



BC Centre for Disease Control
Provincial Health Services Authority



Urine Toxicology Screening among 2018 and 2019 Harm Reduction Client Survey Participants

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List of Acronyms

BC	British Columbia
BCCDC	BC Centre for Disease Control
HRCS	Harm Reduction Client Survey
HRS	Harm Reduction Services
MDMA	3,4-Methylenedioxymethamphetamine (ecstasy)
OAT	Opioid Agonist Therapy
PWUD	People Who Use Drugs
SSRI	Selective Serotonin Reuptake Inhibitor
TCA	Tricyclic Antidepressant
non-TCA	non-Tricyclic Antidepressant
Z-drugs	psychoactive drugs that are unrelated to benzodiazepines but have similar properties and are used in the treatment of sleep problems

Executive Summary

The BC Harm Reduction Program has administered a survey to harm reduction supply distribution site clients across BC since 2012 to assess regional differences in drug use and inform harm reduction planning and quality improvement. Since 2018, funded by Health Canada's Substance Use and Addiction Program, a subset of survey participants also participated in urine toxicology screening to determine content of illicit substances taken and compare to reported use. Urine toxicology screening results from participants of the 2018 and 2019 BC Harm Reduction Client Survey are available in this report. Methamphetamine/amphetamine was the most prevalent illicit substance detected in both 2018 (71.2%) and 2019 (80.5%) participants, followed by fentanyl (2018: 55.8%; 2019: 54.3%). Cannabis was detected in almost half of participants across both years, while diacetylmorphine (heroin)/morphine was detected in almost 55% of 2018 participants, and less than 40% of 2019 participants.

A large variety of substances were co-detected among participants that had opioids, methamphetamine, and/or cocaine detected in their urine. For individuals with opioid agonists detected (buprenorphine/methadone), a large proportion also had other substances such as methamphetamine/amphetamine and fentanyl detected as well. When comparing reported use against detection in urine, just over 63% and 75% of participants in 2018 and 2019 respectively who had fentanyl detected reported using it, whereas over 90% of participants in both 2018 and 2019 with reported fentanyl use had fentanyl detected in their urine. Over 80% of participants in both years who had amphetamine/methamphetamine detected reported using crystal methamphetamine, and over 90% of participants with reported use had amphetamine/methamphetamine detected in their urine.

Background

The BC Harm Reduction Program has administered a survey to harm reduction supply distribution site clients across BC since 2012 to assess regional differences in drug use and inform harm reduction planning and quality improvement. More details on previous surveys, including summary infographics, reports, and publications can be found here. Since 2018, funded by Health Canada Substance Use and Addiction Program, a subset of survey participants also participated in urine toxicology screening to determine content of illicit substances taken and compare to reported use. This brief report describes urine toxicology screening results from participants of the 2018 and 2019 BC Harm Reduction Client Survey. See Appendix A for substances tested for by LifeLabs and their reporting cut off.

Tests performed are qualitative (presence detected), sensitive and detect parent drugs and/or their metabolites. Positive results may be due to trace amounts of a substance used recently or due to presence of minor metabolites of the parent drug. It may be difficult to discern between diacetylmorphine and morphine use as diacetylmorphine (heroin) metabolizes to morphine via short-lived acetylmorphine, and morphine metabolizes to hydromorphone; therefore we report as diacetylmorphine/morphine. Other complex patterns include samples positive for benzodiazepines - nordiazepam, temazepam and oxazepam which may be present as parent drugs or metabolites. The presence of nordiazepam, temazepam, and oxazepam together may be consistent with diazepam use while the presence of temazepam and oxazepam together may be consistent with temazepam use. Furthermore, results may underrepresent drugs with shorter detection windows. See Appendix B for classification of substance by class and subclass.

Findings

Table 1 - Participating communities, sites, and clients with urinalysis results

Health Authority	2018 (n=313)			2019 (n=564)		
	Communities	Harm reduction sites	Participants	Communities	Harm reduction sites	Participants
Fraser	2	3	73	4	5	149
Interior	5	5	56	5	5	110
Island	5	8	82	3	3	57
Northern	4	4	72	4	4	115
Vancouver Coastal*	2	2	30	3	4	133
Total	18	22	313	19	21	564

*Extensive research of PWUD in Vancouver Downtown Eastside (Vancouver Coastal Health Authority) is available through cohort studies at BC Centre for Substance Use. Therefore in 2018, participants from this region were under surveyed.

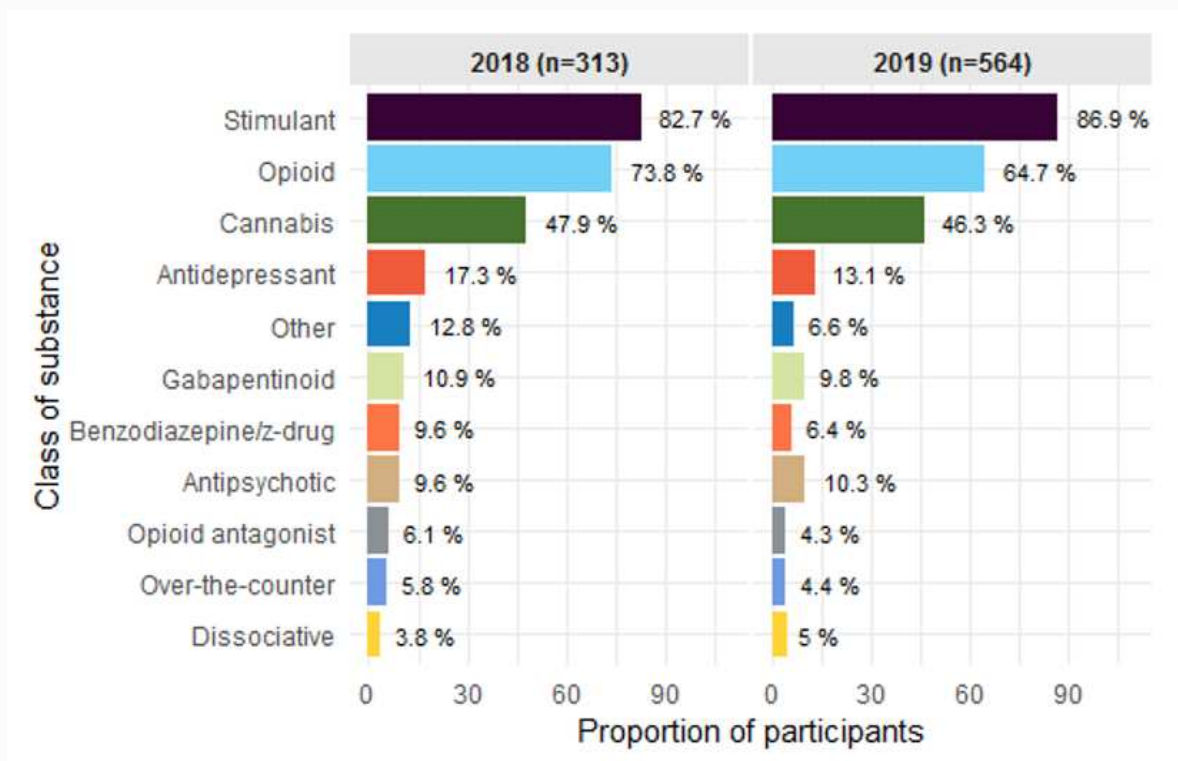
Substances Detected

BY SUBSTANCE CLASS

Stimulants were the largest class of substances detected in participant urine samples in 2018 and 2019. Stimulants were found in over 80% of samples in both years. Opioids were the second largest group of substances detected.

The proportion of opioid-positive samples somewhat declined between 2018 and 2019 while the proportion of cannabis-positive samples remained fairly constant at just less than 50%. The testing in 2018 and 2019 did not identify presence of any synthetic cannabinoids; however, this could be due to limited scope of these analytes included in the test panel.

