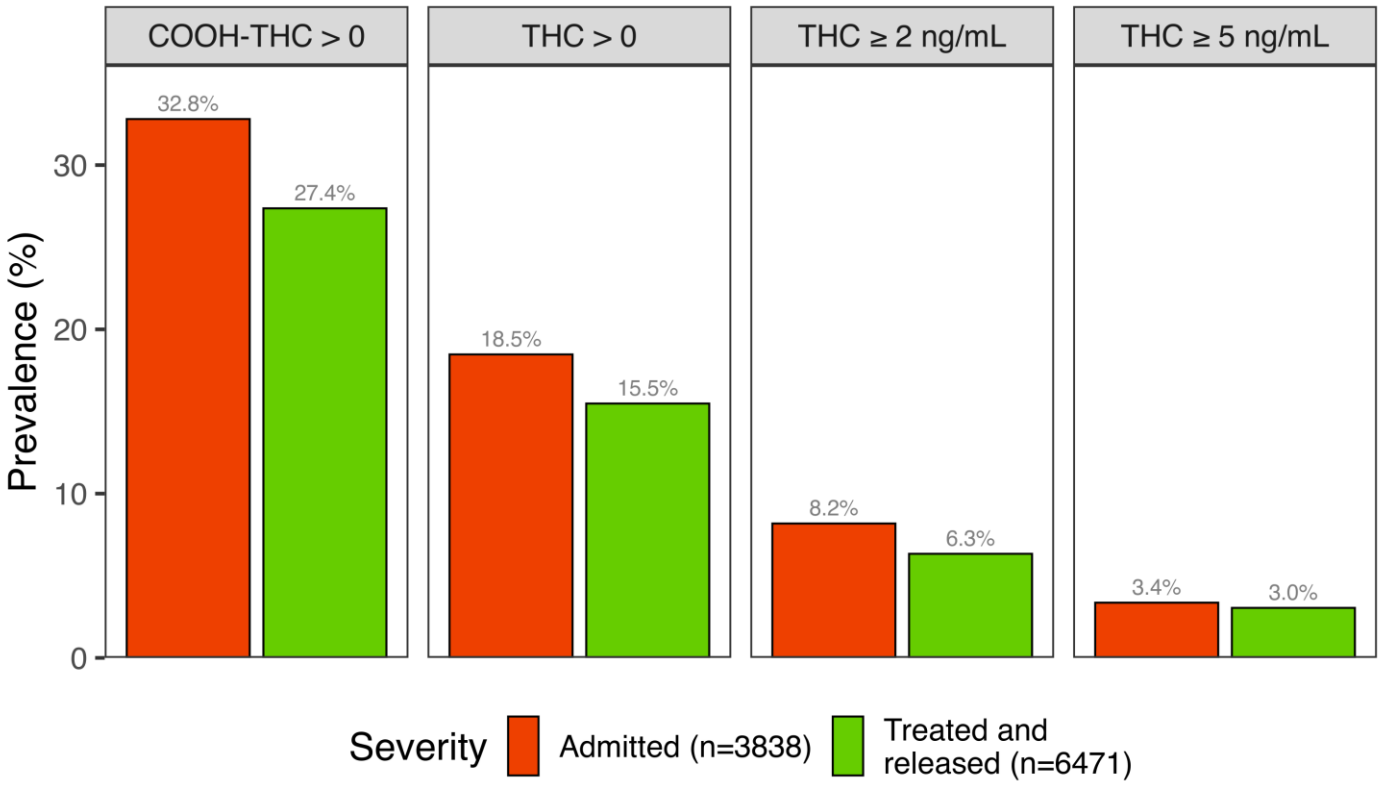


Figure 9. Prevalence of cannabinoids among injured drivers, by time of crash.

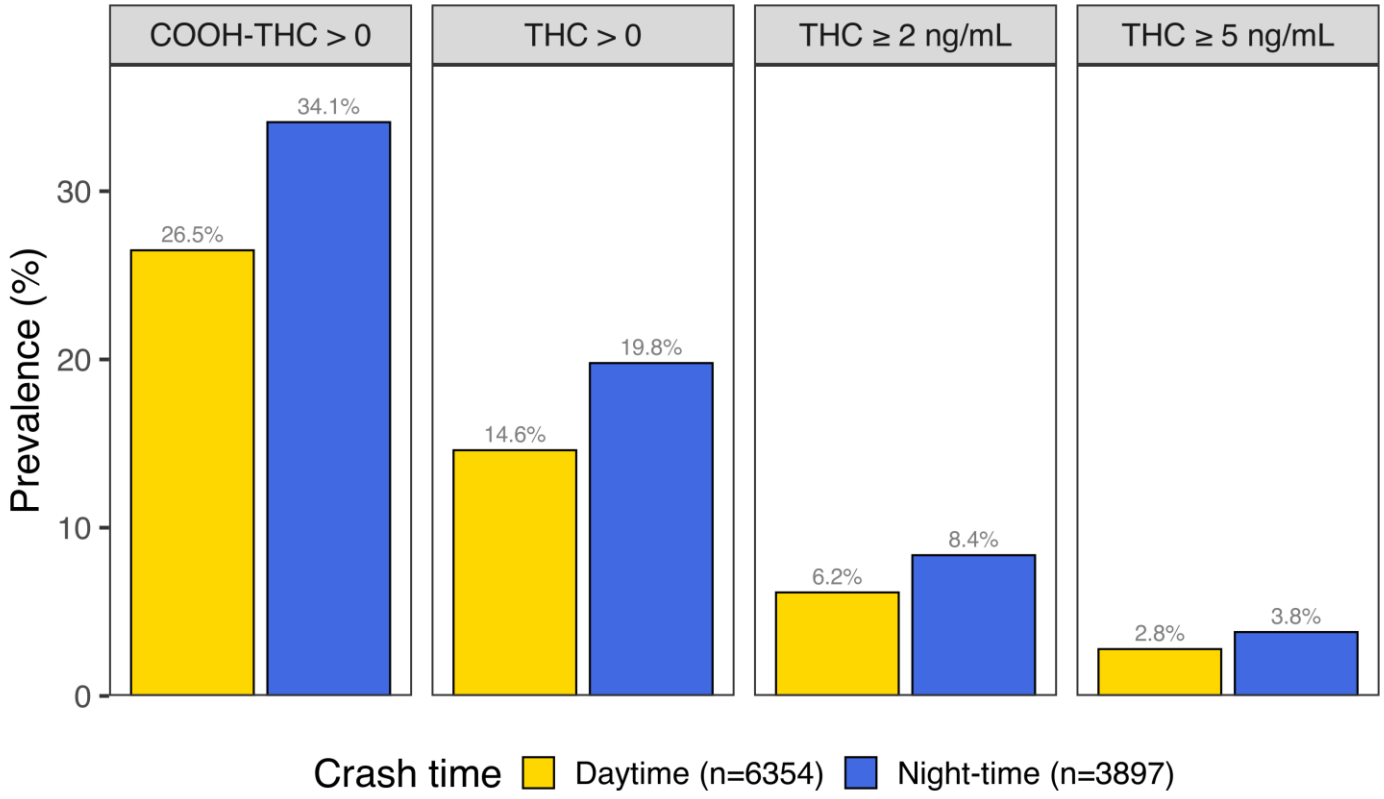


Figure 10. Prevalence of cannabinoids among injured drivers, by number of vehicles involved in the crash.

