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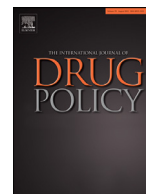
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Research paper

Changes in substance supply and use characteristics among people who use drugs (PWUD) during the COVID-19 global pandemic: A national qualitative assessment in Canada



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ABSTRACT

Background: People who use drugs (PWUD) may be at an increased risk of experiencing negative effects related to COVID-19. Border and non-essential service closures may have placed PWUD at an increased risk of experiencing unintended consequences regarding drug consumption and supply patterns, as well as related outcomes. However, the extent of these effects upon this population is unknown. The current study examined how COVID-19 has impacted substance use supply and use characteristics among a national cohort of PWUD in Canada.

Methods: We conducted semi-structured one-on-one telephone-based interviews with 200 adult PWUD across Canada who were currently using a licit or illicit psychoactive substance at least weekly, and/or currently receiving opioid agonist treatment (OAT). Thematic analyses were conducted using qualitative software.

Results: PWUD attributed adverse changes to their substance use frequency, supply, use patterns, and risk behaviors and outcomes to COVID-19. Many participants noted supply disruptions with the majority indicating a decrease in potency and availability, and an increase in the price of substances since COVID-19. Nearly half of participants specified that they had increased their substance use, with some experiencing relapses. In terms of changes to risk level, many participants perceived they were at a greater risk for experiencing an overdose.

Conclusion: This study demonstrated the impacts of COVID-19 on PWUD, including a significant disruption substance supply. For many, these changes led to increased use and substitution for toxic and adulterated substances, which ultimately amplified PWUD's risk for experiencing related harms, including overdoses. These findings warrant the need for improved supports and services, as well as accessibility of safe supply programs, take home naloxone kits, and novel approaches to ensure PWUD have the tools necessary to mitigate risk when using substances.

Abbreviations: PWUD, People who use(d) drugs; OAT, Opioid agonist Treatment; COPD, Chronic obstructive pulmonary diseases; CRISM, Canadian Research Initiative in Substance Misuse; THN, Take home naloxone.

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Background

The COVID-19 global pandemic has raised concerns regarding the disproportionate impact it may have on people who use drugs (PWUD). PWUD may be at increased risk of COVID-19 infection and adverse health outcomes due to the high prevalence of pre-existing chronic conditions, such as chronic obstructive pulmonary diseases (COPD), HIV, and hepatitis, among others (Armitage, 2020; Bahorik, Satre, Kline-Simon, Weisner, & Campbell, 2017; European Monitoring Centre for Drugs & Drug Addiction [EMCDDA], 2020a; Ornell et al., 2020a; Zhou et al., 2020). In response to COVID-19, in March 2020, many jurisdictions across Canada implemented public health measures, such as social distancing, closures of non-essential businesses and services, and limiting social gatherings (Government of Canada, 2020). Some reports have shown that these pandemic response measures have negatively impacted the lives of PWUD (Canadian Centre of Substance Use & Addiction [CCSA], 2020a; EMCDDA, 2020b). For example, business and border closures, including limitations on non-essential travel due to the pandemic have affected the illicit drug supply across the world (EMCDDA, 2020c; World Drug Report, 2020) including in Canada (CCSA, 2020a). A recent report found that PWUD have experienced a reduction in their drug supply, exacerbated by increased cost and compromised quality (CCSA, 2020a) which could potentially worsen related health consequences, including risk of overdose, drug poisonings and unsupported withdrawals. In Canada, preliminary reports from select jurisdictions have shown increased opioid-related overdose deaths during the pandemic (British Columbia Coroners Service, 2020a; Public Health Agency of Canada [PHAC], 2020; Toronto Public Health [TPH], 2020). For instance, a British Columbia Coroners Service (2020a) report found a 93% increase in the suspected illicit drug toxicity deaths in May 2020 compared to May 2019, while in Ontario, the average weekly overdose death rate increased by 38% in the first fifteen weeks of COVID-19 compared to the fifteen weeks before (Ontario Drug Policy Research Network [ODPRN], 2020).