Figure 1 - Substances detected in urine samples among all participants in 2018 and 2019 by class

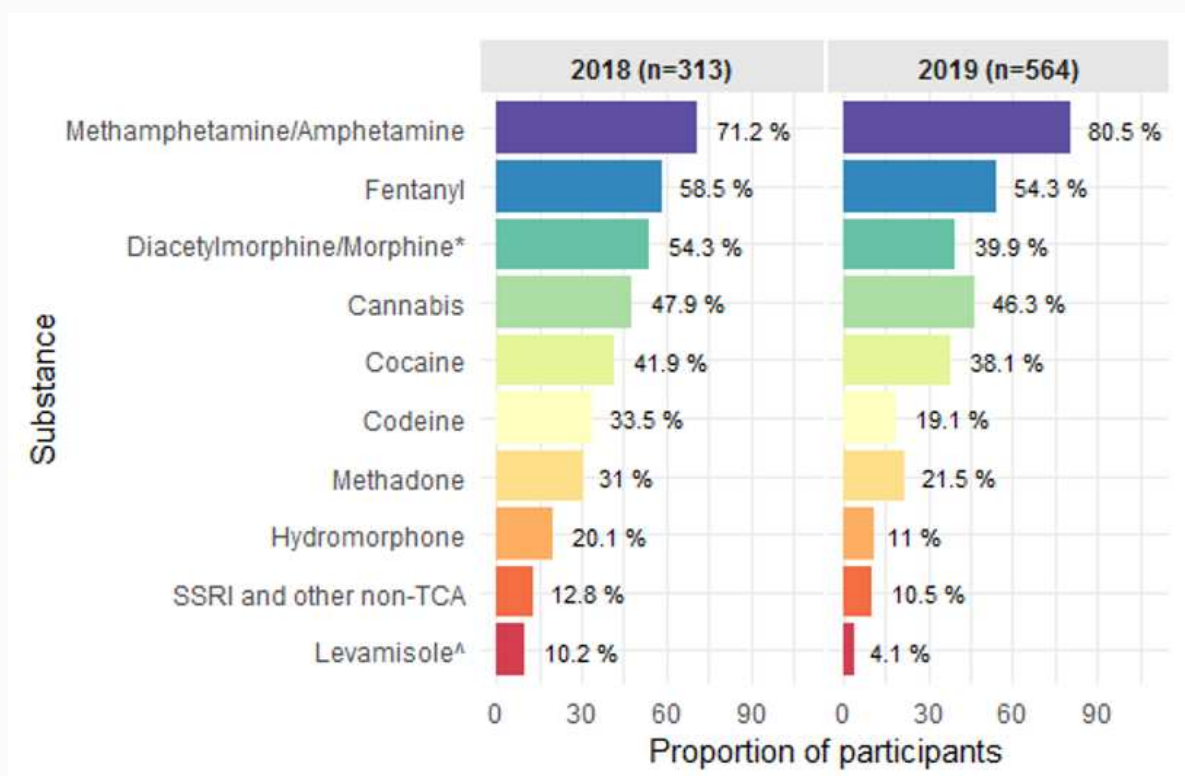


BY SUBSTANCE SUBCLASSES

Methamphetamine /amphetamine was the most frequently detected stimulant and increased from 71% in 2018 to over 80% in 2019. Cocaine detection was similar in 2018 and 2019. Cocaine detected may be due to cocaine powder or crack cocaine.

Fentanyl was the most frequently detected opioid in both years, while diacetylmorphine/morphine decreased from 54% in 2018 to less than 40% in 2019.

Figure 1a - Substance subclasses detected in urine samples among all participants in 2018 and 2019



* Using acetylmorphine as a marker, diacetylmorphine (heroin) use was detected in 81 (25.9%) samples in 2018 and 64 (11.3%) samples in 2019. Because heroin is rapidly metabolized to morphine via acetylmorphine, the above stated numbers and proportion of morphine-positive samples due to diacetylmorphine use may be underestimated.

^Levamisole is a veterinary anthelmintic which is found as an adulterant of cocaine. For more information about levamisole see: <https://towardtheheart.com/resource/levamisole-info-sheet-hcp/open>

SUBSTANCE SUBCLASS

Table 2 - All substance subclasses detected in urine samples among participants in 2018 and 2019 in order of overall detection

Substance Subclass	Overall (n=877); n (%)	2018 (n=313); n (%)	2019 (n=564); n (%)
Methamphetamine/Amphetamine	677 (77.2%)	223 (71.2%)	454 (80.5%)
Fentanyl	489 (55.8%)	183 (58.5%)	306 (54.3%)
Cannabis	411 (46.9%)	150 (47.9%)	261 (46.3%)
Diacetylmorphine/Morphine*	395 (45.0%)	170 (54.3%)	225 (39.9%)
Cocaine	346 (39.5%)	131 (41.9%)	215 (38.1%)
Methadone	218 (24.9%)	97 (31.0%)	121 (21.5%)
Codeine	213 (24.3%)	105 (33.5%)	108 (19.1%)
Hydromorphone	125 (14.3%)	63 (20.1%)	62 (11.0%)
SSRI and other non-tricyclic antidepressants	99 (11.3%)	40 (12.8%)	59 (10.5%)
Gabapentinoid	89 (10.1%)	34 (10.9%)	55 (9.8%)
Antipsychotic	88 (10.0%)	30 (9.6%)	58 (10.3%)
Ephedrine and pseudoephedrine	70 (8.0%)	18 (5.8%)	52 (9.2%)
Levamisole ^a	55 (6.3%)	32 (10.2%)	23 (4.1%)
Buprenorphine	50 (5.7%)	18 (5.8%)	32 (5.7%)
Benzodiazepine	49 (5.6%)	23 (7.3%)	26 (4.6%)
Antihistamine	43 (4.9%)	18 (5.8%)	25 (4.4%)
Tricyclic antidepressants	43 (4.9%)	19 (6.1%)	24 (4.3%)
Naloxone ^a	40 (4.6%)	18 (5.8%)	22 (3.9%)
Dextromethorphan	35 (4.0%)	7 (2.2%)	28 (5.0%)
Methylphenidate	25 (2.9%)	7 (2.2%)	18 (3.2%)
Z-drugs	22 (2.5%)	9 (2.9%)	13 (2.3%)
Muscle relaxants	17 (1.9%)	9 (2.9%)	8 (1.4%)
None	15 (1.7%)	4 (1.3%)	11 (2.0%)
Lidocaine ^b	8 (0.9%)	2 (0.6%)	6 (1.1%)
MDMA and related compounds	6 (0.7%)	1 (0.3%)	5 (0.9%)
Ketamine	5 (0.6%)	5 (1.6%)	0 (0%)
Cathinones	4 (0.5%)	0 (0%)	4 (0.7%)
Tramadol	4 (0.5%)	2 (0.6%)	2 (0.4%)
Mood stabilizers and antiepileptics	3 (0.3%)	1 (0.3%)	2 (0.4%)
Naltrexone	3 (0.3%)	1 (0.3%)	2 (0.4%)
Oxycodone	3 (0.3%)	2 (0.6%)	1 (0.2%)

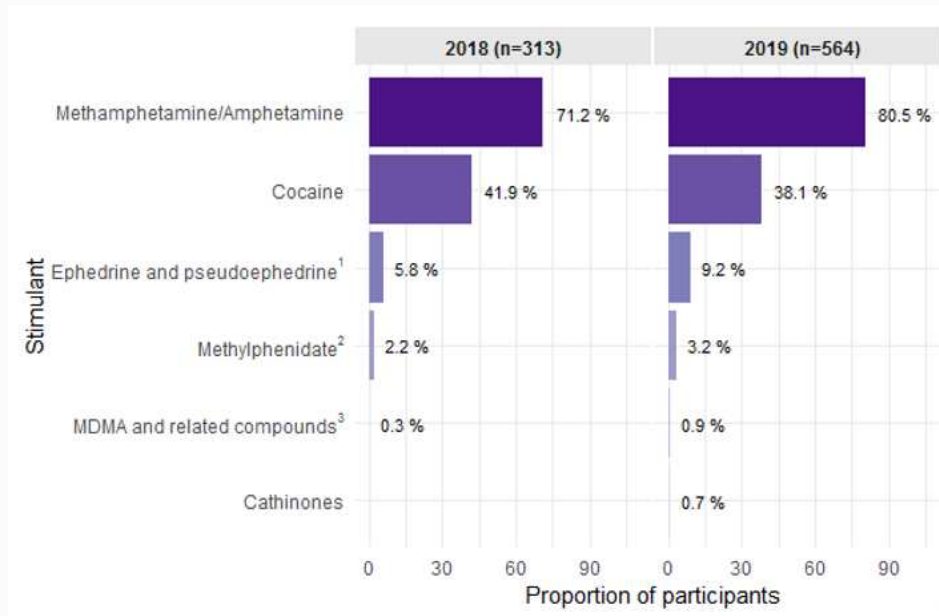
See comment above re *diacetylmorphine and ^alevamisole.

