Drug and Alcohol Dependence 205 (2019) 107589

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Drug checking services at music festivals and events in a Canadian setting

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ARTICLE INFO

Keywords:
Drug checking
Harm reduction
Festivals
Public health

ABSTRACT

Objectives: Drug checking is a harm reduction intervention that allows for identification of drug composition. The objective of the study was to assess drug market components and concordance between expected substance reported by clients and results from point-of-care drug checking at music festivals and events in British Columbia.

Methods: From July to September 2018, we provided drug checking services at four events using combination Fourier Transform Infrared (FTIR) spectroscopy and fentanyl immunoassay strips. We measured concordance between expected substance as reported by clients to the results from the FTIR/fentanyl immunoassay strip and tracked unexpected adulterants.

Results: In total, 336 checks were completed. Most samples were expected by clients to be psychedelics (69.3%) or stimulants (19.6%). Of the 233 psychedelic samples, 169 (72.5%) contained the expected, unadulterated substance, and 27 (11.6%) contained additional contaminants. Of 66 stimulant samples, 41 (62.1%) contained expected substance, while 24 (36.4%) contained additional contaminants. Unexpected adulterants such as fentanyl, levamisole, and phenacetin were also found, in addition to several novel psychoactive substances.

Discussion: We found a large proportion of substances that contained unexpected adulterants. Our findings highlight the value of continued drug checking and will be helpful in designing future harm reduction interventions in similar contexts.

1. Introduction

Globally, illicit drug use is a common occurrence among attendees of electronic dance music festivals (European Monitoring Centre for Drugs and Drug Addiction, 2016; Mohr et al., 2018). Previous studies have shown that compared to the general population, festival attendees have a higher risk profile as a result of the use of such substances, which can cause significant physical and psychological harm (e.g., hyperthermia, seizures, multiorgan failure) (Dillon et al., 2003; Ridpath et al., 2014) and which are a common reason for presentation to emergency departments (Lund and Turris, 2015; Yamamoto et al., 2013).

Drug checking, which aims to provide personalized, fact-based information regarding the composition of substances to people who use drugs, has been implemented as a harm reduction intervention in various countries (Measham, 2018). A growing body of literature has demonstrated the potential for drug checking services to positively influence drug use behavior. For example, some drug checking clients report a decreased intention to use drugs that contain unexpected substances and an increased intention to dispose of such drugs (Measham, 2018; Mema et al., 2018; Saleemi et al., 2017), as well as an increased intention to warn their peers about unexpected substances (Kriener, 2002).

This intervention has particular relevance in light of the continuously shifting market for psychoactive substances (Brunt and Niesink, 2011). It is not uncommon to find adulterants such as legal novel psychoactive substances (NPS) in stimulants and hallucinogens (Mohr et al., 2018; Saleemi et al., 2017), and, concerningly in the context of the ongoing opioid overdose epidemic, there have also been a number of reported cases of fentanyl adulteration in recreational drugs such as cocaine (Nolan et al., 2019).

In order to inform public health interventions in communities of

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https://doi.org/10.1016/j.drugalcdep.2019.107589
Received 19 March 2019; Received in revised form 31 July 2019; Accepted 5 August 2019
Available online 04 October 2019
0376-8716/

people who use drugs in party settings, we embarked on a study to assess drug market components in such settings as well as to measure the concordance between expected substance as reported by clients and results from point-of-care drug checking technologies at select music festivals and events in the summer of 2018 in BC.

2. Methods

In October 2017, the BC Centre on Substance Use (BCCSU), in collaboration with community-based partners and regional health authorities, initiated a provincial drug checking pilot project using Bruker ALPHA and ALPHA II Fourier Transform Infrared (FTIR) spectrometers in combination with BTNX fentanyl immunoassay strips (Tupper et al., 2018).[2] The spectrometers measure infrared light absorption to rapidly provide results about the quantity of fentanyl and a wide range of other compounds in a sample. The composition of the substance reported is based on available reference libraries (i.e., current versions of the TICTAC ATR-FTIR Library, the Bruker ATR-FTIR Pharma Library, the Georgia State Crime Laboratory FTIR Library, the Scientific Working Group for the Analysis of Seized Drugs IR Library, and our own developed reference library based on available samples). While FTIR spectroscopy is capable of identifying a wide range of substances in mixtures rapidly and quantitatively (Tupper et al., 2018), it is less capable of detecting substances present below the limit of detection (reported to be 3–4 percent weight) (Sherman et al., 2018). In order to compensate for this limitation, substances were also tested with BTNX fentanyl immunoassay strips, which have a significantly lower detection limit of 0.13 µg/ml (Sherman et al., 2018).