Changes in drug consumption patterns among PWUD have also been observed during COVID-19 in some countries, including within the European Union and China (EMCDDA, 2020d; Sun et al., 2020). While the consumption of certain substances, such as cocaine, heroin and MDMA decreased in the initial months of the pandemic due to declines in social gatherings, consumption of other drugs such as alcohol (EMCDDA, 2020d; Sun et al., 2020) and prescription medications increased (EMCDDA, 2020d). Furthermore, the pandemic has caused a shift in drug preferences among PWUD, where some individuals are opting to consume licit drugs, such as alcohol, due to ease of access and availability, rather than continuing to use their preferred illicit substances (EMCDDA, 2020d). Moreover, social and psychological issues associated with self-isolation and social distancing measures have been shown to increase the likelihood of experiencing anger, anxiety, boredom, depression and fear (Chou, Liang, & Sareen, 2011; Ornell, Schuch, Sordi, & Kessler, 2020b; Statistics Canada, 2020a), which may increase risk of relapse and drug consumption (Chou, Liang, and Sareen, 2011; Serafini, Toohey, Kiluk, and Carroll, 2016; Sinha et al., 2009; Statistics Canada, 2020b). These effects have been observed among PWUD in Europe and Canada during COVID-19 (CCSA, 2020b; EMCDDA, 2020d).

Often neglected in the COVID-19 global pandemic discussions thus far are experiences and opinions of PWUD. While there has been an identified need to understand the impact of the pandemic on PWUD, there is a paucity of research investigating the implications and impacts that COVID-19 has had on the health and well-being of PWUD within Canada, particularly by those directly impacted. The current study therefore addresses an important gap in the literature by conducting qualitative interviews with PWUD across Canada to understand how COVID-19 has impacted the substance supply, as well as substance use patterns. The findings from this research will be used to inform responses to the crisis for PWUD.

Methods

Study design

The present qualitative study consisted of semi-structured, one-on-one telephone interviews conducted by trained members of the research team. The interview guide, developed in consultation with peer advisors, focused on exploratory questions identifying the needs and challenges of PWUD during the current pandemic, including specific questions related to changes to substance use frequency, substance use characteristics, and substance supply during the COVID-19 pandemic. See Supplemental Figure for interview guide.

The study protocol and all procedures were approved by the center for Addiction and Mental Health Research Ethics Board (#049/2020), and by the center Hospitalier de l'Université de Montréal (CHUM) Research Ethics Board (#20.053).

Participant recruitment and eligibility

Participants were recruited using a convenience sampling method. A digital recruitment poster was circulated among the national Canadian Research Initiative in Substance Misuse (Canadian Research Initiative in Substance Misuse- Initiative canadienne de echerché en abus de substances (CRISM-ICRAS), n.d) network contacts, peer advisors, partner organizations and services used by PWUD, with minimum targeted participation of 30 PWUD from each province. Interested participants contacted the research team via telephone or email and were subsequently screened for eligibility.

Francoophone participants were recruited from a pre-existing study cohort (HEPCO Cohort) of injection drug users with a history of HIV and/or HCV infection, residing in the greater Montreal area. All Francoophone interviews were conducted with French-speaking members of the research team from the center Hospitalier de l'Université de Montréal (CHUM) in Quebec.

Eligible participants were adults 18 years of age or older, current residents of Canada, fluent in English or French, and currently (at least once per week) using a licit or illicit psychoactive substance and/or currently receiving opioid agonist therapy (OAT) treatment.

Data collection and analysis

Data was collected between May 4, 2020 and July 27, 2020. After obtaining consent, interviews were conducted by telephone and audio recorded (lasting from 30 min to 1 hour). Study participants were provided a \$30 honorarium (via E-transfer or MoneyGram). Transcripts were anonymized to ensure confidentiality and audio recordings were deleted upon transcription. Francoophone interviews were translated into English, transcribed, and amalgamated with the English transcriptions for collaborative analysis.

