

Polysubstance Use and Motor Vehicle Crashes in Illinois:

An Exploration of Linked
Crash and Hospital Data

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Why?

- Polysubstance use is two or more intoxicating substances simultaneously present in a single person.
- Polysubstance use is a growing concern among health and transportation safety professionals.
- Combining various substances at varying levels can be unpredictable and tragic for all road users.
- To gain a better understanding of substance use on Illinois roadways.
- To better understand polysubstance use; what are the commonly combined substances; and what outcomes may occur as a result of those combinations.

How?

- Statewide data sets of crash reports from the Illinois Department of Transportation
- Hospital discharge records from the Illinois Department of Public Health
- Customized software and probabilistic matching strategy - linking crash files to hospital discharge file
- Provides more complete picture of circumstances surrounding a crash and medical outcomes endured
- Data likely undercount the true scale of substance-involved crashes in Illinois
- Statistical analysis shows data are proportionately representative of the population.
- Hospital data contain information regarding the presence of intoxicating substances.
- Research information for 6 specific substance types with an additional field for “other,” including alcohol, cannabis, opioid, cocaine, hallucinogen, and stimulant.
- Precise concentrations of substances discussed are not known
- Implications of impairment, guilt or blame for crash will not be used

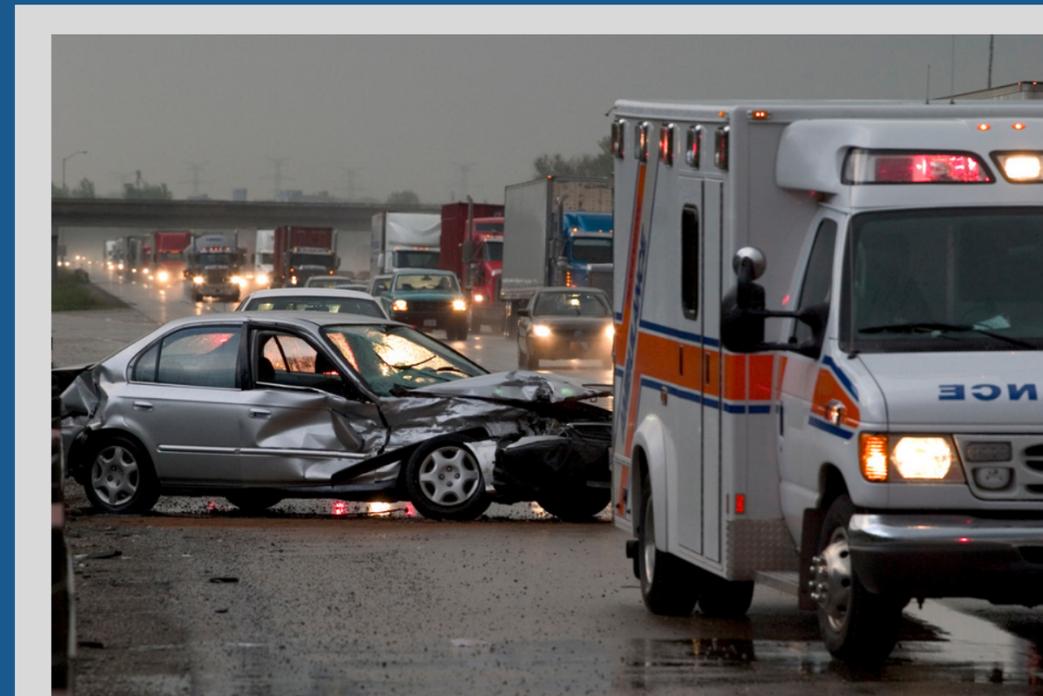
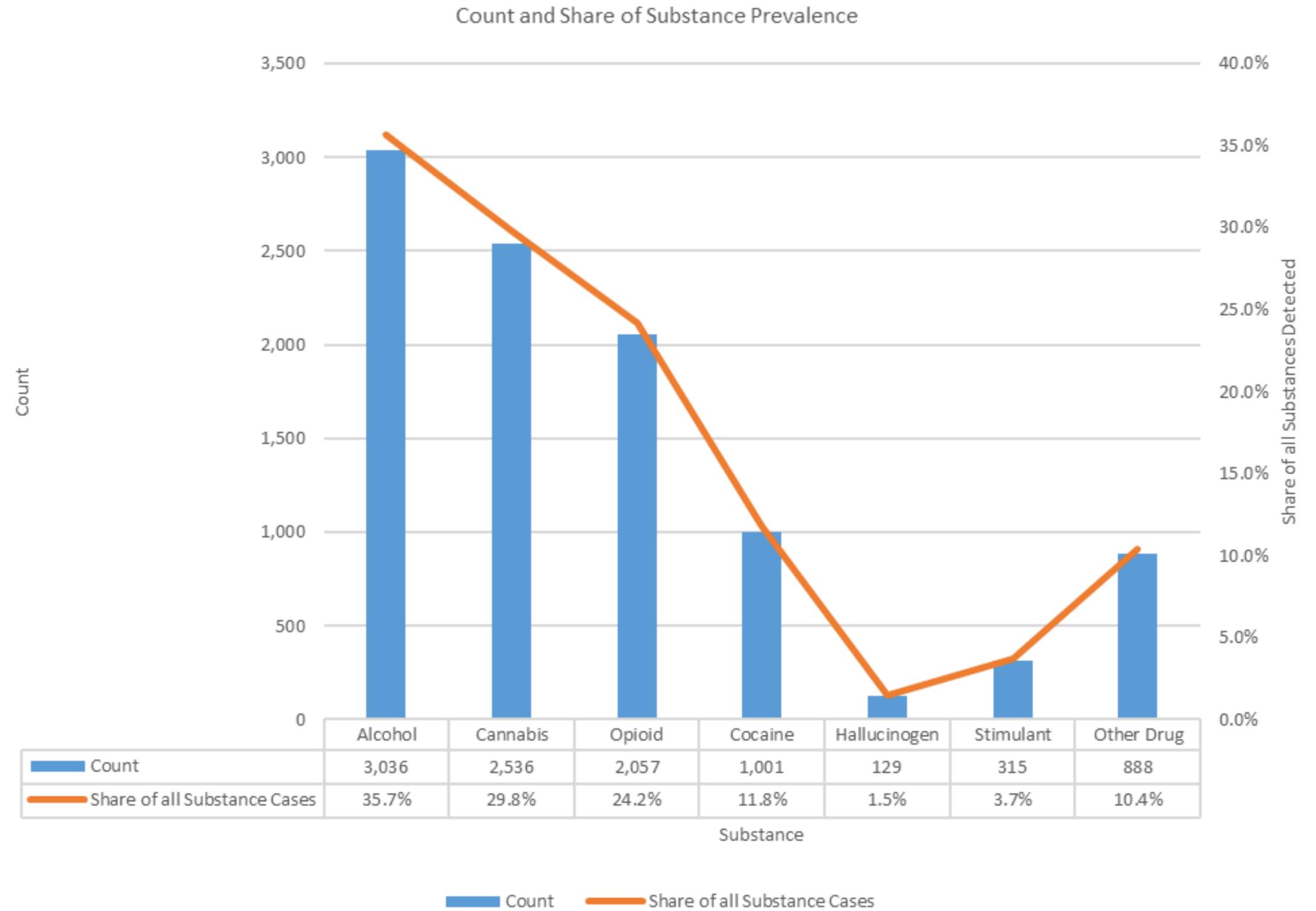