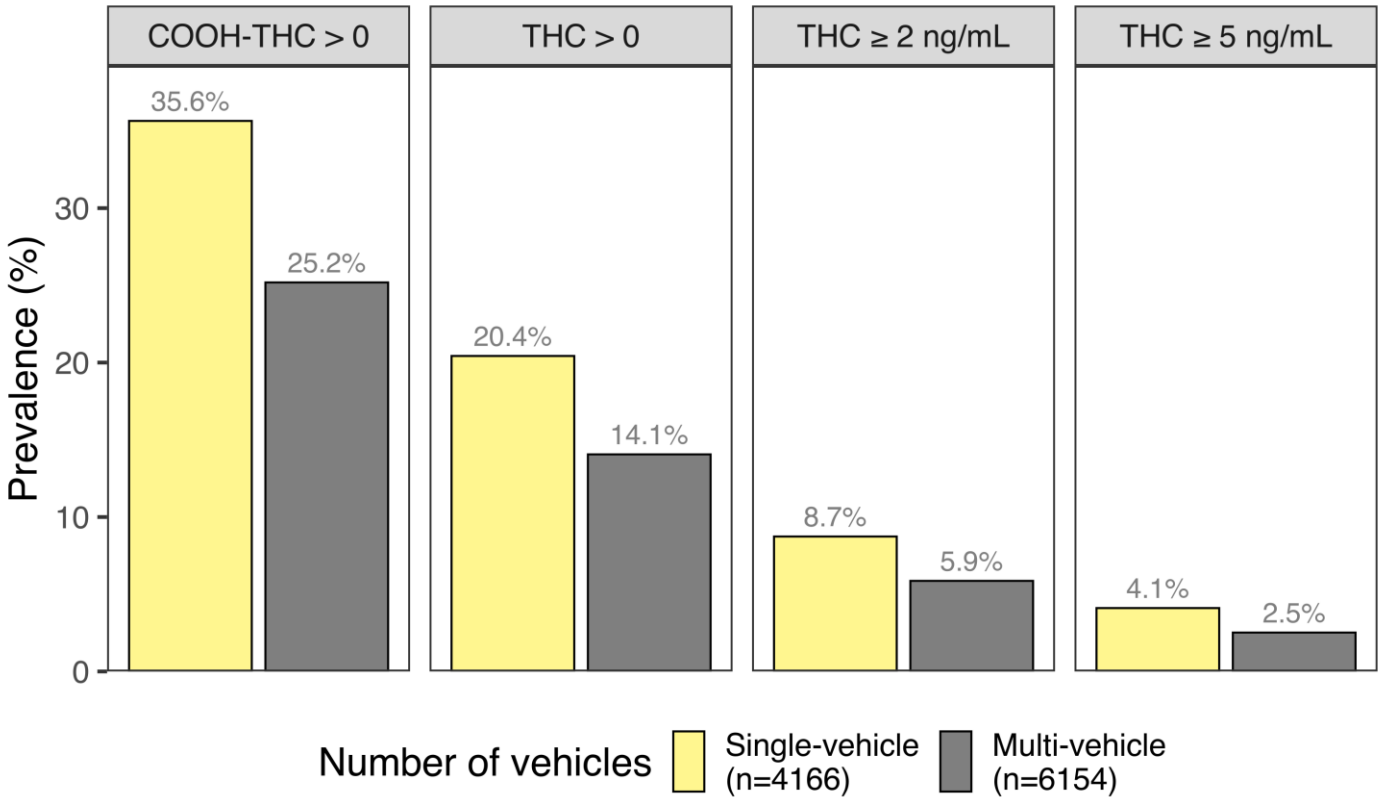


Figure 11. Prevalence of other recreational drugs, medications, and opiates among injured drivers, by age group.