All transcripts were uploaded to qualitative analysis software (NVivo 12) for analysis. Prior to coding the transcripts using NVivo, the research team developed and agreed upon an extensive codebook of major themes, which were initially informed by the overarching questions asked in the interview guide. Each theme was further broken down into sub-categories and emerging and additional themes were added to the codebook as they arose during analysis. A single member of the research team (CR) initially coded all transcripts. To ensure accurate and reliable coding, an independent coder (FA) coded a randomly selected sample (20%) of the transcripts. A final average kappa coefficient of 0.75 and inter-coder agreement of 99.29% was obtained, after codes with low kappa scores were discussed and discrepancies were resolved.

A total of $n = 255$ PWUD across Canada expressed an interest in participation. Of these, $n = 14$ were not eligible and $n = 41$ either could not be reached or subsequently declined participation. A final total of $n = 200$ participants completed the interviews.

Results

Sample characteristics

Sample characteristics are presented in Table 1. The majority (56%) of participants were male, and 59% of participants reported their ethno-racial background as Caucasian. The mean age of participants was 41 years old. Just over a third (36%) of participants were on OAT.

Table 1
Demographic characteristics of the study participants.

Demographic Characteristics	Total Sample N = 200 (%)	Atlantic Node N = 32 (%)	British Columbia Node N = 32 (%)	Ontario Node N = 67 (%)	Prairies Node N = 38 (%)	Quebec Node N = 31 (%)
Age (years, mean ± SD)	41.2 ± 11.1	34.4 ± 9.8	42.4 ± 10.5	41.5 ± 11.8	41.6 ± 11.0	45.5 ± 8.8
Age Groups						
18–30	38 (19.0)	12 (37.5)	5 (15.6)	13 (19.4)	6 (15.8)	2 (6.5)
31–45	90 (45.0)	17 (53.1)	14 (43.8)	29 (43.3)	18 (47.4)	12 (38.7)
46–64	70 (35.0)	3 (9.4)	12 (37.5)	24 (35.8)	14 (36.8)	17 (54.8)
≥ 65	2 (1.0)	0	1 (3.1)	1 (1.5)	0	0
Gender						
Male	112 (56.0)	21 (65.6)	16 (50.0)	36 (53.7)	19 (50.0)	20 (64.5)
Female	81 (40.5)	10 (31.3)	15 (46.9)	27 (40.3)	18 (47.4)	11 (35.5)
Other ^a	7 (3.5)	1 (3.1)	1 (3.1)	4 (6.0)	1 (2.6)	0
Ethnicity						
Caucasian	118 (59.0)	24 (75.0)	17 (53.1)	41 (61.2)	16 (42.1)	20 (64.5)
Indigenous	58 (29.0)	7 (21.9)	14 (43.8)	14 (20.9)	21 (55.3)	2 (6.5)
Other	24 (12.0)	1 (3.1)	1 (3.1)	12 (17.9)	1 (2.6)	9 (29.0)
Opioid Agonist Therapy						
No	128 (64.0)	17 (53.1)	15 (46.9)	48 (71.6)	32 (84.2)	16 (51.6)
Yes	72 (36.0)	15 (46.9)	17 (53.1)	19 (28.4)	6 (15.8)	15 (48.4)
Methadone	49 (68.1)	8 (53.3)	12 (70.6)	15 (79.0)	1 (16.7)	13 (86.7)
Suboxone	12 (16.7)	7 (46.7)	2 (11.8)	2 (10.5)	0	1 (6.7)
Other	11 (15.3)	0	3 (17.7)	2 (10.5)	5 (83.3)	1 (6.7)
Living Situation						
Housed	149 (74.5)	20 (62.5)	13 (40.6)	55 (82.1)	33 (86.8)	28 (90.3)
Transient	18 (9.0)	7 (21.9)	4 (12.5)	3 (4.5)	1 (2.6)	3 (9.7)
Shelter	13 (6.5)	4 (12.5)	3 (9.4)	6 (9.0)	0	0
Homeless/Street	20 (10.0)	1 (3.1)	12 (37.5)	3 (4.5)	4 (10.5)	0

^a Transgender/Non-binary.