Figure 1

2016 - 2020 analysis used 337,418 linked crash and patient hospital discharges and includes all road user types: drivers, passengers, pedestrians, and cyclists.

Alcohol was the most prevalent at nearly 2/3 of substance-related crashes, cannabis was next at about 30%, followed by opioids at just under a quarter.



**Because of polysubstance use, shares do not add to 100%*

Distribution of Polysubstance Use in Crashes by Road User Type

Road User	Polysubstance Crash Count	Share of Polysubstance Crashes	At Least One Substance Count	Share of at Least One Substance
Driver	915	76.7%	6,568	77.3%
Passenger	180	15.1%	1,354	15.9%
Pedestrian	71	5.94%	435	5.11%
Cyclists	27	2.26%	144	1.69%

Table 2

We were able to identify 1,193 cases involving all road users in which two or more substances were present in a single patient – where we found some 8,501 were diagnosed with at least one intoxicating substance.

Drivers accounted for more than $\frac{3}{4}$ of polysubstance crashes, with passengers accounting for about 16%, and pedestrians and cyclists making up the remainder.

Table 3

Different substances are distributed across different road user types with heavy concentrations in the driver column, especially among alcohol, cannabis, and opioids. Among cyclists, cannabis is the most commonly identified substance among crash victims.

Distribution of Substance Use by Road User Type*

Substance	Driver	Share of Drivers	Passenger	Share of Passengers	Pedestrian	Share of Pedestrians	Cyclist	Share of Cyclists
Alcohol	2470	38%	385	28%	144	33%	37	26%
Cannabis	1814	28%	556	41%	110	25%	56	39%
Opioid	1613	25%	286	21%	121	28%	37	26%
Cocaine	743	11%	133	10%	95	22%	39	27%
Hallucinogen	103	2%	18	1%	-	-	-	-
Stimulant	240	4%	58	4%	12	3%	-	-
Other Drug	727	11%	120	9%	29	7%	12	8%

*Because of polysubstance use columns do not add to 100%; "-" denotes cell count less than 10

Figure 2

The most prevalent substances to be used in combination with at least one other substance include:

- 1st is Cannabis at 63%
- 2nd is Cocaine at 51%
- 3rd is Alcohol at 37%
- 4th are Opioids at 34%.