^a Naloxone is an opioid antagonist and a component of buprenorphine/naloxone (Suboxone) a medication to treat opioid use disorder.

^b Lidocaine is a local anesthetic.

STIMULANTS

Figure 2 - Stimulants detected in urine samples among all participants in 2018 and 2019

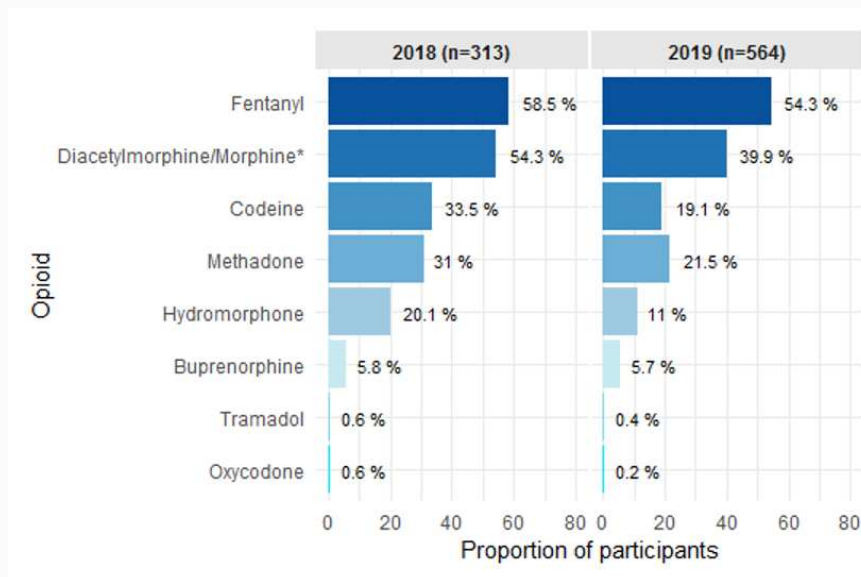


¹ Ephedrine and pseudoephedrine are precursor chemicals used to synthesize methamphetamine
² Methylphenidate is sold under the brand name of Ritalin and is prescribed for the treatment of attention-deficit/hyperactivity disorder (ADHD)
³ MDMA - 3,4-Methylenedioxymethamphetamine, is commonly known as ecstasy, E, or Molly

OPIOIDS

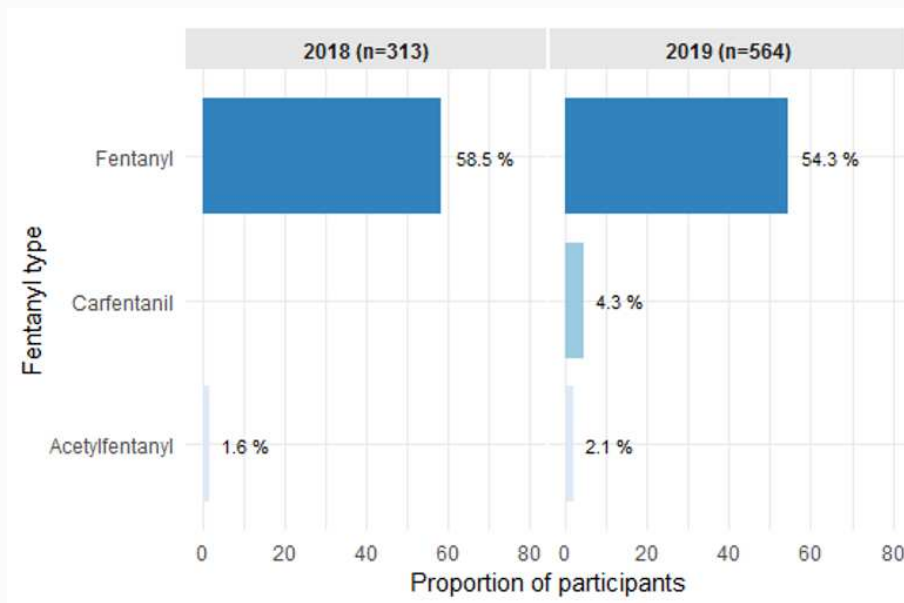
Fentanyl was the most commonly detected opioid in both 2018 and 2019, followed by diacetylmorphine/morphine; the latter decreased by 27% between 2018 and 2019

Figure 3 - Opioids detected among all participants in 2018 and 2019.



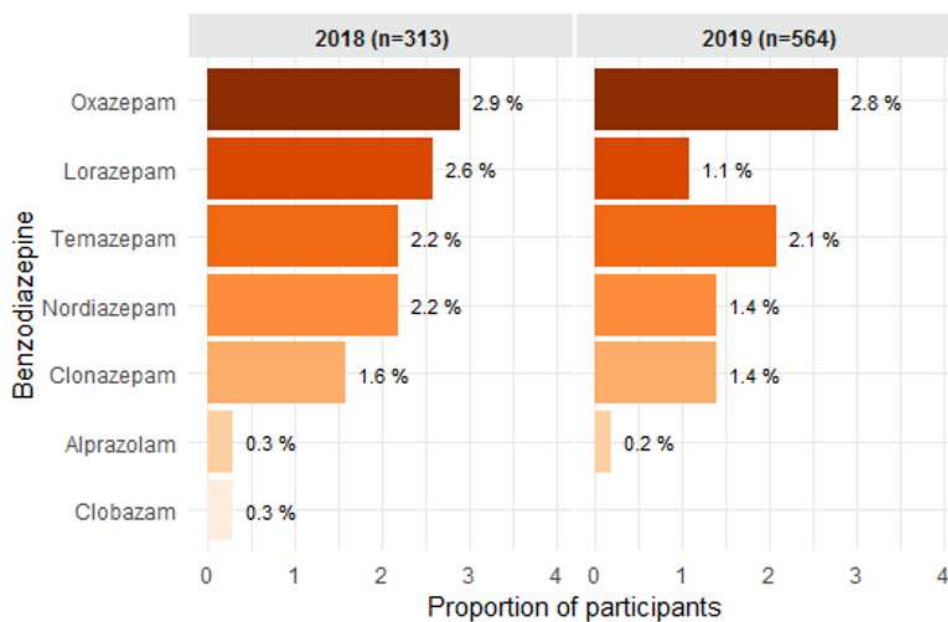
FENTANYL AND FENTANYL ANALOGUES

Figure 3a - Fentanyl and fentanyl analogues detected among all participants in 2018 and 2019