Among participants who specified which substances they were currently using (98%; n = 196), stimulants were the most commonly used psychoactive drugs (74%; n = 145), followed by opioids (excluding OAT) (60%; n = 117). (See Table 2 for complete substance use breakdown).

Table 2
Current substance use among study participants.

Substances Used ^a	Participants N (%)
Polysubstance	147 (75%)
Stimulants	145 (74%)
Opioids	117 (60%)
Cannabis	82 (42%)
Alcohol	38 (19%)
Benzodiazepines	31 (16%)
Hallucinogens	9 (5%)

^a Substances used were not mutually exclusive and percentages for each substance category were calculated out of the total who specified which substances they were currently using (N = 196). ‘Stimulants’ primarily included uppers such as cocaine, crack-cocaine and amphetamines including methamphetamine/crystal meth; ‘Opioids’ primarily included downers including both illicit and pharmaceutical opioids such as hydro-morphine, heroin and fentanyl, but excluded references to OAT such as Suboxone or methadone; ‘Benzodiazepines’ primarily included Xanax and Valium, as well as other anti-anxiety and anti-depressants; ‘Hallucinogens’ primarily included party drugs such as MDMA, LSD, Ecstasy, mushrooms and GHB. ‘Polysubstance’ use included reference to using two or more categories of substances, as well as using speedballs (a combination of stimulants and opioids).

Qualitative results

Table 3 provides an overview of the major impacts of COVID-19 on participants’ substance supply and substance use characteristics. While there was a total of 200 participants that participated in the study, not every individual raised each issue as it may not have been relevant. As a result, the percentages provided are based on the participants that discussed each respective theme. It is also important to note that some participants may have discussed different experiences within the same

theme, for instance, a participant may have discussed increased substance use at the beginning of the pandemic, but decreased use at a later time.

Table 3
Major changes and impacts due to COVID-19.

Overarching Theme(s) and Sub-Theme(s) ^a	Frequency of participants who indicated changes n (%)	Percentage out of total sample (n = 200) (%)
Indicated changes to substance supply		
Quality of substances decreased (N = 153)	94 (61%)	47%
Cost of substances increased (N = 162)	100 (62%)	50%
Accessibility of substances decreased (N = 151)	88 (58%)	44%
Indicated changes to substance use frequency		
Increased use (N = 196)	92 (47%)	46%
Relapsed (N = 196)	14 (7%)	7%
Decreased use (N = 196)	75 (38%)	38%
Indicated changes to substance use characteristics		
Use characteristics (e.g., use alone, use with others) (N = 182)	73 (40%)	37%
Location of use (N = 131)	44 (34%)	22%
Indicated increases in potential risk		
Substituted for other substances (N = 94)	57 (61%)	29%
Re-used paraphernalia due to COVID-19 (N = 64)	30 (47%)	15%
Overdose risk increased (N = 173)	66 (38%)	33%

^a For clarification and illustrative purposes, we have provided the total number (N) of participants who discussed each respective theme in the left-hand column, and the total number of participants who indicated experiencing the respective change or impact to this theme in the column on the right. We have also included the respective percentage of each out of the total sample on the far right. Categories are not mutually exclusive as participants described experiencing several impacts simultaneously.