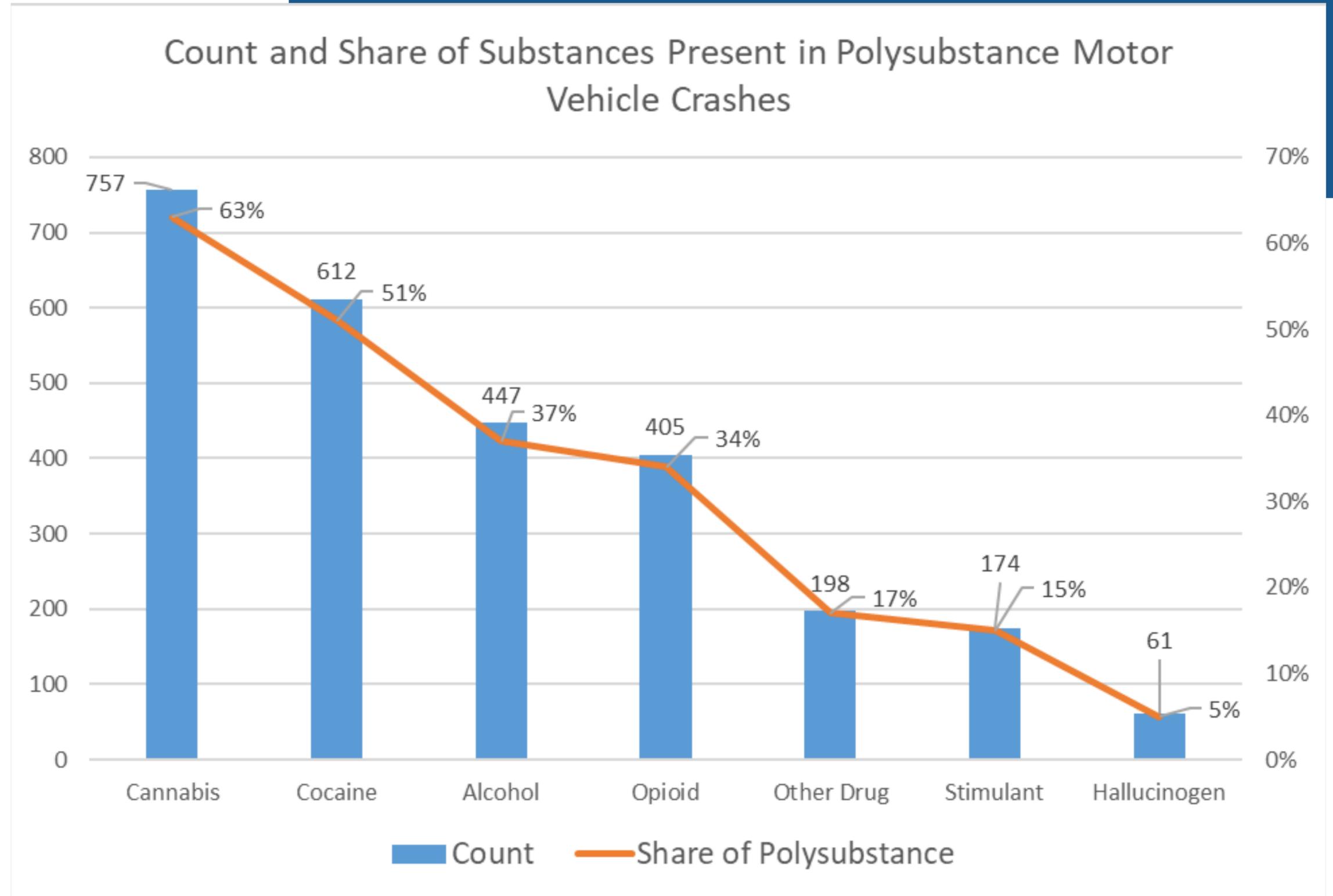


Figure 3

Cannabis with cocaine is the most frequently occurring combination at 1/3 of such cases.

Cannabis and Alcohol are above a quarter of such cases.

Opioids and Cocaine at about 1/5 of such cases.

Cannabis and Opioids at 18% of such cases.

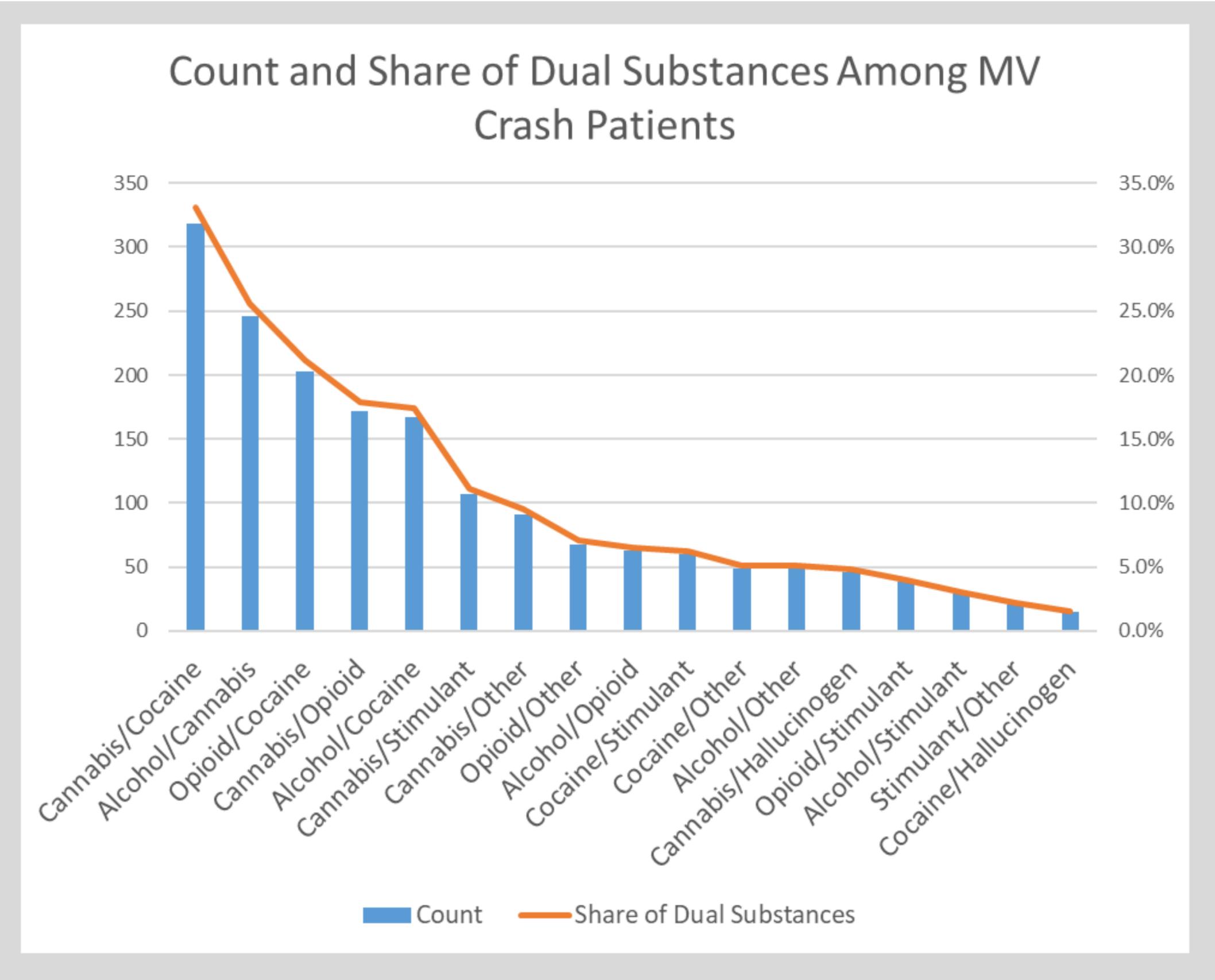




Table 4

Dual-substance Combinations by Road User Type*

Among drivers, the combination of cannabis and cocaine was once more the most frequently occurring substance combination, followed by cannabis and alcohol, cannabis and opioids, and alcohol and cocaine.