BENZODIAZEPINES¹

Figure 4 - Benzodiazepines detected among all participants in 2018 and 2019



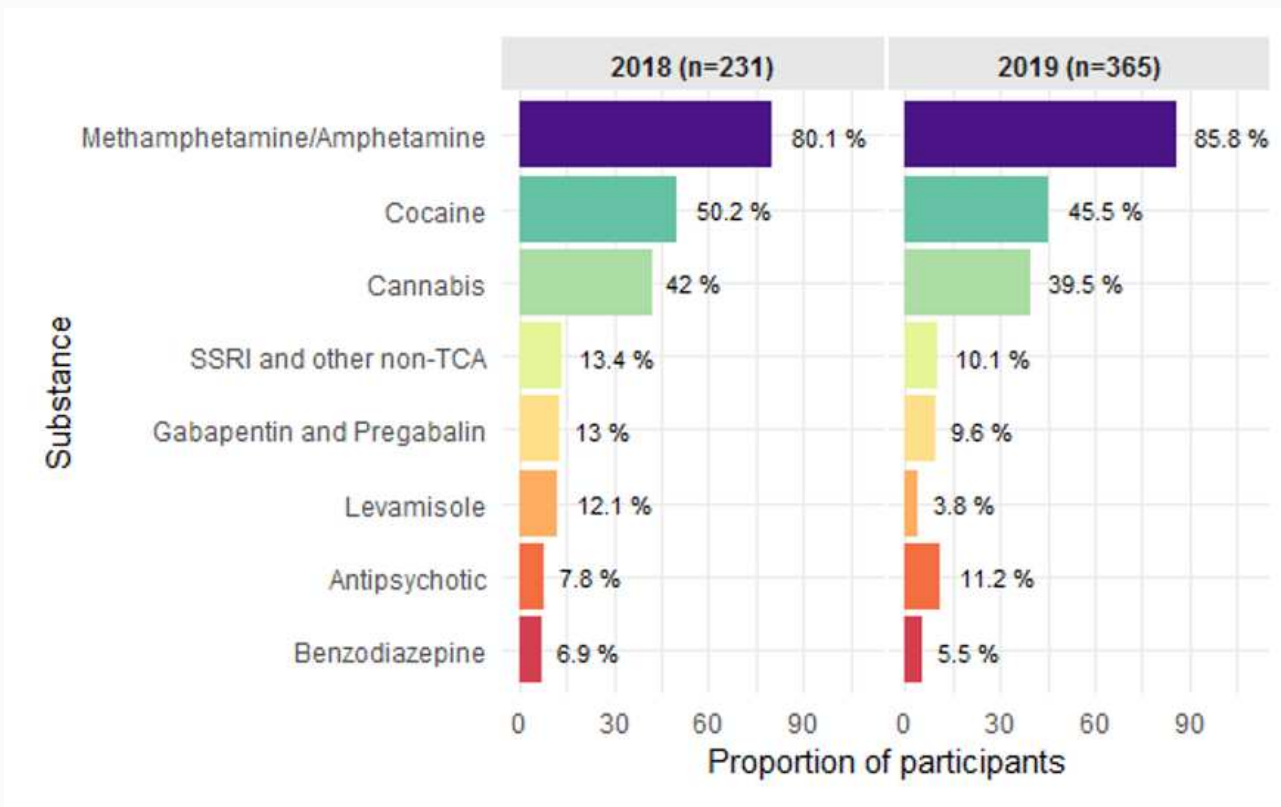
¹ Etizolam was not tested for in 2018 and 2019. Note that nordiazepam, temazepam, and oxazepam can all arise as metabolites from diazepam (not tested for).

SUBSTANCES CO-DETECTED WITH OPIOIDS

In both 2018 and 2019, stimulants were frequently co-detected with opioids. Methamphetamine/amphetamine was detected in more than 80% of urine samples where an opioid was detected and the proportion increased over the two years from 80% to 86%. However the proportion where cocaine was co-detected declined from 50% to 46%.

The proportion where benzodiazepines were co-detected with an opioid was less than 7%. However, in 2020/2021, benzodiazepine and benzodiazepine-like substances were commonly detected in illicit opioids (Pursell et. al., 2021)

Figure 5 - Substances detected among participants that had any opioid detected in 2018 and 2019.



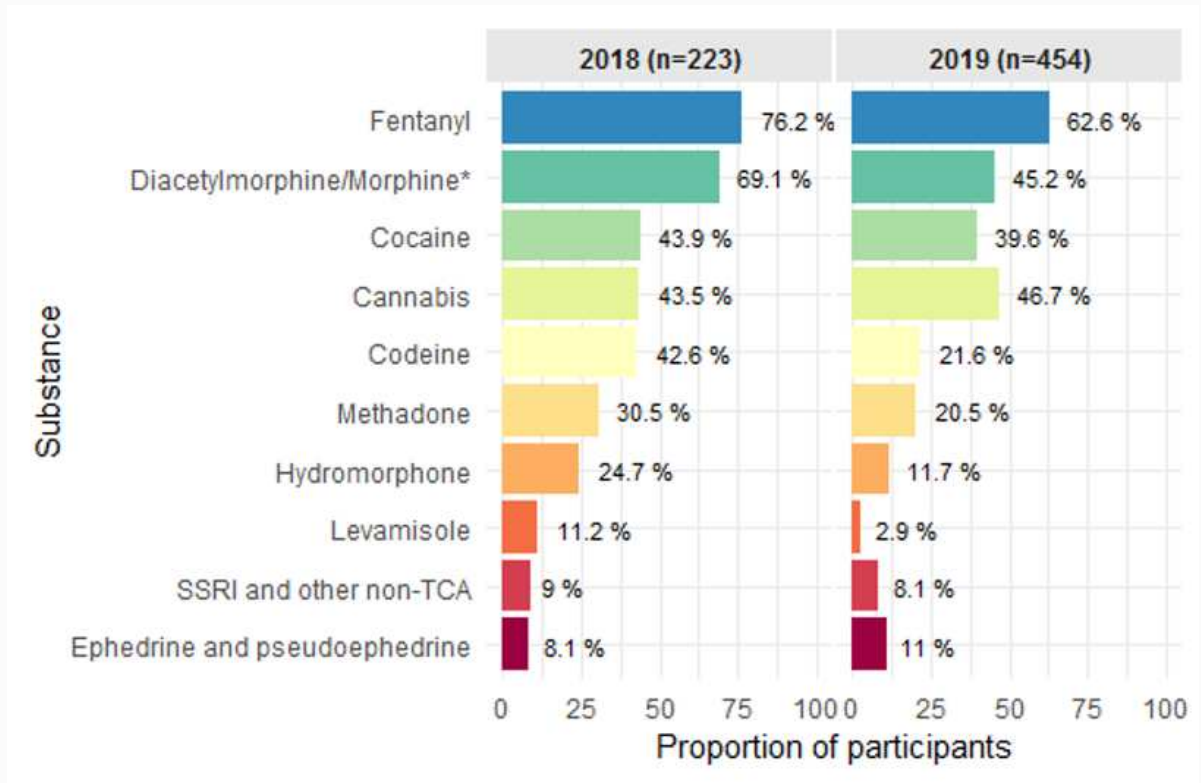
SUBSTANCES CO-DETECTED WITH OPIOIDS

Table 3 - All substance subclasses detected in urine samples among participants who had opioids detected in 2018 and 2019, in order of overall detection

Substance Subclass	2018 (n=231); n (%)	2019 (n=365); n (%)
Methamphetamine/Amphetamine	185 (80.1%)	313 (85.8%)
Cocaine	116 (50.2%)	166 (45.5%)
Cannabis	97 (42.0%)	144 (39.5%)
SSRI and other non-tricyclic antidepressants	31 (13.4%)	37 (10.1%)
Gabapentinoid	30 (13.0%)	35 (9.6%)
Levamisole	28 (12.1%)	14 (3.8%)
Antipsychotic	18 (7.8%)	41 (11.2%)
Naloxone	18 (7.8%)	22 (6.0%)
Benzodiazepine	16 (6.9%)	20 (5.5%)
Ephedrine and pseudoephedrine	16 (6.9%)	36 (9.9%)
Antihistamine	14 (6.1%)	15 (4.1%)
Tricyclic antidepressants	12 (5.2%)	17 (4.7%)
Z-drugs	8 (3.5%)	9 (2.5%)
Dextromethorphan	6 (2.6%)	25 (6.8%)
Methylphenidate	6 (2.6%)	14 (3.8%)
Muscle relaxants	6 (2.6%)	3 (0.8%)
Ketamine	5 (2.2%)	0 (%)
Lidocaine	2 (0.9%)	6 (1.6%)
MDMA and related compounds	1 (0.4%)	3 (0.8%)
Mood stabilizers and antiepileptic	1 (0.4%)	2 (0.5%)
Cathinones	0 (%)	3 (0.8%)
Naltrexone	0 (%)	1 (0.3%)

SUBSTANCES CO-DETECTED WITH METHAMPHETAMINE

Figure 6 - Substances detected among participants that had methamphetamine detected in 2018 and 2019



*Diacetylmorphine (heroin) use was detected in 78 (35%) samples in 2018 and 61 (13.4%) samples in 2019.