During the course of the study, drug checking services were offered at four festivals, including three outdoor music festivals (i.e., Electric Love Music Festival, Bass Coast, Rifflandia) and Vancouver Pride. The service was limited to the area of the drug checking tent due to legal restrictions around drug checking in the province. The service was voluntary, and clients entered the drug checking tent upon learning about the service through word-of-mouth or service promotion. To test the sample, the technician collected a small (2–3 mg) portion of sample before running the FTIR check. A smaller portion (1–2 mg) was dissolved in approximately 30 mL of water for testing using a fentanyl immunoassay strip. Results were provided back to clients immediately and clients were invited to take back the remainder of their sample if they chose. A volunteer harm reduction worker was onsite and was able to discuss the client's results and any potential health risks associated with using the substance. Data were recorded on what the client expected their substance to be, the color and texture of the sample, and the results of the FTIR spectroscopy and fentanyl immunoassay strip tests. Results regarding unusual or concerning substances were posted outside drug checking tents and were shared with contracted harm reduction groups and regional health authorities. Note that there were no restrictions on the number of samples that each client could have checked.

We measured the concordance between expected substance as reported by the client to the results from the FTIR/immunoassay strip analysis. Substances were ranked according to the following tier system: (1) expected substance present with no contaminants found, (2) expected substance present with inert contaminant(s) found, (3) expected substance present with active (i.e., causes a physiological or psychological effect) contaminant(s) found, (4) unexpected substance present with no traces of expected substance. Inert substances refer to those that do not result in a significant effect in the human body (e.g., sugars, waxes, starches), whereas active substances cause a physiological or psychological effect (e.g., caffeine, methamphetamine, procaine). Substances were categorized broadly based on substance type, namely: psychedelics, stimulants, opioids, depressants, unknown substances, and cross-category mixtures (see Table 1). This study was approved by the University of British Columbia/Providence Health Care Research Ethics Board.

Table 1
Number of drug checks at summer festivals, by client expectation.

Expected Substance	Number of samples checked
Psychedelics	**233**
3,4-methylenedioxy-methamphetamine (MDMA)	141
3,4-methylenedioxyamphetamine (MDA)	17
2C family drugs	10
Ketamine	61
N, N-dimethyltryptamine (DMT)	1
Changa	1
4-acetoxy-N,N-dimethyltryptamine (4-AcO-DMT)	1
4-hydroxy-N-methyl-N-ethyltryptamine (4-HO-MET)	1
Stimulants	**66**
Cocaine	62
Methamphetamine	3
4-Fluoroamphetamine	1
Opioids	**0**
Depressants	**5**
Alprazolam	2
Gamma-hydroxybutyrate (GHB)	2
Gamma-butyrolactone (GLB)	1
Cross-Category Mixture	**1**
Mixture of MDMA, ketamine, and methamphetamine	**1**
Unknown Substances	**31**
TOTAL	**336**

As it was determined that people who use drugs may be hesitant to engage with drug checking services due to stigma and various fears, including confiscation of substances, removal from the event, and arrest, the drug checking service was provided anonymously, and clients were not tracked. This was done in order to reduce potential barriers to accessing the service. As a result, demographic data were not collected in the course of this study and it cannot be determined how many individual clients submitted samples.