		AlcCan	AlcOpi	AlcCoc	AlcHal	AlcSti	AlcOth	CanOpi	CanCoc	CanHal	CanSti	CanOth	OpiCoc	OpiHal	OpiSti	OpiOth	CocHal	CocSti	CocOth	HalSti	HalOth	StiOth
Driver	Count	198	48	132	-	24	42	137	249	34	76	72	149	-	36	62	12	52	40	-	-	20
	Share of Drivers	27.5%	6.7%	18.3%	-	3.3%	5.8%	19.0%	34.6%	4.7%	10.6%	10.0%	20.7%	-	5.0%	8.6%	1.7%	7.2%	5.6%	-	-	2.8%
Passenger	Count	38	-	19	-	-	-	24	37	-	25	13	21	-	-	-	-	-	-	-	-	-
	Share of Passengers	23.9%	-	11.9%	-	-	-	15.1%	23.3%	-	15.7%	8.2%	13.2%	-	-	-	-	-	-	-	-	-
Pedestrian	Count	-	-	14	-	-	-	-	21	-	-	-	23	-	-	-	-	-	-	-	-	-
	Share of Pedestrians	-	-	23%	-	-	-	-	34%	-	-	-	38%	-	-	-	-	-	-	-	-	-
Cyclist	Count	-	-	-	-	-	-	-	11	-	-	-	10	-	-	-	-	-	-	-	-	-
	Share of Cyclists	-	-	-	-	-	-	-	55%	-	-	-	50%	-	-	-	-	-	-	-	-	-

* "-" denotes cell count of less than 10; shares do not add to 100%

Figure 4

Distribution of Hospital Charges by Number of Substances Present in Crash Patient

The average hospital charge of those involved in crashes increases by a factor of greater than 7 when road users move from no substances present to 3 substances present – the latter with an average hospital charge of \$75,000.