Changes to substance supply

Quality and potency of substances. More than three quarters of participants (77%; $n = 153$) discussed whether or not the quality of their substances had been affected by COVID-19, with the majority of those (61%; $n = 94$) indicating a major decrease in the quality or potency of their substances. Participants overwhelmingly detailed accounts of substances being heavily adulterated (e.g., ‘cut’, ‘stomped’, ‘buffed’ etc.) with fillers including unknown substances and chemicals, often decreasing the potency. Participants also indicated that the substances they used tasted, smelled and looked different, and in some instances, were fake and did not produce the desired effect:

“Well it had a certain taste before, now it tastes like heroin sometimes, it tastes like baking soda other times, it tastes like acid sometimes. You never know what you’re getting anymore. You could be paying for crack, but it might not be crack. It’s not dependable, you don’t know what you’re getting any more.” (AN.12)

These changes and fluctuations in supply had unintended negative effects on participants as it often affected their tolerance levels, resulting in participants experiencing withdrawal symptoms more frequently and more quickly than usual. Decreases in tolerance consequently increased their risk for experiencing an irreversible and/or potentially fatal overdose:

“It’s really scary watching the drugs that like changed through this whole like eight, nine-week process because the reactions to it. It’s really scary watching people drop like instantly and then you can Narcan them, but then they still don’t wake up for hours and hours and hours because they’re laced with like so many Benzos. And they’re in, like, excruciating pain, even though they’ve taken like so much fentanyl and this isn’t something that I want for myself.” (ON.07)

Price or cost of substances. In addition to fluctuations in substance potency, many participants (81%; $n = 162$) discussed changes to the price of substances, with the majority of those (62%; $n = 100$) indicating substantial increases since COVID-19. Some of the increases in prices were substance-specific, however, in general, participants reported that prices for substances had increased overall: *“The price has skyrocketed. It’s like it’s their world now, so they have opportunities to just mix it in with all kinds of crap. It’s just not the same. It’s disgusting. And they’re charging like almost double now.” (ON.15)* Many participants indicated that prices had doubled, tripled, or even quadrupled and that because of this, they were spending more than usual on substances.

Consequently, more than half (61%; $n = 57$) of participants who discussed drug substitution (47%; $n = 94$), indicated having to substitute their substance for a more affordable one during COVID-19: *“So I’m kind of substituting those for the hydromorphone or the Dilaudid and I mean the price is \$2 to \$3 a pill compared to the hydro’s \$20 to \$30 a pill, right?” (AN.33)*

Some participants indicated that they were not only spending more overall, but they were now spending more at a time as well. Reasons for doing so included an increase in their use, or because they changed the way they administered or received the product, such as opting for delivery services in order to minimize going into public, which cost more money.

For some other participants, prices did not necessarily increase, but the quantity of substance they received had decreased, so that they were essentially paying the same, or more than usual, for less product (or a less potent product). These changes led some participants to suggest that the suppliers were taking advantage of the disrupted supply chain.

Availability or accessibility of substances. Over three-quarters of participants (76%; $n = 151$) discussed changes to the availability of substances, with many (58%; $n = 88$) of those explaining that there was a noticeable decrease in availability; an issue which was exacerbated by decreases in the quality and increases in the cost of substances. Some participants

described that due to public health measures meant to limit social interactions (including closures of ‘non-essential’ services and ‘stay-at-home’ orders), they had a hard time finding a dealer because there were not as many dealers out in public nor visible on the street. As a result, some indicated that they had to wait days or travel very far to obtain their preferred substance(s):

“It’s just sometimes it’s been like a waiting game because they can’t get a hold of the person or the person isn’t making as many trips or whatever the case is. So people aren’t being as available I guess as they were before maybe? Or they’re not having as much available. Normally, it’s just a phone call and no big deal, but where it’s been waiting a day or two or three sometimes. I noticed that never used to be a problem before. If I couldn’t get hold of the one person, there was always somebody else like within a couple of minute’s phone calls.” (BN.15)