3. Results

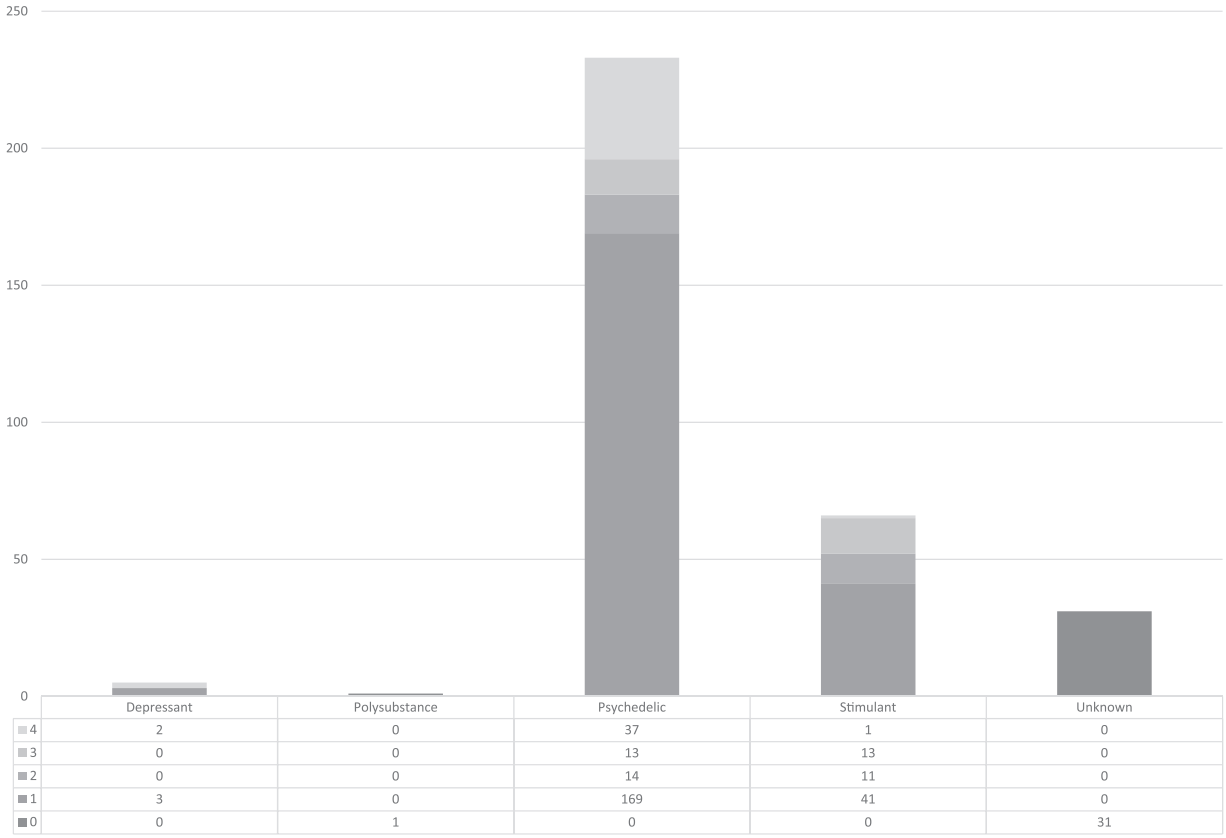
3.1. Type of substances tested

During the service period, a total of 336 drug checks were completed at the following festivals between July and September 2018: 157 drug checks at Electric Love; 133 drug checks at Bass Coast; 29 drug checks at Rifflandia; and 17 drug checks during and around Vancouver Pride Festival. See Table 1 for a list of all samples checked using the point-of-care methods.

As shown in Table 1, the majority of clients expected their drugs to be psychedelics (233, 69.3%), with the second highest category of drugs checked expected to be stimulants (66, 19.6%). Only a small number of samples (6, 1.8%) fell into other drug classification categories (e.g., depressants and cross-category mixtures). Clients did not report an expectation for 31 of the samples. No substances expected to be opioids were tested at these events.

3.2. Client expectation vs. point-of-care results

As shown in Fig. 1, the degree of concordance between client expectation and point-of-care results varied based on substance category. Of the 233 expected psychedelic samples, 169 (72.5%) were found to contain the expected, unadulterated substance. Twenty-seven (11.6%) samples contained unexpected inert or active contaminants and 37 (15.9%) samples contained none of the expected substance. Of the 66 expected stimulant samples, 41 (62.1%) were found to contain the expected, unadulterated substance, while 24 (36.4%) contained unexpected inert or active contaminants and 1 (1.5%) contained none of the expected substance. Four of the 5 (80.0%) depressant samples contained the expected substance. Concordance could not be determined for the 31 samples that were presented by clients as unknown.



	Depressant	Polysubstance	Psychedelic	Stimulant	Unknown
4	2	0	37	1	0
3	0	0	13	13	0
2	0	0	14	11	0
1	3	0	169	41	0
0	0	1	0	0	31

Fig. 1. Number of drug checks at summer festivals per tier, by expected drug category.

The single polysubstance sample (expected to be a mixture of ketamine, MDMA, and methamphetamine) was found to only contain MDMA and was not assigned a tier.

3.3. Unexpected adulterants

While the standard drug checking protocol was to conduct fentanyl immunoassay strip tests on all samples, clients declined this test in 42 of 336 samples (12.5%). In these cases, clients typically cited a lack of concern over the possibility of the presence of fentanyl. Of the 294 samples tested with fentanyl immunoassay strips, 1 sample tested positive. This sample was an unknown pill brought to the drug checking tent by the medical team at Electric Love after they responded to a suspected opioid overdose.