Hospital Charges by Substance Count

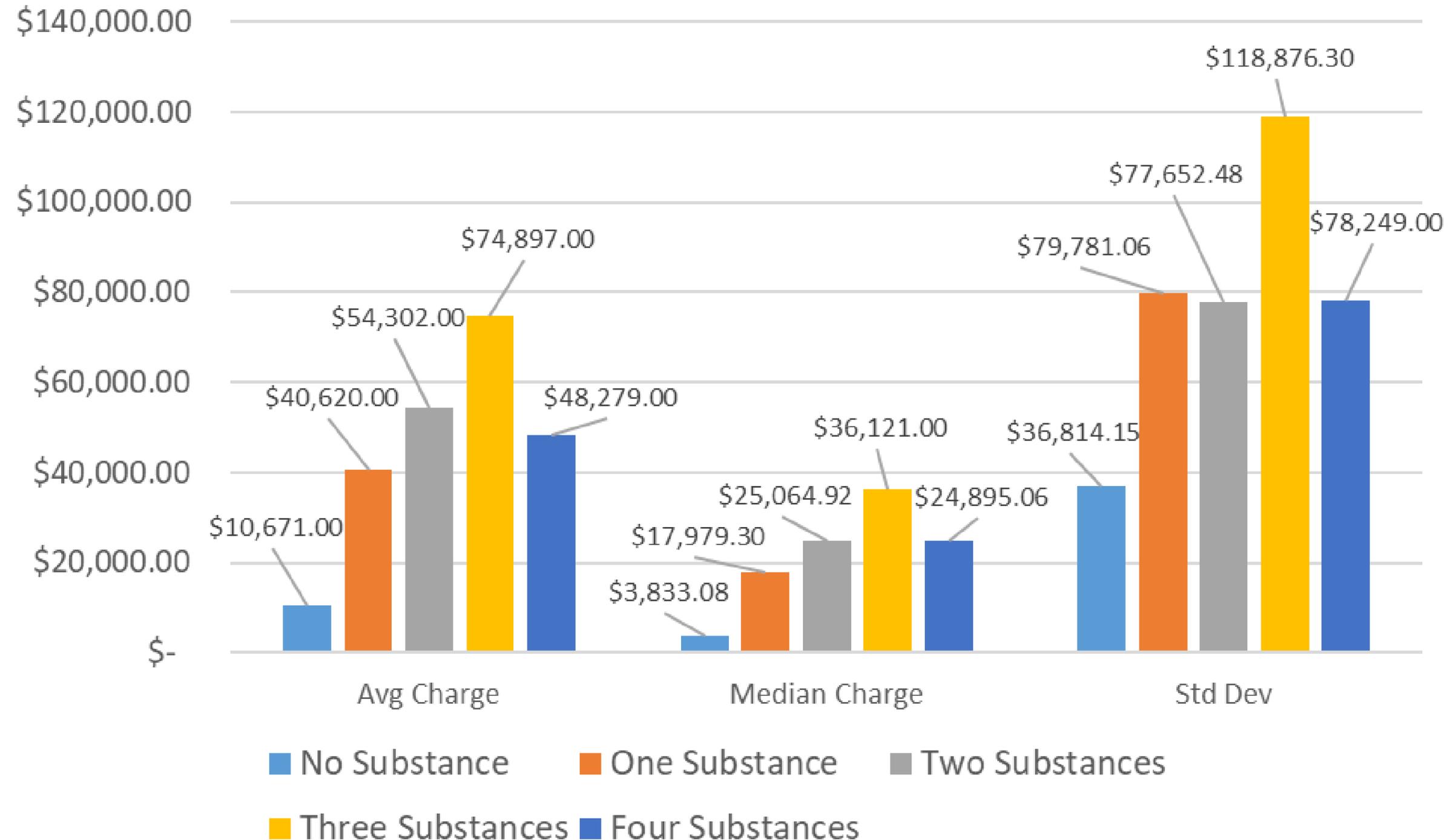


Figure 5

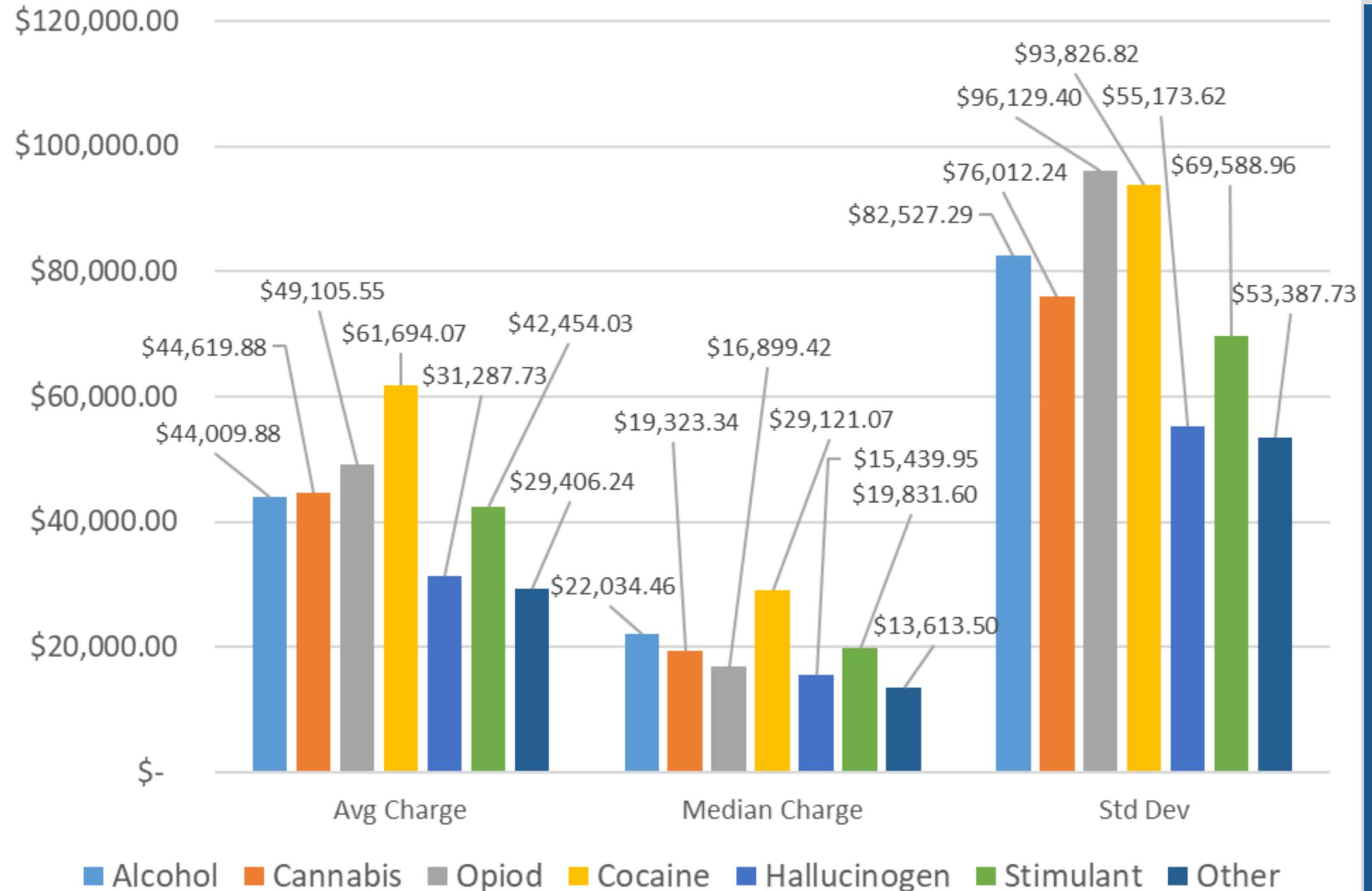


Those involved in crashes who had cocaine in their systems averaging almost \$62,000.

Second highest were those who had opioids in their systems.

Next highest were those with cannabis present.