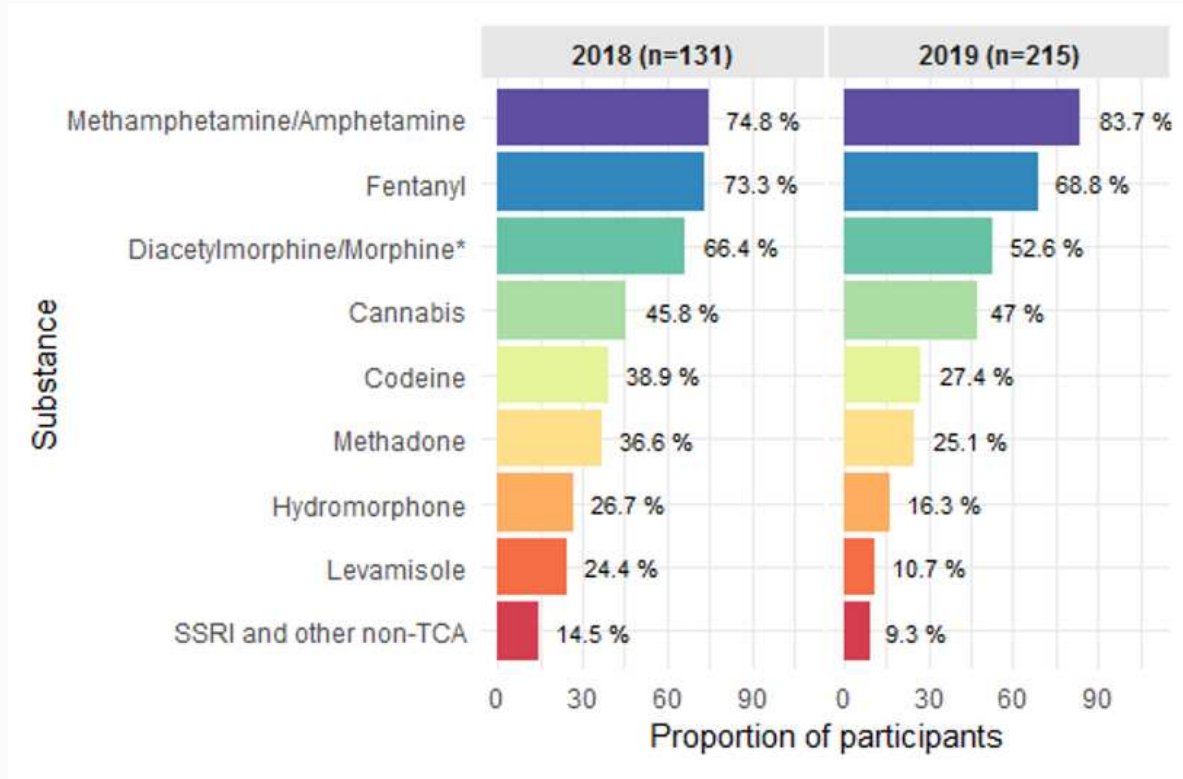
SUBSTANCES CO-DETECTED WITH METHAMPHETAMINE

Table 4 - All substance subclasses co-detected with methamphetamine among participants in 2018 and 2019

Substance Subclass	2018 (n=223); n (%)	2019 (n=454); n (%)
Fentanyl	170 (76.2%)	284 (62.6%)
Diacetylmorphine/Morphine	154 (69.1%)	205 (45.2%)
Cocaine	98 (43.9%)	180 (39.6%)
Cannabis	97 (43.5%)	212 (46.7%)
Codeine	95 (42.6%)	98 (21.6%)
Methadone	68 (30.5%)	93 (20.5%)
Hydromorphone	55 (24.7%)	53 (11.7%)
Levamisole	25 (11.2%)	13 (2.9%)
SSRI and other non-tricyclic antidepressants	20 (9.0%)	37 (8.1%)
Gabapentinoid	19 (8.5%)	38 (8.4%)
Ephedrine and pseudoephedrine	18 (8.1%)	50 (11.0%)
Antipsychotic	15 (6.7%)	45 (9.9%)
Benzodiazepine	13 (5.8%)	17 (3.7%)
Naloxone	12 (5.4%)	15 (3.3%)
Buprenorphine	10 (4.5%)	23 (5.1%)
Antihistamine	6 (2.7%)	15 (3.3%)
Muscle relaxants	6 (2.7%)	4 (0.9%)
Dextromethorphan	5 (2.2%)	24 (5.3%)
Ketamine	5 (2.2%)	0 (0%)
Methylphenidate	4 (1.8%)	16 (3.5%)
Tricyclic antidepressants	4 (1.8%)	14 (3.1%)
Z-drugs	3 (1.3%)	11 (2.4%)
Lidocaine	2 (0.9%)	5 (1.1%)
Oxycodone	2 (0.9%)	1 (0.2%)
MDMA and related compounds	1 (0.4%)	5 (1.1%)
Tramadol	1 (0.4%)	2 (0.4%)
Cathinones	0 (0%)	4 (0.9%)
Naltrexone	0 (0%)	2 (0.4%)
Mood stabilizers and antiepileptics	0 (0%)	1 (0.2%)

SUBSTANCES CO-DETECTED WITH COCAINE

Figure 7 - Substances detected among participants that had cocaine detected in 2018 and 2019



*Diacetylmorphine (heroin) use was detected in 43(44%) samples in 2018 and 38 (31.4%) samples in 2019.

SUBSTANCES CO-DETECTED WITH COCAINE

Table 5 - All substance subclasses co-detected with cocaine among participants in 2018 and 2019

Substance Subclass	2018 (n=131); n (%)	2019 (n=215); n (%)
Methamphetamine/Amphetamine	98 (74.8%)	180 (83.7%)
Fentanyl	96 (73.3%)	148 (68.8%)
Diacetylmorphine/Morphine	87 (66.4%)	113 (52.6%)
Cannabis	60 (45.8%)	101 (47.0%)
Codeine	51 (38.9%)	59 (27.4%)
Methadone	48 (36.6%)	54 (25.1%)
Hydromorphone	35 (26.7%)	35 (16.3%)
Levamisole	32 (24.4%)	23 (10.7%)
Gabapentin and Pregabalin	20 (15.3%)	26 (12.1%)
SSRI and other non-tricyclic antidepressants	19 (14.5%)	20 (9.3%)
Ephedrine and pseudoephedrine	11 (8.4%)	23 (10.7%)
Antipsychotic	10 (7.6%)	19 (8.8%)
Benzodiazepine	10 (7.6%)	14 (6.5%)
Tricyclic antidepressants	10 (7.6%)	6 (2.8%)
Buprenorphine	8 (6.1%)	8 (3.7%)
Antihistamine	7 (5.3%)	12 (5.6%)
Muscle relaxants	7 (5.3%)	3 (1.4%)
Z-drugs	7 (5.3%)	5 (2.3%)
Dextromethorphan	5 (3.8%)	17 (7.9%)
Naloxone	5 (3.8%)	5 (2.3%)
Ketamine	3 (2.3%)	0 (0%)
Lidocaine	2 (1.5%)	3 (1.4%)
MDMA and related compounds	1 (0.8%)	2 (0.9%)
Naltrexone	1 (0.8%)	1 (0.5%)
Oxycodone	1 (0.8%)	1 (0.5%)
Tramadol	1 (0.8%)	1 (0.5%)
Methylphenidate	0 (0%)	5 (2.3%)
Cathinones	0 (0%)	1 (0.5%)
Mood stabilizers and antiepileptics	0 (0%)	1 (0.5%)