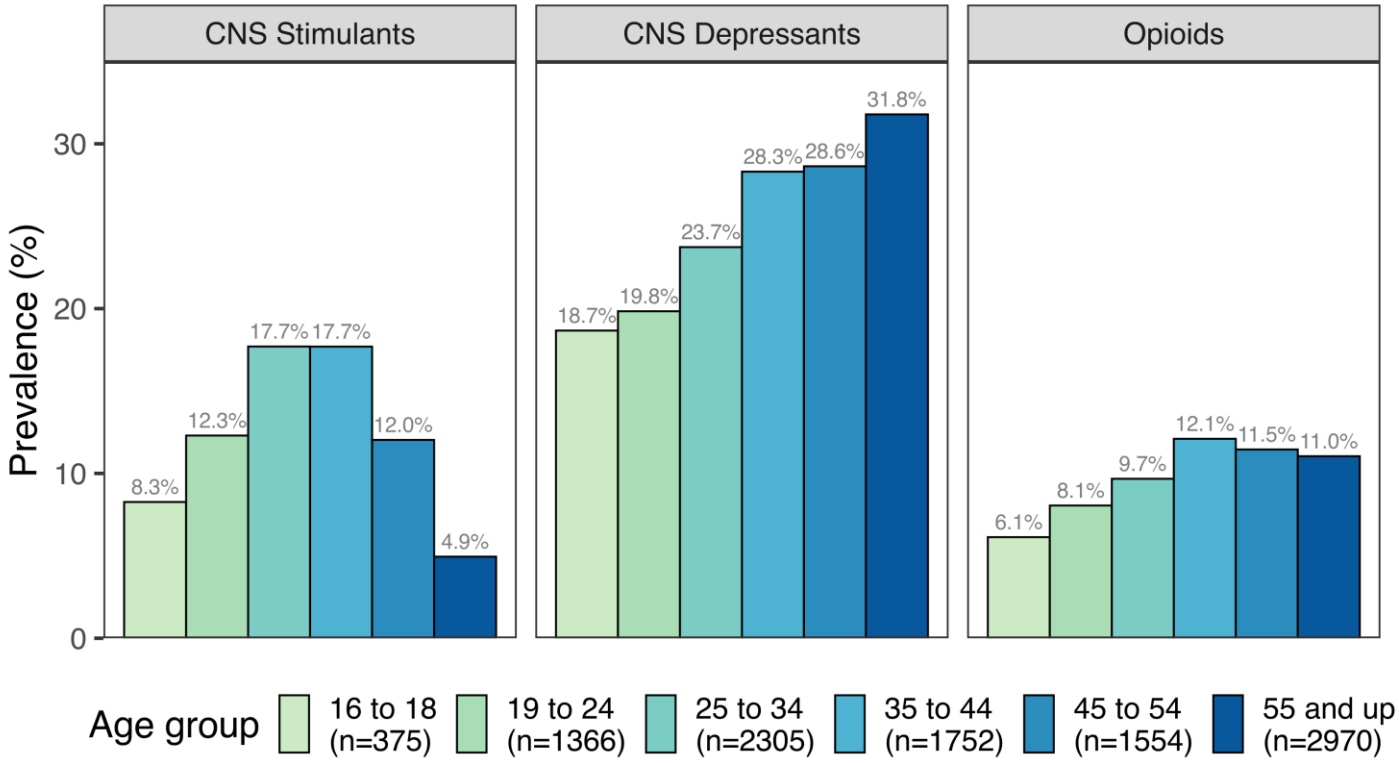


Figure 12. Prevalence of other recreational drugs, medications, and opiates among injured drivers, by sex.

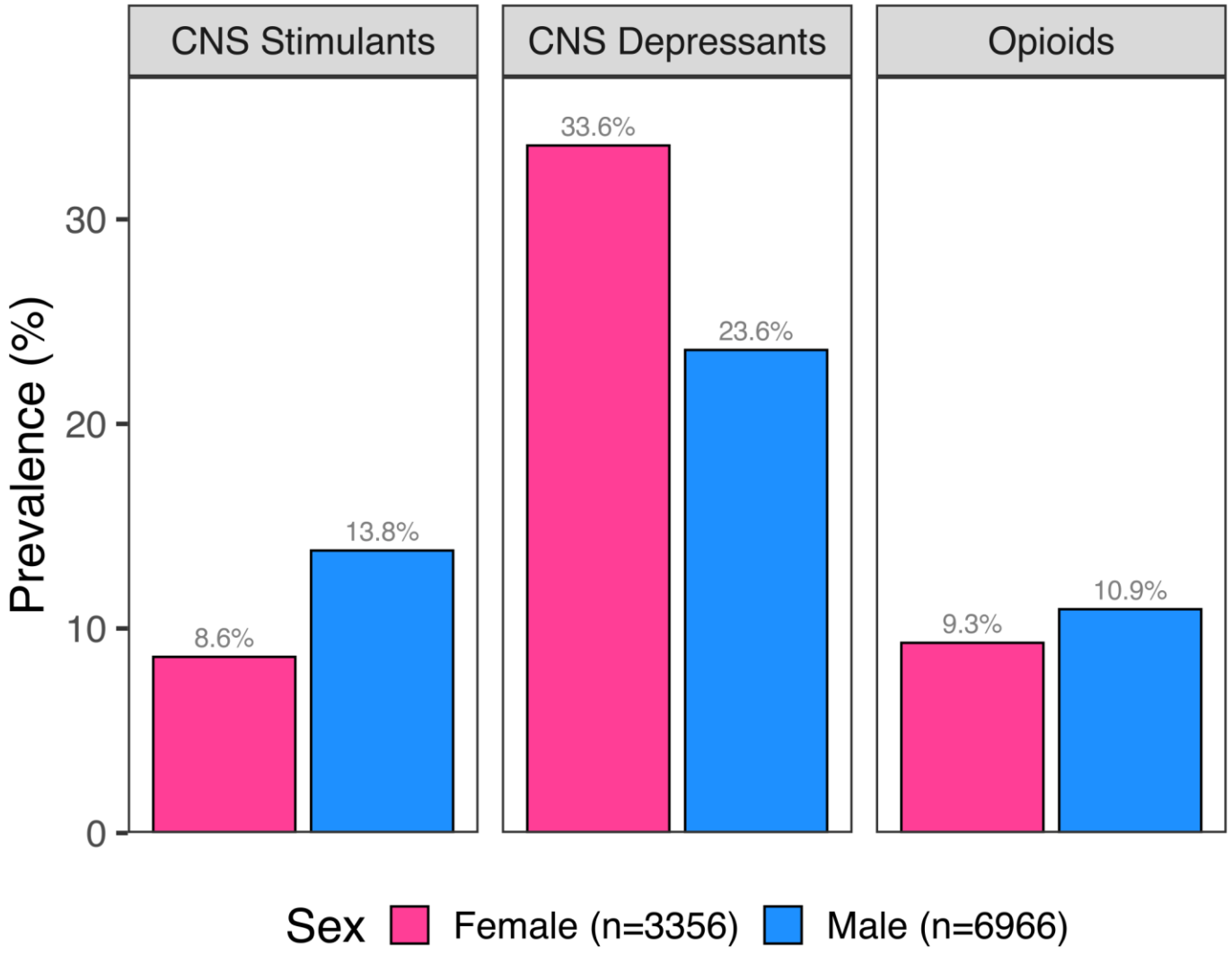


Figure 13. Prevalence of other recreational drugs, medications, and opiates among injured drivers, by disposition.