FTIR spectroscopy detected a carcinogenic compound, phenacetin, in 5 samples (all expected to be cocaine), as well as levamisole in 3 samples (2 expected cocaine samples and 1 expected ketamine sample). Several NPS were also found among all categories of substances tested, including 2C series phenethylamines (n = 7), 1-benzylpiperazine (BZP) (n = 2), 1-(3-trifluoromethylphenyl) (TFMPP) (n = 2), and heliomethylamine (n = 1).

4. Discussion

We found psychedelics and stimulants to be the most common drugs checked, with more than one-quarter of all samples checked contained additional unexpected substances. The prevalence of psychedelics and stimulants is consistent with the types of drugs commonly checked at music festivals in other locales, including the UK (Measham, 2018) and Australia (Butterfield et al., 2016). Several of the substances found have serious potential health implications, including levamisole, fentanyl, and phenacetin, as well as several NPS.

Despite the rampancy of fentanyl adulteration of the opioid supply in the region, we found only one sample in this study that tested positive for fentanyl, confirming that the prevalence of fentanyl may be relatively contained to the illicit opioid supply. However, the illicit drug supply continues to be uncontrolled and dynamic (Prekupec et al., 2017) and opioid overdose public health emergency is ongoing. Despite the fact that only one sample tested positive for fentanyl, there were a number of unexpected adulterants found in drug samples in festival settings; thus, continued monitoring of the illicit drug supply is essential for individual risk assessment and public health surveillance in this context. While beyond the scope of the present study, exploring the benefits of monitoring the drug supply in street-entrenched settings may also be warranted.

Although this study found very little fentanyl adulteration in the drugs tested at events in the region, drugs used in recreational settings are at risk of being contaminated with a wide variety of other harmful substances. Consistent with studies in other settings (Blanckaert et al., 2018), we found some samples to be contaminated with non-opioid adulterants that have the potential to cause adverse health outcomes. For example, levamisole, widely found as an adulterant in cocaine, is associated with a range of health complications (e.g., neutropenia, agranulocytosis, arthralgias, retiform purpura, skin necrosis) (Lee et al., 2012), and phenacetin is classified as carcinogenic to humans (Health Canada, 2017). As has been seen in drug checking conducted in similar settings globally (Mohr et al., 2018; Saleemi et al., 2017), several NPS were also discovered in the course of this study; ingestion of some NPS have been found to result in adverse events and fatalities (Mohr et al., 2018).

Evidence exists to suggest that drug checking can influence drug use patterns (e.g., discarding unexpected substances) (Measham, 2018; Mema et al., 2018; Saleemi et al., 2017); however, given the anonymity of the drug checking service, we were unable to measure changes in drug consumption behaviours. Future research should seek to further understand changes in festival attendees' attitude towards drug

consumption and behavioural modifications as a result of drug checking.

There are several limitations to this study. Due to the small sample size and rapidly changing drug market, results may not be generalizable to other settings. Furthermore, the portion of a drug sample that was tested may not reflect heterogeneity in the overall composition of the larger batch and samples were not tested with gold standard analytical instruments (e.g., gas chromatography mass spectrometry). Therefore, it was not possible to determine the validity of the FTIR/test strip analysis.

This study yielded important information about the recreational drug supply circulating at festivals in BC. We found that more than a quarter of all samples contained adulterants unexpected by clients, some of which have serious potential health implications. In light of the small study sample size and rapidly changing drug market, our findings highlight the value of continued monitoring of the illicit drug supply at festivals and dissemination of results to attendees.

Role of funding source

The study was supported by a Health Canada Substance Use and Addictions Program grant to the BC Centre on Substance Use to implement and evaluate a drug checking pilot in British Columbia (Arrangement #: 1718-HQ-000024). Funding agencies had no role in the research, design, or writing of the manuscript, nor did they have a role in the decision to submit the paper for publication.

Contributors

KM and LT conceived of the study and provided critical input into the manuscript and interpretation of findings. KM prepared the first draft of the manuscript. ST collected, prepared and analyzed data and edited drafts of the manuscript. All authors have provided critical comments on the first draft and approved the final version.

Declaration of Competing Interest

No conflict declared.

Acknowledgments

The authors would like to express our sincere thanks to current and past researchers and staff. This research was undertaken, in part, thanks to funding from the Canada Research Chairs program through a Tier 1 Canada Research Chair in Addiction Medicine which supports EW. LT is supported by a Michael Smith Foundation for Health Research (MSFHR) Scholar Award.

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