SUBSTANCES CO-DETECTED WITH OPIOID AGONIST TREATMENT

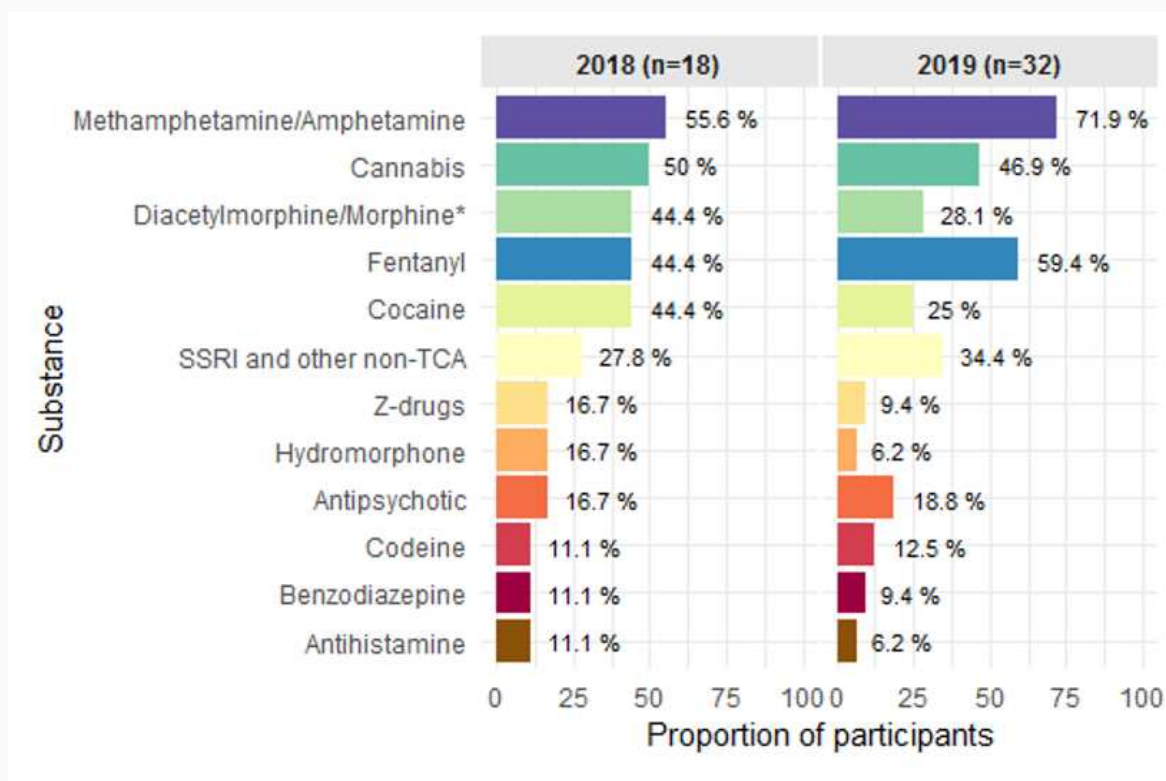
Opioid agonist treatment (OAT) reduces harms, including morbidity and mortality, in people with opioid use disorder. People on OAT who attend harm reduction supply distribution sites and completed the survey likely differ from people on OAT who do not attend these sites.

Daily oral methadone and buprenorphine/naloxone (Suboxone) are the most commonly prescribed OAT in BC. OAT acts to prevent withdrawal and reduce cravings in people who are dependent on opioids.

SUBSTANCES CO-DETECTED WITH BUPRENORPHINE

Overall buprenorphine was detected in 18 of 313 urine samples (5.8%) in 2018 and 32 of 564 (5.7%) in 2019.

Figure 8 - Substances detected among participants that had buprenorphine detected in 2018 and 2019



*Diacetylmorphine (heroin) use was detected in 43(44%) samples in 2018 and 38 (31.4%) samples in 2019.

Percentages in Figure 8 are difficult to interpret due to small sample size.

SUBSTANCES CO-DETECTED WITH BUPRENORPHINE

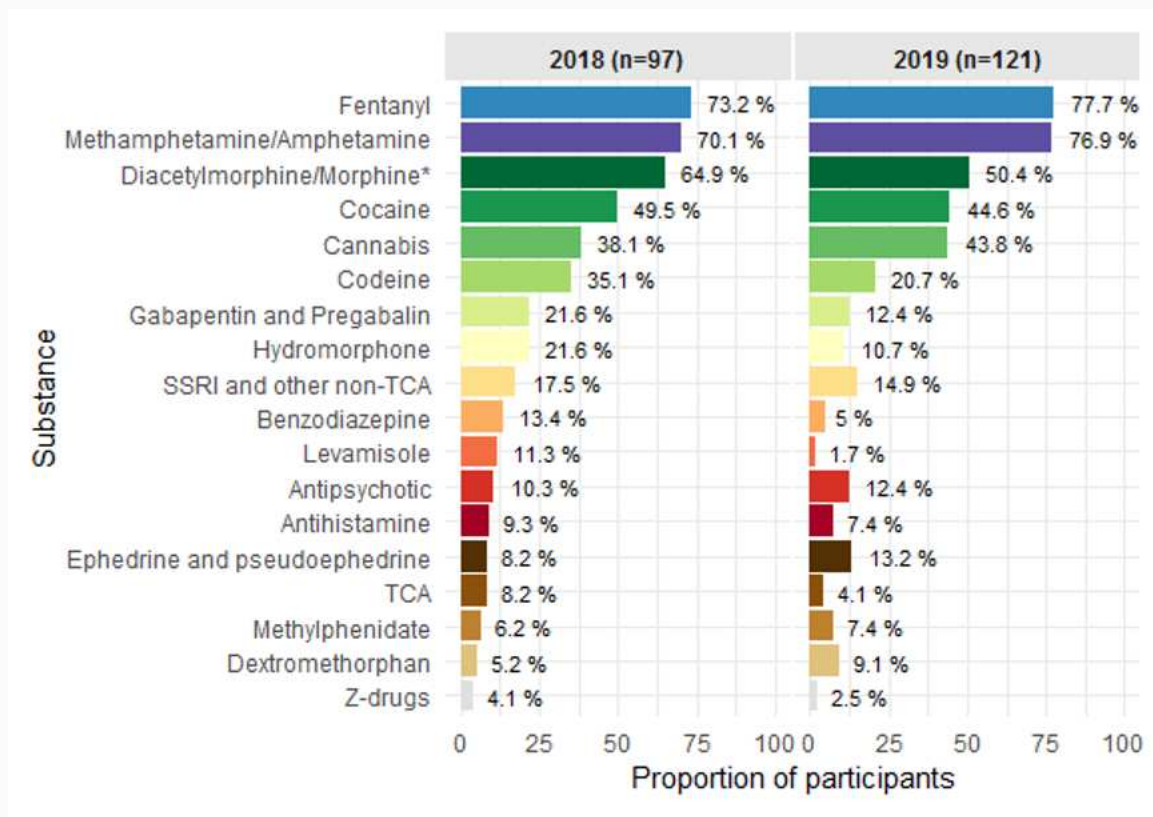
Table 6 - All substance subclasses co-detected with buprenorphine among participants in 2018 and 2019

Substance Subclass	2018 (n=18); n (%)	2019 (n=32); n (%)
Methamphetamine/Amphetamine	10 (55.6%)	23 (71.9%)
Cannabis	9 (50.0%)	15 (46.9%)
Cocaine	8 (44.4%)	8 (25.0%)
Fentanyl	8 (44.4%)	19 (59.4%)
Diacetylmorphine/Morphine	8 (44.4%)	9 (28.1%)
SSRI and other non- tricyclic antidepressants	5 (27.8%)	11 (34.4%)
Antipsychotic	3 (16.7%)	6 (18.8%)
Hydromorphone	3 (16.7%)	2 (6.2%)
Z-drugs	3 (16.7%)	3 (9.4%)
Antihistamine	2 (11.1%)	2 (6.2%)
Benzodiazepine	2 (11.1%)	3 (9.4%)
Codeine	2 (11.1%)	4 (12.5%)

SUBSTANCES CO-DETECTED WITH METHADONE

Methadone was detected in 97 of the 313 urine samples (31%) in 2018, and 121 out of 564 urine samples (21.5%) in 2019.

Figure 9 - Substances detected among participants that had methadone detected in 2018 and 2019



*Diacetylmorphine (heroin) use was detected in 43(44%) samples in 2018 and 38 (31.4%) samples in 2019.