Hospital Charges by Substance



*Alcohol n = 3,036; cannabis n = 2,536; Opioid n = 2,057; Cocaine n = 1,001; Hallucinogen n = 129; Stimulant n = 315; Other Drug n = 888

Figure 7

First:

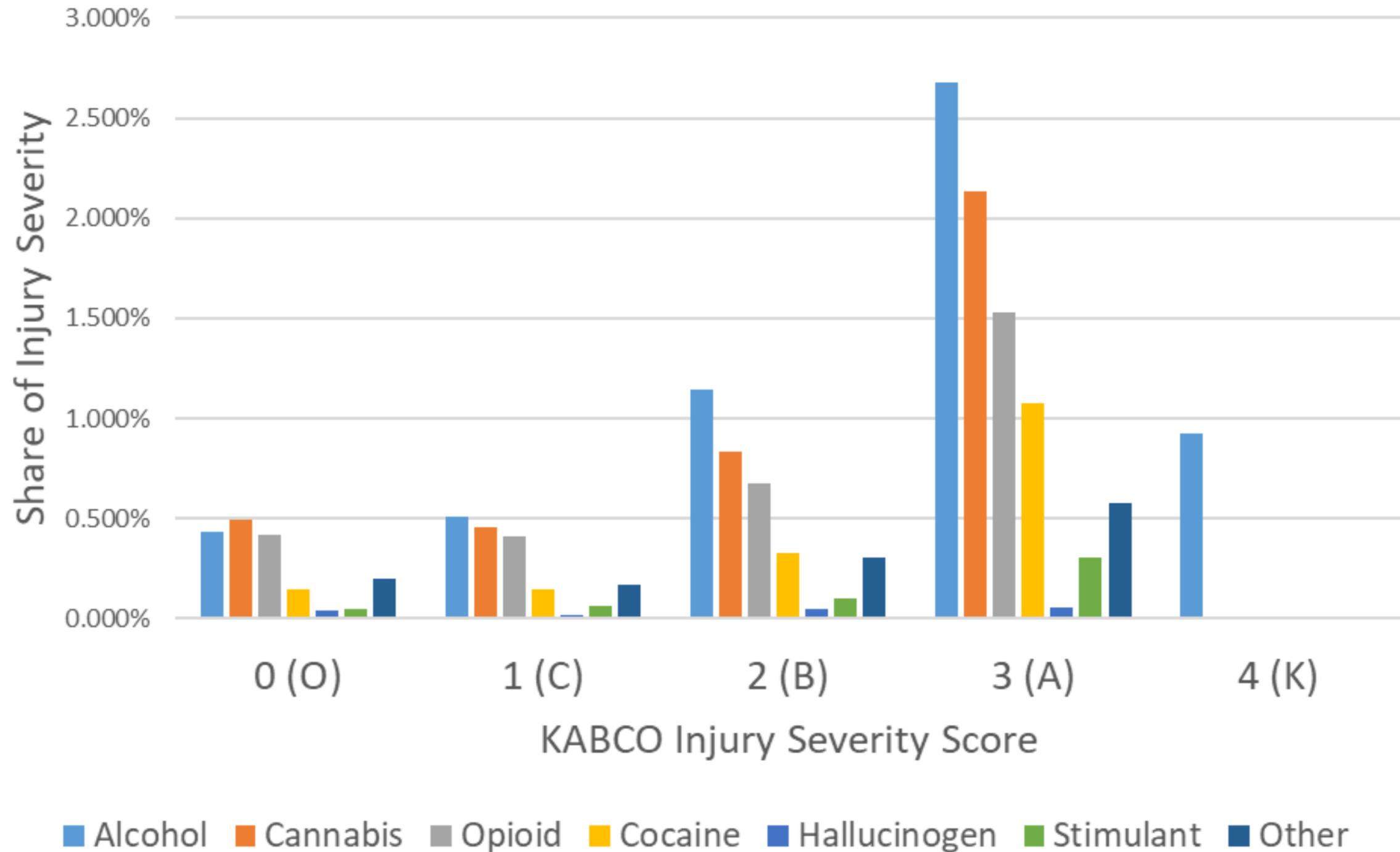
The share of crashes involving serious injury increases along with substance use.

Second:

Alcohol use among road users consistently garners the greatest share of injury crashes, followed by cannabis.

Note: Because of variations in circumstances surrounding fatal crashes the substance use details among the decedent are incomplete.