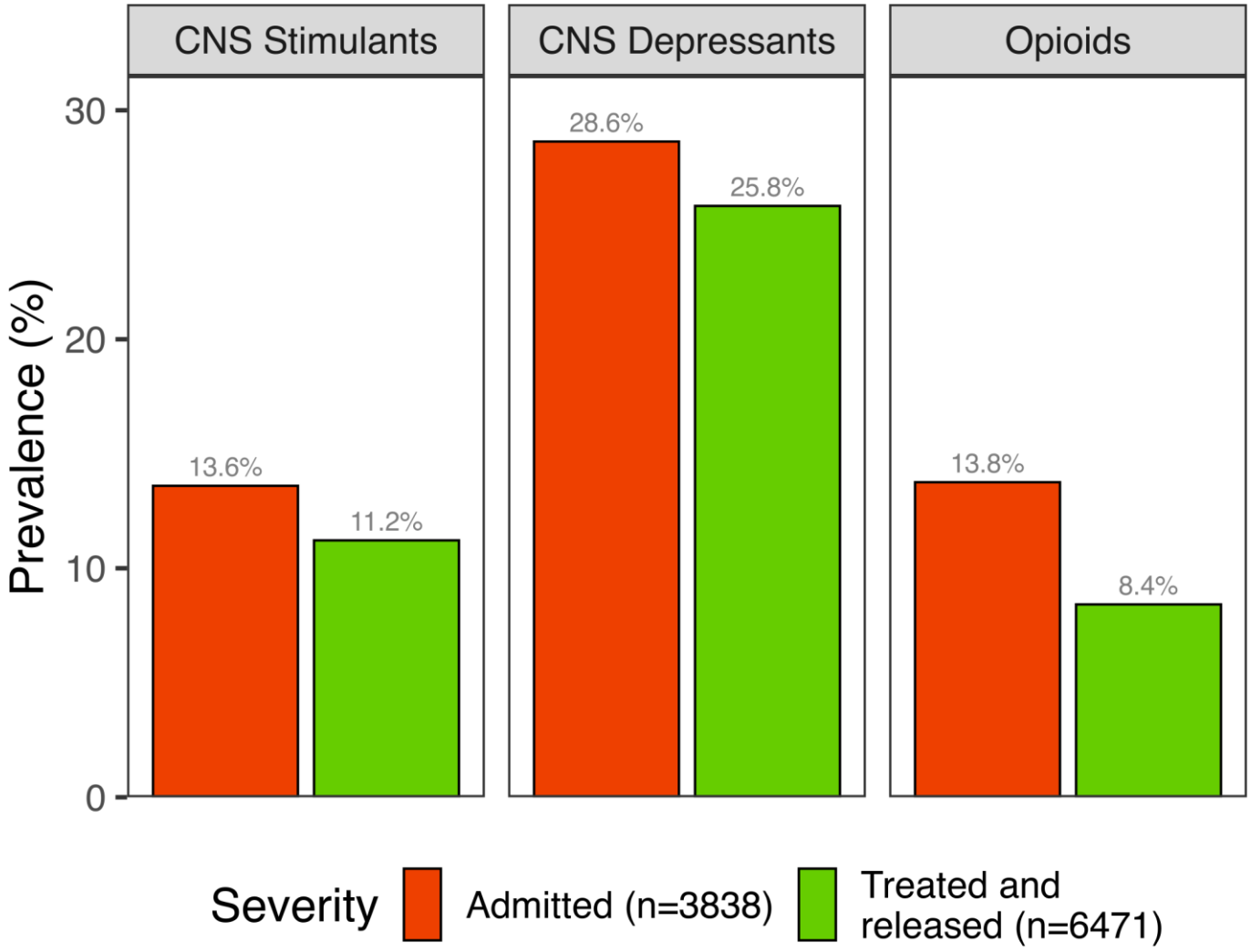


Figure 14. Prevalence of other recreational drugs, medications, and opiates among injured drivers, by time of crash.

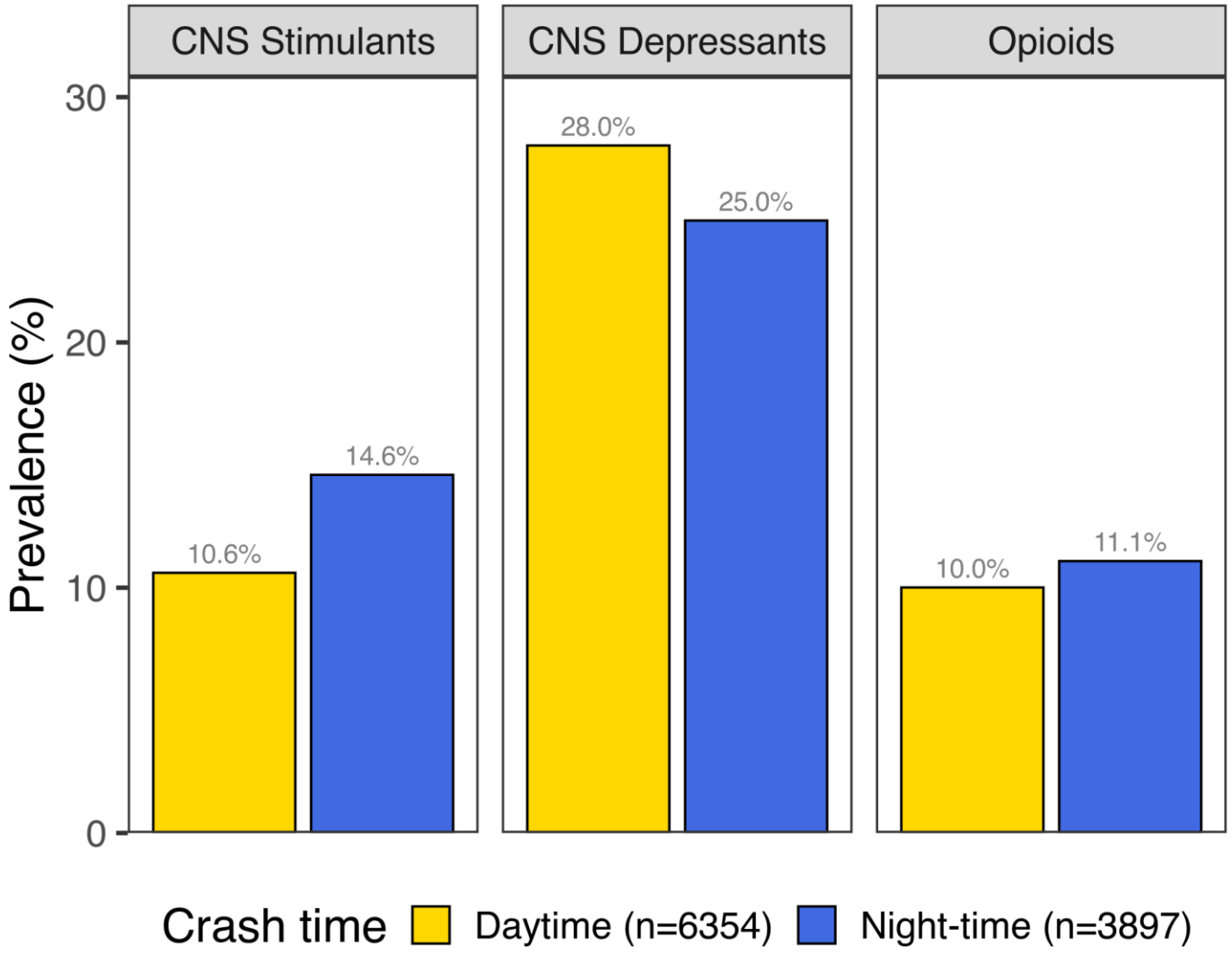


Figure 15. Prevalence of other recreational drugs, medications, and opiates among injured drivers, by number of vehicles involved in the crash.