SUBSTANCES CO-DETECTED WITH METHADONE

Table 7 - All substance subclasses co-detected with methadone among participants in 2018 and 2019

Substance Subclass	2018 (n=97); n (%)	2019 (n=121); n (%)
Fentanyl	71 (73.2%)	94 (77.7%)
Methamphetamine/Amphetamine	68 (70.1%)	93 (76.9%)
Diacetylmorphine/Morphine	63 (64.9%)	61 (50.4%)
Cocaine	48 (49.5%)	54 (44.6%)
Cannabis	37 (38.1%)	53 (43.8%)
Codeine	34 (35.1%)	25 (20.7%)
Gabapentin and Pregabalin	21 (21.6%)	15 (12.4%)
Hydromorphone	21 (21.6%)	13 (10.7%)
SSRI and other non- tricyclic antidepressants	17 (17.5%)	18 (14.9%)
Benzodiazepine	13 (13.4%)	6 (5.0%)
Levamisole	11 (11.3%)	2 (1.7%)
Antipsychotic	10 (10.3%)	15 (12.4%)
Antihistamine	9 (9.3%)	9 (7.4%)
Ephedrine and pseudoephedrine	8 (8.2%)	16 (13.2%)
Tricyclic antidepressants	8 (8.2%)	5 (4.1%)
Methylphenidate	6 (6.2%)	9 (7.4%)
Dextromethorphan	5 (5.2%)	11 (9.1%)
Z-drugs	4 (4.1%)	3 (2.5%)
Buprenorphine	1 (1.0%)	2 (1.7%)
Lidocaine	1 (1.0%)	3 (2.5%)
Mood stabilizers and antiepileptics	1 (1.0%)	0 (0.0%)
Muscle relaxants	1 (1.0%)	1 (0.8%)
Naloxone	1 (1.0%)	1 (0.8%)
Cathinones	0 (0.0%)	2 (1.7%)
Tramadol	0 (0.0%)	1 (0.8%)

COMPARING REPORTED USE AND DETECTION OF FENTANYL

Figure 10 shows of all (100%) urine samples where fentanyl was detected (light blue), the proportion of participants who also reported using fentanyl (dark blue); figure 11 shows of all participants (i.e. 100%) who reported fentanyl use (dark blue), who also had fentanyl detected in urine samples (light blue).

In 2015, 73% of those testing positive for fentanyl reported no known use of fentanyl (Amlani et al., 2015), the proportion who had fentanyl detected in their urine but did not report fentanyl use declined over time to 36% in 2018 and 23% in 2019 (Karamouzian et al., 2020).

In 2018 and 2019, of participants who had fentanyl detected in their urine, about 64% and 77% respectively reported using it.

In 2018 and 2019, more than 90% of participants who reported fentanyl use had fentanyl detected in their urine.

Figure 10 - Reported fentanyl use among participants that had fentanyl detected in 2018 and 2019

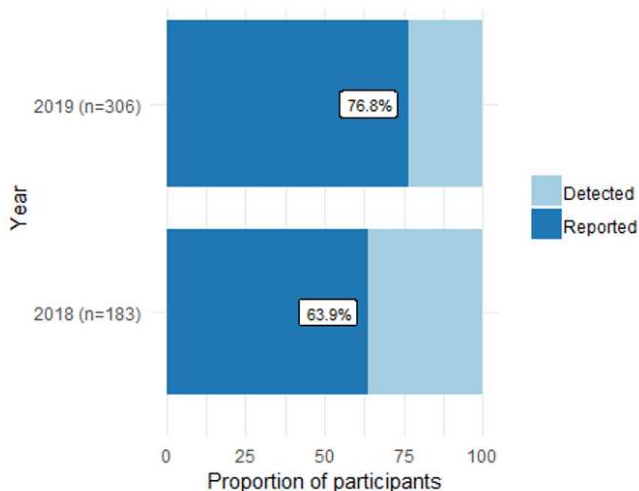
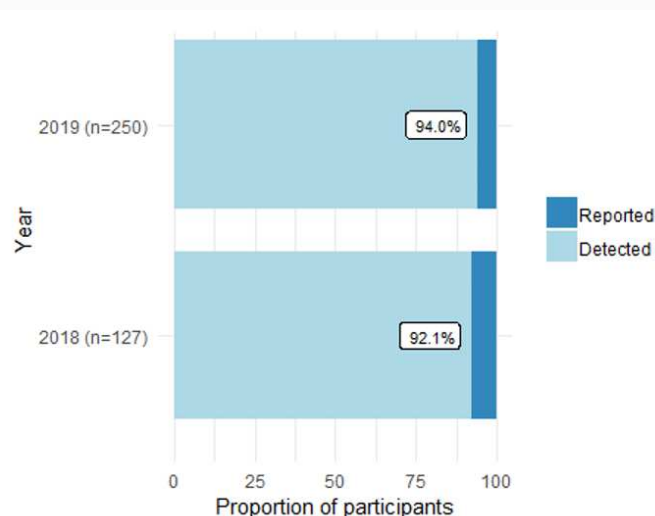


Figure 11 - Fentanyl detection among participants that reported fentanyl use in 2018 and 2019



COMPARING REPORTED USE AND DETECTION OF METHAMPHETAMINE

Figure 12 shows of all (100%) urine samples where amphetamine/methamphetamine was detected (light purple), the proportion of participants who also reported using amphetamine/methamphetamine (dark purple).

Figure 13 shows of all participants (i.e. 100%) who reported amphetamine/methamphetamine use (dark purple), who also had amphetamine/methamphetamine detected in urine samples (light purple).

Over 80% of participants in both years who had amphetamine/methamphetamine detected reported using crystal methamphetamine.

In both 2018 and 2019, over 90% of participants with reported methamphetamine use had methamphetamine/amphetamine detected in their urine.

Figure 12 - Reported crystal methamphetamine use among participants that had methamphetamine/amphetamine detected in 2018 and 2019.

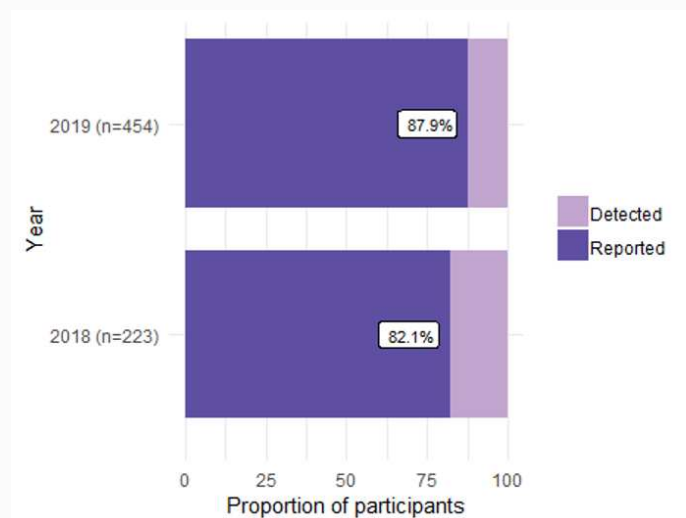
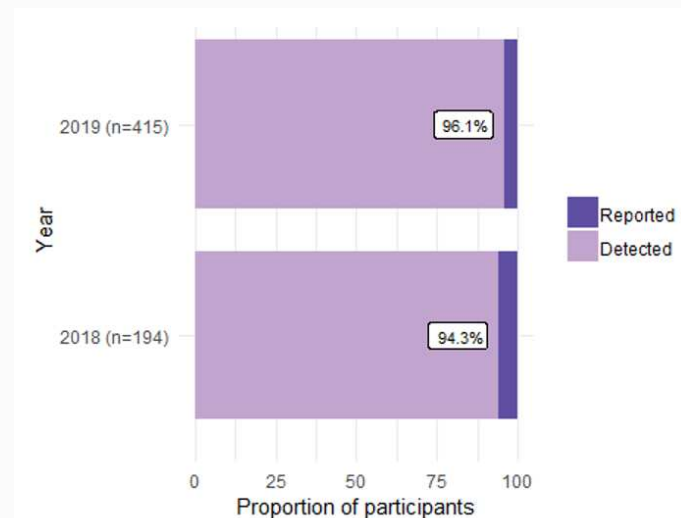


Figure 13 - Methamphetamine/amphetamine detection among participants that reported crystal methamphetamine use in 2018 and 2019.



A manuscript was published which used data from the 2018 and 2019 surveys to determine the prevalence and correlates and validity of self-reported methamphetamine use. Sensitivity of self-reported methamphetamine use was 86%, specificity was 86%, positive predictive value was 96%, and negative predictive value was 65% (Papamihali et al., 2021).