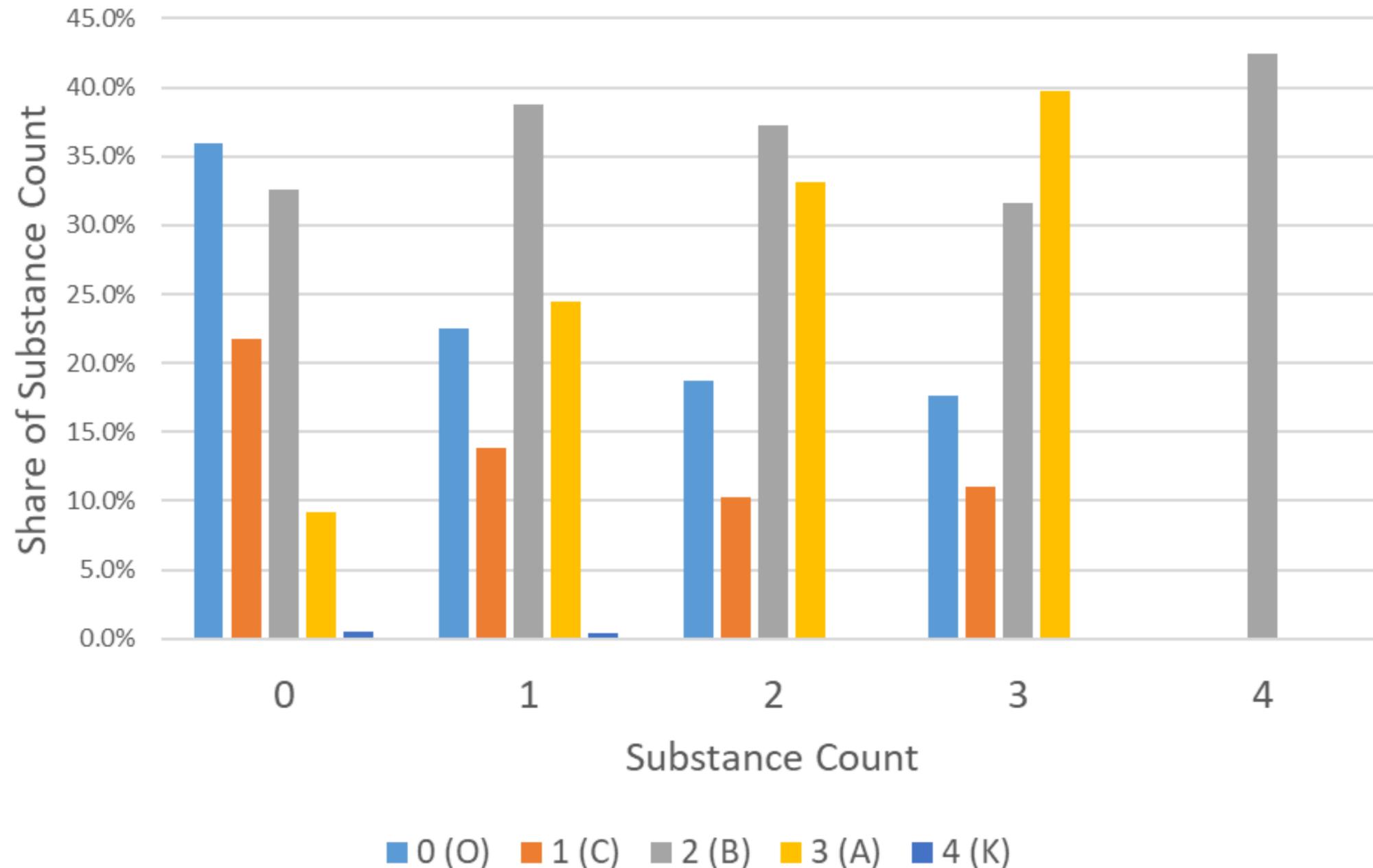
Injury Severity by Substance



Injury Severity by Quantity of Substances Present in Motor Vehicle Crash Patient

Figure 8

Injury Severity by Substance Count



- Focusing on the trends, a clear association emerges between injury severity and substance count.
- Road users who escape uninjured from a motor vehicle crash diminishes quickly as substances enter the circumstances.
- When looking at severe injury, the bar grow ever larger as substance count increases.
- Substance use is not only associated with injuries but severe injuries – especially as the number of substances present increases.

Figure 10

- 42,376 crashes identified in which the driver made an aggressive action.
- 1,754 of those drivers were also diagnosed as positive for an intoxicating substance.
- 14% of those drivers were positive for two or more substances.
- Drivers with 3 substances present were greater than twice as likely to make an aggressive action preceding a crash.