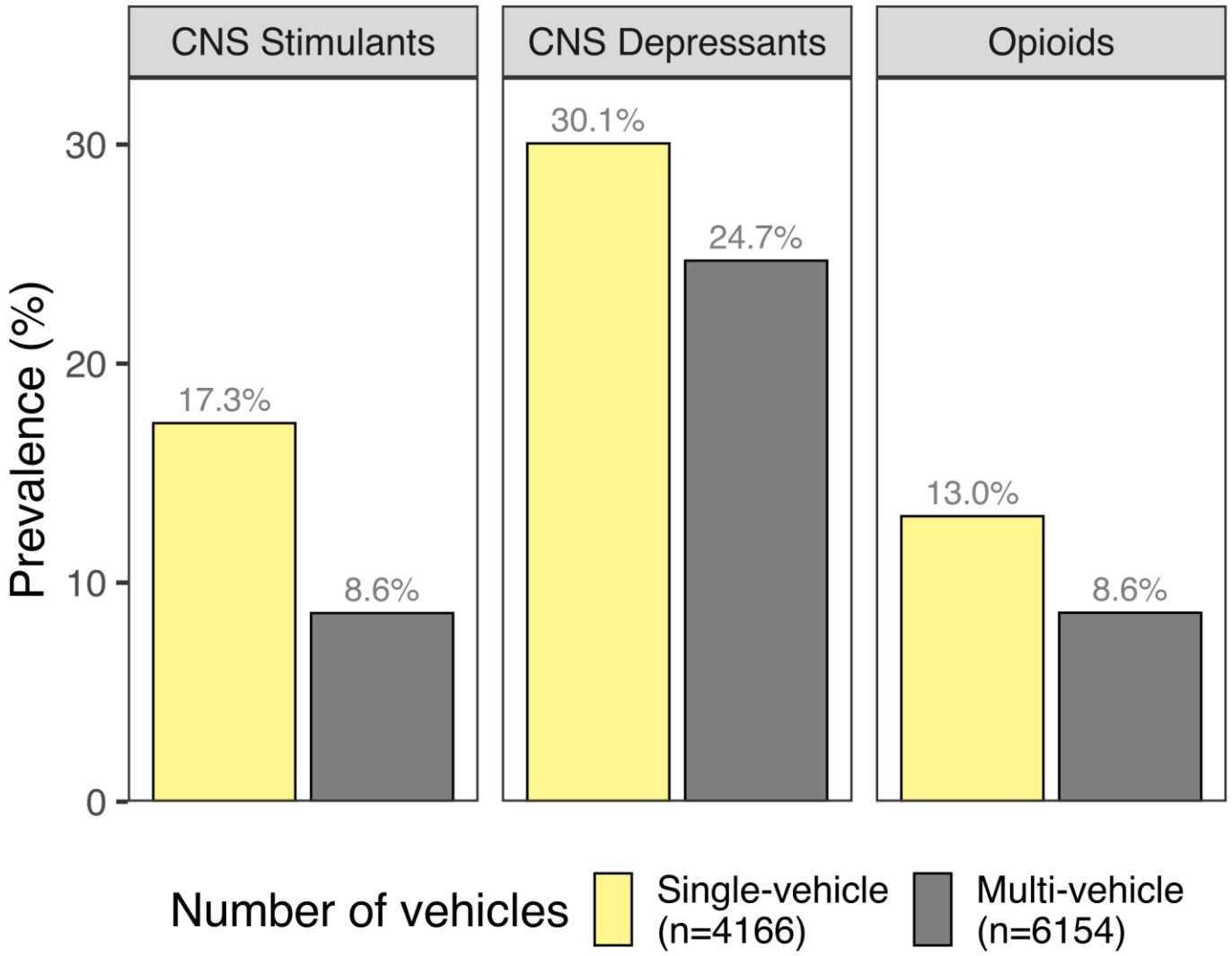


Figure 16. Use of alcohol and cannabis among injured drivers.