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APPENDIX A: Substances Tested for by LifeLabs

OPIOIDS	Reporting Cut-off (ug/L)	OPIOIDS (cont'd)	Reporting Cut-off (ug/L)	AMPHETAMINES	Reporting Cut-off (ug/L)	BENZODIAZEPINES	Reporting Cut-off (ug/L)
Acetylcodeine	25	Norbuprenorphine (buprenorphine metab.)	15	Amphetamine (methamphetamine metab.)	50	Aminoflunitrazepam (flunitrazepam metab.)	25
Acetylmorphine (heroin metab.)	5	Norcarfentanil* (Carfentanil metab.)	1	Butylone*	15	Aminonitrazepam (nitrazepam metab.)	25
Acetylfentanyl*	5	Norfentanyl (fentanyl metab.)	15	DiMeMethcathinone* (dimethylmethcathinone)	50	HO-Alprazolam (alprazolam metab.)	25
Acetylnorfentanyl* (acetylfentanyl metab.)	50	Norhydrocodone (hydrocodone metab.)	50	Ethylone*	15	HO-Midazolam (midazolam metab.)	25
Alfentanil*	5	Nomeperidine (meperidine metab.)	50	MBDB	25	HO-Triazolam (triazolam metab.)	25
Buprenorphine	15	Noroxycodone (oxycodone metab.)	25	MDA	50	Aminoclonazepam (clonazepam metab.)	25
Butorphanol	50	Norpropoxyphene (propoxyphene metab.)	50	MDEA	50	Bromazepam	25
Codeine	75	Nortilidine (tilidine metab.)	50	MDMA ("Ecstasy")	50	Desalkylflurazepam (flurazepam metab.)	25
Codeine-6Glc (codeine metab.)	75	O-Desmethyltramadol (tramadol metab.)	25	MDPV*	15	Lorazepam	25
Desmethyltapentadol (tapentadol metab.)	100	Oxycodone	25	Mephedrone*	15	Desmethylclobazam (clobazam metab.)	25
Dextromethorphan	50	Oxymorphone	25	Methcathinone*	25	Nordiazepam (diazepam metab.)	25
Dextrophan	50	Pentazocine	50	Methamphetamine	50	Oxazepam (nordiazepam, temazepam metab.)	50
EDDP (methadone metab.)	100	Sufentanil*	5	Methedrone*	15	Temazepam	25
Fentanyl	5	Tapentadol	100	Methedrone_NPE* (methedrone metab.)	50		
Hydrocodone	25	Tilidine	50	Methylone*	15		
Hydromorphone	25	Tramadol	50	Methylphenidate	50		
Meperidine	50			Pentedrone_NE* (pentedrone metab.)	50		
Methadone	100			PMA (para-methoxy-amphetamine)	50		
Mitragynine ("Kratom")	25			alpha-PVP*	15		
Morphine (heroin, codeine metab.)	50			Ritalinic_acid (methylphenidate metab.)	25		
Nalbuphine	50			TFMPP (3-Trifluoromethyl-phenylpiperazine)	25		
Nalorphine	50						
Naloxone	25						
Naltrexol	25						
Naltrexone	25	*Fentanyl analogues		*Substituted Cathinones "Bath Salts"		*Z-drugs	

APPENDIX A: Con't

ANTI-DEPRESSANTS	Reporting Cut-off (ug/L)	ANTI-PSYCHOTICS	Reporting Cut-off (ug/L)	OTHER	Reporting Cut-off (ug/L)	OTHER (CONT.)	Reporting Cut-off (ug/L)
Amoxapine	25	Aripiprazole	50	Benzoyllecgonine (cocaine metab.)	50	Promethazine	50
Bupropion	25	Asenapine	50	Brompheniramine	50	Zolpidem [†]	25
Citalopram	50	Chlorpromazine	50	Buspirone	50	Zolpidem-PCA [†] (zolpidem metab.)	25
Clomipramine	25	Clozapine	50	Carbamazepine	50	Zopiclone [†]	5
Desipramine	25	Dehydroaripiprazole (aripiprazole metab.)	50	Carbamazepine_EPX (carbamazepine metab.)	50		
Desmethylcitalopram (citalopram metab.)	50	Fluphenazine	50	Carisoprodol	50		
Desmethyldoxepin (doxepin metab.)	25	Haloperidol	50	Chlorpheniramine	50		
Desmethyltrimipramine (imipramine metab.)	25	HO-Quetiapine (quetiapine metab.)	50	Cocaethylene (ethanol/cocaine metab.)	25		
Doxepin	25	HO-Risperidone (risperidone metab.)	50	Cyclobenzaprine	50		
Duloxetine	25	Lurasidone	50	Dehydronorketamine (ketamine metab.)	50		
Fluoxetine	25	N-Desmethylclozapine (clozapine metab.)	50	Desmethylozopiclone [†] (zopiclone metab.)	5		
HO-Bupropion (bupropion metab.)	25	N-Desmethylolanzapine (olanzapine metab.)	50	Diphenhydramine	50		
Imipramine	25	Norquetiapine (quetiapine metab.)	50	Ephedrine	150		
mCPP (trazodone metab.)	25	Olanzapine	50	Gabapentin	500		
Mirtazapine	25	Quetiapine	50	Ketamine	50		
N-Desmethylclomipramine (clomipramine metab.)	25	Risperidone	50	Levamisole (cocaine cutting agent)	5		
N-Desmethylmirtazapine (mirtazapine metab.)	25			Lidocaine	50		
Norfluoxetine (fluoxetine metab.)	50	CANNABINOIDS	Reporting Cut-off (ug/L)	Meprobamate (carisoprodol metab.)	50		
Nortriptyline (amitriptyline metab.)	25	THCA (cannabis metab.)	25	Methaqualone	50		
O-Desmethylvenlafaxine (venlafaxine metab.)	50	JWH-018_4-OH [‡] (JWH-018 metab.)	25	Methoxetamine	50		
Paroxetine	25	JWH-019_5-OH [‡] (JWH-019 metab.)	25	N-Desmethylozopiclone (zopiclone metab.)	50		
Sertraline	25	JWH-073_3-OH [‡] (JWH-073 metab.)	25	Norketamine (ketamine metab.)	50		
Trazodone	25	UR-144_5-OH [‡] (UR-144 metab.)	25	Phencyclidine (PCP)	50		
Trimipramine	25	XLR-11_4-OH [‡] (XLR-11 metab.)	25	Pregabalin	50		
Venlafaxine	50	[‡] Synthetic cannabinoids "Spice"		Pseudoephedrine	150	[†] Z-drugs	

APPENDIX B: Substances Detected by Class and Subclass

Class	Subclass	2018 (n)	2019 (n)
Antidepressant	SSRI and other non-tricyclic antidepressants	40	59
	Tricyclic antidepressants	19	24
Antipsychotic	Antipsychotic	30	58
Benzodiazepine/ z-drug	Benzodiazepine	23	26
	Z-drugs	9	13
Cannabis	Cannabis	150	261
Dissociative	Dextromethorphan	7	28
	Ketamine	5	0
Gabapentinoid	Gabapentin and pregabalin	34	55
Opioid	Buprenorphine	18	32
	Codeine	105	108
	Fentanyl	183	306
	Diacetylmorphine/Morphine*	170	225
	Hydromorphone	63	62
	Methadone	97	121
	Oxycodone	2	1
	Tramadol	2	2
Opioid antagonist	Naloxone	18	22
	Naltrexone	1	2
Other	Levamisole	32	23
	Lidocaine	2	6
	Mood stabilizers/ antiepileptic	1	2
	Muscle relaxants	9	8
Over-the-counter	Antihistamine	18	25
Stimulant	Cathinone	0	4
	Cocaine	131	215
	Ephedrine and pseudoephedrine	18	52
	MDMA and related compounds	1	5
	Methamphetamine/ Amphetamine	223	454
	Methylphenidate	7	18
None	Nothing detected	4	11

*Diacetylmorphine (heroin) use was detected in 81 samples in 2018 and 64 samples in 2019. Since diacetylmorphine is rapidly metabolized to morphine, it may be difficult to discern between diacetylmorphine or morphine use.