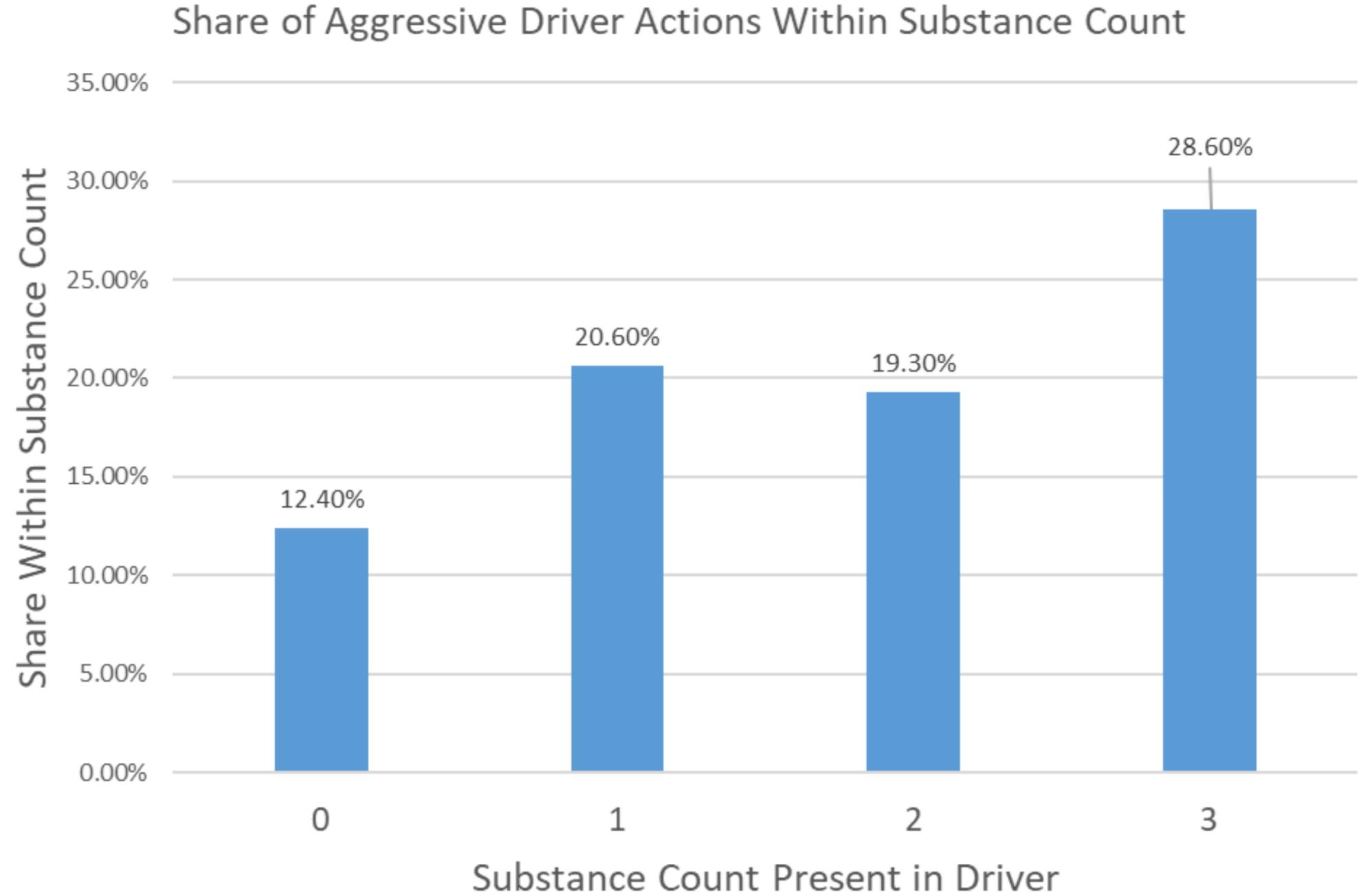
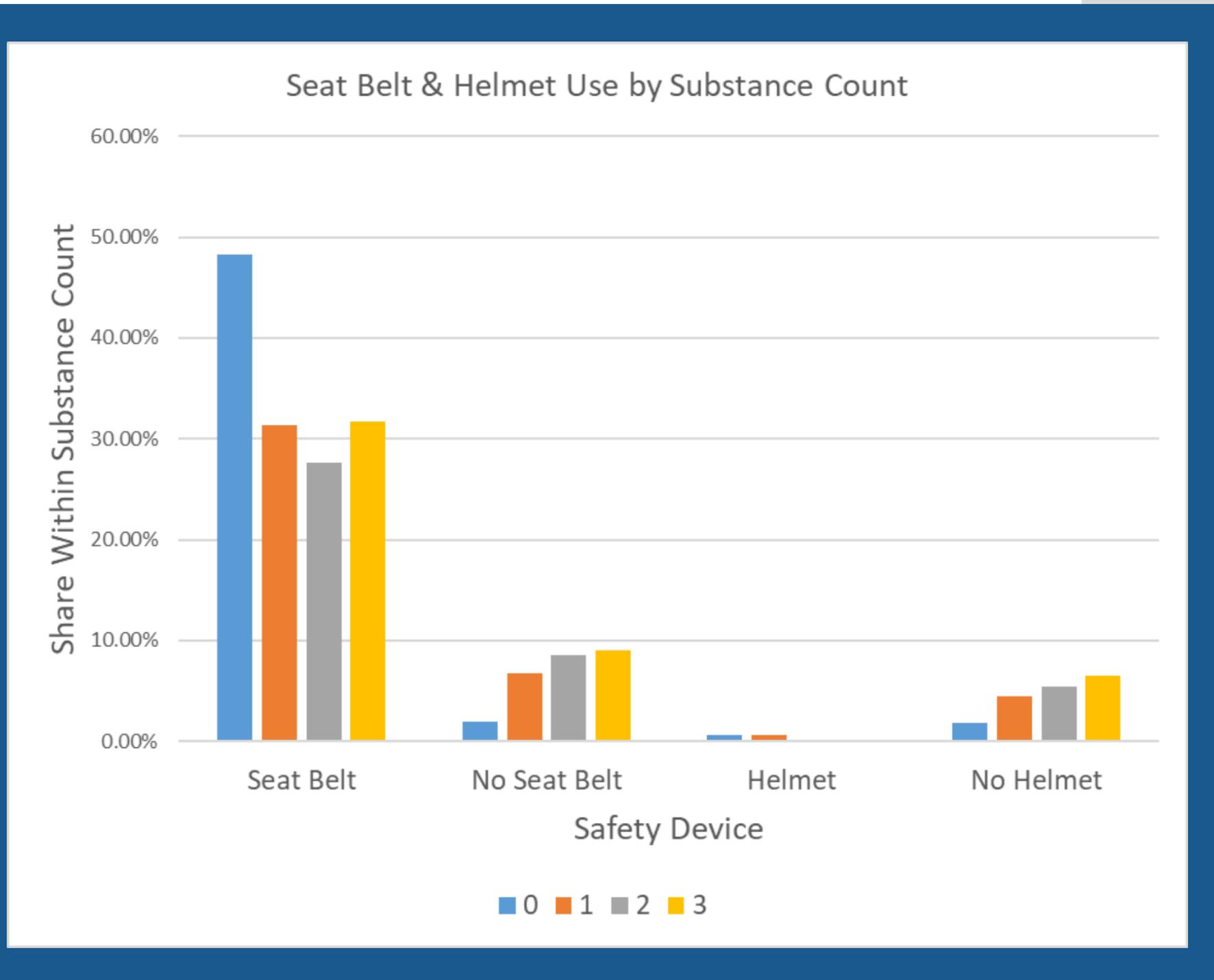


Figure 12



- **Seatbelt use drop by 20 percentage points among those involved in motor vehicle crashes with the introduction of intoxicating substances.**
- **Helmet use among motorcyclists begins at a low rate, and falls off of a cliff with the introduction of substances.**
- **The rate of no helmet worn climbs along with substance count.**

Conclusion

The presence of any substance is related to increased risky behavior.

The presence of any substance is also related to more severe injuries and higher hospital charges.

The presence of multiple substances – polysubstance use – intensifies these relationships as substance count increases.

Cannabis, alcohol, cocaine, and opioids are commonly present among those involved in crashes who have at least one substance present in their system.

Looking ahead, language in the 2021 bipartisan infrastructure law directs the national highway traffic safety administration, or NHTSA, to draft regulation requiring new motor vehicles in the US to be equipped with impaired driving prevention technology.

This potential regulation could be a game-changer for reducing impaired driving and all of the negative externalities to our communities that it brings.