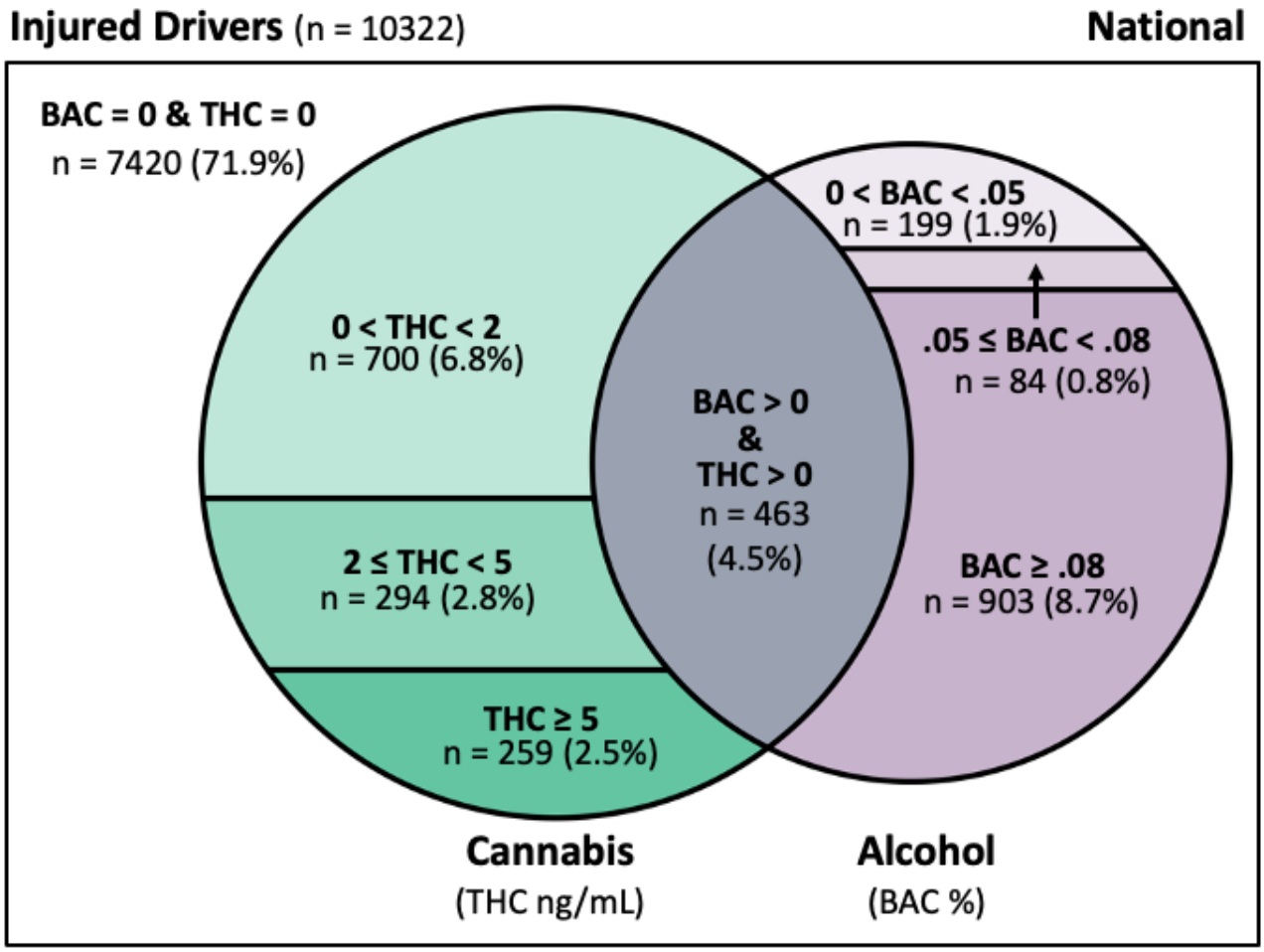
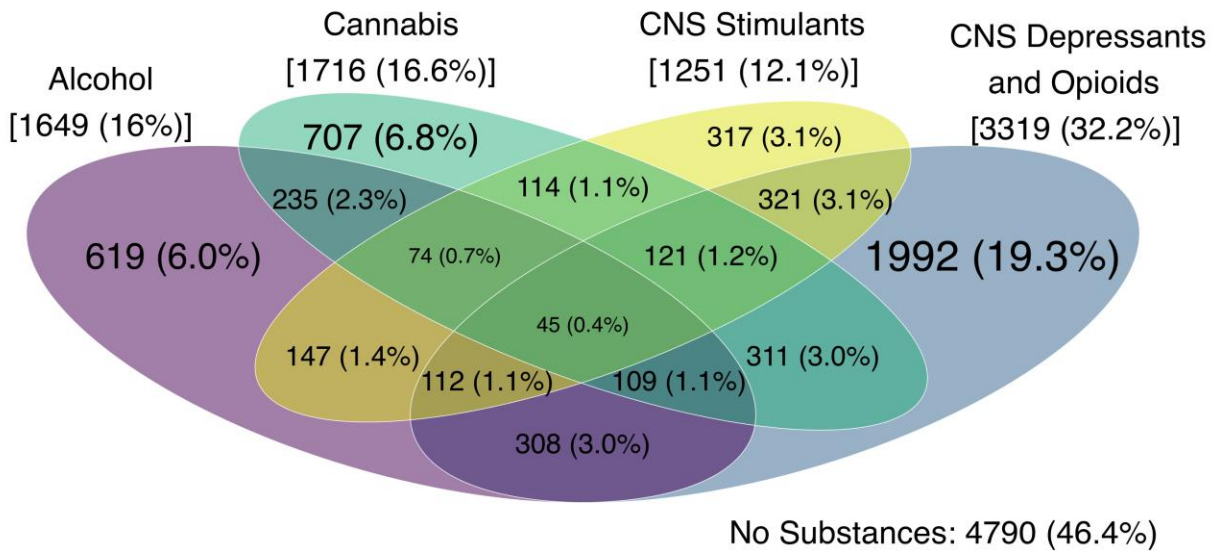


Figure 17. Polysubstance use among injured drivers.



References

1. Hunault CC, Bocker KB, Stellato RK, Kenemans JL, de Vries I, Meulenbelt J. Acute subjective effects after smoking joints containing up to 69 mg Delta9-tetrahydrocannabinol in recreational users: a randomized, crossover clinical trial. Psychopharmacology (Berl). 2014;231(24):4723-33.
2. Karschner EL, Swortwood MJ, Hirvonen J, Goodwin RS, Bosker WM, Ramaekers JG, et al. Extended plasma cannabinoid excretion in chronic frequent cannabis smokers during sustained abstinence and correlation with psychomotor performance. Drug Testing & Analysis. 2016;8(7):682-9.
3. Smith HW, Popham RE. Blood alcohol levels in relation to driving. Canadian Medical Association Journal. 1951;65(4):325-8.
4. Borkenstein RF, Crowther RF, Shumate RP, Ziel WB, Zylman R. The role of the drinking driver in traffic accidents (the Grand Rapids Study). Blutalcohol. 1974;11 (Suppl):7-13.
5. Zador PL, Krawchuk SA, Voas RB. Alcohol-related relative risk of driver fatalities and driver involvement in fatal crashes in relation to driver age and gender: an update using 1996 data. Journal of studies on alcohol. 2000;61(3):387-95.
6. Blomberg RD, Peck RC, Moskowitz H, Burns M, Fiorentino D. The Long Beach/Fort Lauderdale relative risk study. Journal of safety research. 2009;40(4):285-92.
7. Tippetts AS, Voas RB, Fell JC, Nichols JL, Tippetts AS, Voas RB, et al. A meta-analysis of .08 BAC laws in 19 jurisdictions in the United States. Accident Analysis & Prevention. 2005;37(1):149-61.
8. Tay R. The effectiveness of enforcement and publicity campaigns on serious crashes involving young male drivers: Are drink driving and speeding similar? Accident Analysis & Prevention. 2005;37(5):922-9.
9. Tay R. Drink driving enforcement and publicity campaigns: are the policy recommendations sensitive to model specification? Accident Analysis & Prevention. 2005;37(2):259-66.
10. Rothschild ML, Mastin B, Miller TW. Reducing alcohol-impaired driving crashes through the use of social marketing. Accident Analysis & Prevention. 2006;38(6):1218-30.
11. Asbridge. The criminalization of impaired driving in Canada: Assessing the deterrent impact of Canada's first per se law. Journal of studies on alcohol. 2004;65(4):450.
12. Simpson H, Singhal D, Vanlaar W, Mayhew D. The road safety monitor: Drugs and driving. Ottawa, Ontario, Canada: Traffic Injury Research Foundation; 2006.
13. Ialomiteanu AR, Hamilton HA, Adlaf EM, Mann RE. Substance Use, Mental Health and Well Being Among Ontario Adults. Toronto, Ontario: Centre for Addictions and Mental Health; 2016.
14. Beasley E, Beirness D. Drug use by fatally injured drivers in Canada. (2000 - 2008). Ottawa, ON: Canadian Centre on Substance Abuse. 2011.
15. Beasley E, Beirness D. Drug and Alcohol use among Drivers - the 2010 BC Roadside Survey. BC Injury Prevention Conference; Vancouver2010.
16. Beirness D, Beasley E, McClafferty K. Alcohol and drug use among drivers in Ontario: Findings from the 2014 roadside survey Toronto, Ontario: Ontario Ministry of Transportation; 2015.
17. Solomon R, Clarizio M. Total Crash Deaths Involving Alcohol and/or Drugs in Canada, by Jurisdiction: 2012. London, Ontario: MADD Canada; 2016 April 19.
18. Brubacher JR, Chan H, Martz W, Schreiber W, Asbridge M, Eppler J, et al. Prevalence of alcohol and drug use in injured British Columbia drivers. BMJ Open. 2016;6(3).
19. Hartman RL, Brown TL, Milavetz G, Spurgin A, Pierce RS, Gorelick DA, et al. Cannabis effects on driving lateral control with and without alcohol. Drug Alcohol Depend. 2015;154:25-37.
20. Downey LA, King R, Papafotiou K, Swann P, Ogden E, Boorman M, et al. The effects of cannabis and alcohol on simulated driving: influences of dose and experience. Accident Analysis & Prevention. 2013;50:879-86.
21. Dubois S, Mullen N, Weaver B, Bédard M. The combined effects of alcohol and cannabis on driving: Impact on crash risk. Forensic Sci Int. 2015;248:94-100.
22. Ronen A, Gershon P, Drobiner H, Rabinovich A, Bar-Hamburger R, Mechoulam R, et al. Effects of THC on driving performance, physiological state and subjective feelings relative to alcohol. Accid Anal Prev. 2008;40(3):926-34.

23. Grotenhermen F, Leson G, Berghaus G, Drummer OH, Krüger HP, Longo M, et al. Developing Science-Based Per Se Limits for Driving under the Influence of Cannabis (DUIC): Findings and Recommendations by an Expert Panel. Report. Washington, DC: International Association for Cannabis as Medicine; 2005 September.
24. Sewell RA, Poling J, Sofuoglu M, Sewell RA, Poling J, Sofuoglu M. The effect of cannabis compared with alcohol on driving. American Journal on Addictions. 2009;18(3):185-93.
25. Ramaekers JG, Berghaus G, van Laar M, Drummer OH. Dose related risk of motor vehicle crashes after cannabis use. Drug & Alcohol Dependence. 2004;73(2):109-19.
26. Berghaus G, Scheer N, Schmidt P, editors. Effects of Cannabis on Psychomotor Skills and Driving Performance - a Metaanalysis of Experimental Studies. International Council on Alcohol Drugs and Traffic Safety (ICADTS); 1995; Adelaide, Australia.
27. Grotenhermen F, Leson G, Berghaus G, Drummer OH, Kruger HP, Longo M, et al. Developing limits for driving under cannabis. Addiction. 2007;102(12):1910-7.
28. Berghaus G, Sticht G, Grellner W, Lenz D, Naumann T, Wiesenmuller S. Meta-analysis of empirical studies concerning the effects of medicines and illegal drugs including pharmacokinetics on safe driving. 2010.
29. Vindenes V, Jordbru D, Knapskog A-B, Kvan E, Mathisrud G, Slordal L, et al. Impairment based legislative limits for driving under the influence of non-alcohol drugs in Norway. Forensic Sci Int. 2012;219(1-3):1-11.
30. Desrosiers NA, Ramaekers JG, Chauchard E, Gorelick DA, Huestis MA. Smoked cannabis' psychomotor and neurocognitive effects in occasional and frequent smokers. J Anal Toxicol. 2015;39(4):251-61.
31. Broyd SJ, van Hell HH, Beale C, Yucel M, Solowij N. Acute and Chronic Effects of Cannabinoids on Human Cognition-A Systematic Review. Biol Psychiatry. 2016;79(7):557-67.
32. Colizzi M, Bhattacharyya S. Cannabis use and the development of tolerance: a systematic review of human evidence. Neuroscience and biobehavioral reviews. 2018;93:1-25.
33. Soar K, Mason C, Potton A, Dawkins L. Neuropsychological effects associated with recreational cocaine use. Psychopharmacology. 2012;222(4):633-43.
34. Ramaekers JG, Kuypers KPC, Bosker WM, Brookhuis KA, Veldstra JA, Simons R, et al. Effects of stimulant drugs on actual and simulated driving: perspectives from four experimental studies conducted as part of the DRUID research consortium. Psychopharmacology. 2012;222(3):413-8.
35. Wittmann M, Leland DS, Churan J, Paulus MP. Impaired time perception and motor timing in stimulant-dependent subjects. Drug & Alcohol Dependence. 2007;90(2-3):183-92.
36. Fillmore MT, Rush CR, Hays L. Acute effects of oral cocaine on inhibitory control of behavior in humans. Drug Alcohol Depend. 2002;67(2):157-67.
37. Rush CR, Baker RW, Wright K. Acute physiological and behavioral effects of oral cocaine in humans: a dose-response analysis. Drug & Alcohol Dependence. 1999;55(1-2):1-12.
38. Foltin RW, Fischman MW, Pippen PA, Kelly TH. Behavioral effects of cocaine alone and in combination with ethanol or marijuana in humans. Drug & Alcohol Dependence. 1993;32(2):93-106.
39. Smith JL, Mattick RP, Jamadar SD, Iredale JM. Deficits in behavioural inhibition in substance abuse and addiction: a meta-analysis. Drug & Alcohol Dependence. 2014;145:1-33.
40. Spronk DB, van Wel JH, Ramaekers JG, Verkes RJ. Characterizing the cognitive effects of cocaine: a comprehensive review. Neurosci Biobehav Rev. 2013;37(8):1838-59.
41. Gustavsen I, Hjelmeland K, Bernard JP, Morland J. Psychomotor performance after intake of zopiclone compared with intake of ethanol: a randomized, controlled, double-blinded trial. J Clin Psychopharmacol. 2011;31(4):481-8.
42. Conen S, Theunissen EL, Van Oers ACM, Valiente R, Ramaekers JG. Acute and subchronic effects of bilastine (20 and 40 mg) and hydroxyzine (50 mg) on actual driving performance in healthy volunteers. Journal of Psychopharmacology. 2011;25(11):1517-23.
43. Zacny JP, Lichtor SA. Within-subject comparison of the psychopharmacological profiles of oral oxycodone and oral morphine in non-drug-abusing volunteers. Psychopharmacology. 2008;196(1):105-16.
44. Leufkens TR, Vermeeren A, Smink BE, van Ruitenbeek P, Ramaekers JG, Leufkens TRM, et al. Cognitive, psychomotor and actual driving performance in healthy volunteers after immediate and extended release formulations of alprazolam 1 mg. Psychopharmacology (Berl). 2007;191(4):951-9.
45. Wingen M, Ramaekers JG, Schmitt JA, Wingen M, Ramaekers JG, Schmitt JAJ. Driving impairment in depressed patients receiving long-term antidepressant treatment. Psychopharmacology. 2006;188(1):84-91.
46. Verster JC, Veldhuijzen DS, Patat A, Olivier B, Volkerts ER. Hypnotics and driving safety: meta-analyses of randomized controlled trials applying the on-the-road driving test. Curr Drug Saf. 2006;1(1):63-71.

47. Wingen M, Bothmer J, Langer S, Ramaekers JG. Actual driving performance and psychomotor function in healthy subjects after acute and subchronic treatment with escitalopram, mirtazapine, and placebo: a crossover trial. Journal of Clinical Psychiatry. 2005;66(4):436-43.
48. Bramness JG, Skurtveit S, Morland J. Testing for benzodiazepine inebriation--relationship between benzodiazepine concentration and simple clinical tests for impairment in a sample of drugged drivers. European Journal of Clinical Pharmacology. 2003;59(8-9):593-601.
49. Hill JL, Zacny JP. Comparing the subjective, psychomotor, and physiological effects of intravenous hydromorphone and morphine in healthy volunteers. Psychopharmacology. 2000;152(1):31-9.
50. Hanks GW, O'Neill WM, Simpson P, Wesnes K. The cognitive and psychomotor effects of opioid analgesics. II. A randomized controlled trial of single doses of morphine, lorazepam and placebo in healthy subjects. European Journal of Clinical Pharmacology. 1995;48(6):455-60.
51. Volz HP, Sturm Y. Antidepressant drugs and psychomotor performance. A review. Neuropsychobiology. 1995;31(3):146-55.
52. Asbridge M, Hayden JA, Cartwright JL. Acute cannabis consumption and motor vehicle collision risk: systematic review of observational studies and meta-analysis. BMJ. 2012;344.
53. Li MC, Brady JE, DiMaggio CJ, Lusardi AR, Tzong KY, Li G. Marijuana use and motor vehicle crashes. Epidemiol Rev. 2012;34:65-72.
54. Rogeberg O, Elvik R. The effects of cannabis intoxication on motor vehicle collision revisited and revised. Addiction. 2016;111(8):1348-59.
55. Drug use and road safety: a policy brief. Geneva, Switzerland: World Health Organization; 2016.
56. Elvik R. Risk of road accident associated with the use of drugs: A systematic review and meta-analysis of evidence from epidemiological studies. Accid Anal Prev. 2013;60(0):254-67.
57. Hels T, Lyckegaard A, Simonsen KW, Steentoft A, Bernhoft IM. Risk of severe driver injury by driving with psychoactive substances. Accid Anal Prev. 2013;59:346-56.
58. Compton RP, Berning A. Drug and Alcohol Crash Risk. National Highway Traffic Safety Administration. Washington, D.C.; 2015. Report No.: DOT HS 812 117.
59. Beirness DJ, Beasley EE. A roadside survey of alcohol and drug use among drivers in British Columbia. Traffic Inj Prev. 2010;11(3):215-21.
60. Beirness D, Swann P, Logan BK. Drugs and driving: Detection and deterrence. Paris, France: International Transport Forum OECD; 2010.
61. Beirness D, Beasley E. An evaluation of immediate roadside prohibitions for drinking drivers in British Columbia: Findings from roadside surveys. Traffic Inj Prev. 2014;15(3):228-33.
62. Calapai F, Cardia L, Sorbara EE, Navarra M, Gangemi S, Calapai G, et al. Cannabinoids, Blood-Brain Barrier, and Brain Disposition. Pharmaceutics. 2020;12(3).
63. Robertson MB, Li A, Yuan Y, Jiang A, Gjerde H, Staples JA, et al. Correlation between oral fluid and blood THC concentration: A systematic review and discussion of policy implications. Accid Anal Prev. 2022;173:106694.
64. Brown SW, Vanlaar WGM, Robertson RD. The Alcohol and Drug Crash Problem in Canada 2016 Report. Ottawa, Canada: The Traffic Injury Research Foundation of Canada; 2021.
65. Brunet B, Hauet T, Hebrard W, Papet Y, Mauco G, Mura P. Postmortem redistribution of THC in the pig. International journal of legal medicine. 2010;124(6):543-9.
66. Holland MG, Schwope DM, Stoppacher R, Gillen SB, Huestis MA. Postmortem redistribution of Delta9-tetrahydrocannabinol (THC), 11-hydroxy-THC (11-OH-THC), and 11-nor-9-carboxy-THC (THCCOOH). Forensic Sci Int. 2011;212(1-3):247-51.
67. Lemos NP, Ingle EA. Cannabinoids in postmortem toxicology. J Anal Toxicol. 2011;35(7):394-401.
68. Pounder DJ, Jones GR. Post-mortem drug redistribution--a toxicological nightmare. Forensic Sci Int. 1990;45(3):253-63.
69. Yarema MC, Becker CE. Key concepts in postmortem drug redistribution. Clin Toxicol (Phila). 2005;43(4):235-41.
70. Brubacher JR, Chan H, Erdelyi S, Asbridge M, Mann RE, Purssell RA, et al. Police documentation of drug use in injured drivers: Implications for monitoring and preventing drug-impaired driving. Accid Anal Prev. 2018.
71. Mann RE, Stoduto G, Ialomiteanu A, Asbridge M, Smart RG, Wickens CM. Self-reported collision risk associated with cannabis use and driving after cannabis use among Ontario adults. Traffic Inj Prev. 2010;11(2):115-22.

72. Brubacher JR, Chan H, Erdelyi S, Macdonald S, Asbridge M, Mann RE, et al. Cannabis use as a risk factor for causing motor vehicle crashes: a prospective study. Addiction. 2019.
73. Peck RC, Gebers MA, Voas RB, Romano E. The relationship between blood alcohol concentration (BAC), age, and crash risk. Journal of Safety Research. 2008;39(3):311-9.
74. Schulze H, Schumacher M, Urmeew R, Alvarez J, Bernhoft IM, de Gier H, et al. Driving under the influence of drugs, alcohol and medicines in Europe—findings from the DRUID project. Lisbon, Portugal: European Monitoring Centre for Drugs and Drug Addiction; 2012.