For a number of participants, the increasing supply issues resulted in PWUD having to either change their suppliers or in their typical interaction with their supplier. Some participants discussed how their suppliers did not feel comfortable being in public to engage in the transaction, for fear of catching the virus or being more visible to the police, and thus at a heightened risk of potential criminalization. This made it more difficult for PWUD to meet with their regular suppliers and access their substances. Additionally, there were instances noted where participants had to search outside their regular supplier in order to access their substance of choice. This at times, created a sense of vulnerability as participants expressed feeling more susceptible of being taken advantage of in terms of cost, obtaining substances that they did not trust, or experience increased exposure in public in their attempt to acquire their substances. These changes were expressed by one participant:

“Actually you know what, it [interaction with the dealer] has changed because it’s hard to get it through people, so everybody’s you know, doing what they’re doing, cutting their shit, trying to extend it out, and when they run out, then you gotta go through somebody else that you don’t know.” (AN.09)

Some participants described how the lack of availability of their substance(s) of choice resulted in negative effects, such as increased withdrawal symptoms or ‘dope sickness’, or having to spend more time searching for quality substances, thus increasing their risk for virus exposure. For some, the inaccessibility combined with the increased cost of their preferred substance led them to substitute for whatever was available, including potentially contaminated drugs.

Changes to substance use frequency and characteristics

Increased substance use. Among participants who discussed changes to substance use frequency (98%; $n = 196$), nearly half (47%; $n = 92$) of those indicated an increase in their substance use since COVID-19. One of the most common reasons for this change was related to loss of employment or fear of catching the virus, where participants found themselves staying at home and experiencing ‘boredom’ more often due to having to self-isolate and socially distance from others:

“Um, I find that I’m home more often because I don’t wanna get on the bus because of the disease and all that, and I don’t really wanna be out around it. I’m finding that I’m home more and I’m bored, and when I’m bored I find I use crack because I’m on methadone and opiates... only thing I can use is uppers and I find that I’m using more now than I was before because I’m home all the time.” (AN.09)

Some participants explained that their use had increased specifically as a coping mechanism to deal with the negative physical, mental and social impacts of COVID-19. A handful of participants indicated that their physical pain had specifically increased due to the effects of COVID-19 and being confined indoors or to disruptions in access to services (e.g., OAT) that would typically lessen pain and/or any withdrawal symptoms. Further, some participants discussed how an increase in use

was due to self-medicating, where they were using substances to induce sleep, or to numb mental or physical pain:

“When COVID first started coming up, we were so busy, we were working such long hours and I was physically ruined...my back was really bad, I was aching all over, despite being on methadone and stuff, the pain was unbearable, I was using more. I would come home from work after a long day and use again to just cope with the idea of being able to go in again tomorrow. And I was kind of eating less at the time too, I lost some weight, just physically in a lot of pain.” (BN.03)

Outside of individual-level reasons for increased use, many participants explained that their use was dependent on their substance supply. In areas where supply had been greatly affected, participants would often buy more at a time because they were unsure when the next time they would be able to access their substances, which often led to increased use:

“I find that I use more because when there’s stuff around I tend to get more of it because you don’t know when they’re gonna get it next, or you don’t know when there’s gonna be more. So you end up buying more, and then when you have more, you end up doing more.” (AN.10)

For others, frequency of use depended on the quality of the substance. Due to decreases in quality, where many substances did not produce the usual effects, some participants indicated using more at a time in order to ‘feel’ the desired effects from ‘weaker’ substances. Consequently, participants were worried that this increase in use had affected their level of tolerance, which was concerning for some.

Relapse. Importantly, among those who discussed changes to use, a few (7%; $n = 14$) participants indicated that they had relapsed due to COVID-19. For these individuals, losing stability in their lives, such as jobs, daily routines, social and substance use supports, or experiencing increased negative mental and physical health impacts was a catalyst to relapse: *“I was sober for like two years, had no plans on using again, but just with like the isolation and the uncertainty, yeah, I just – I started using again. And yeah, it’s been really difficult for me this whole COVID-19” (ON.07)*. For others, inaccessibility of specific substance use services due to closures and reductions in service capacity (including moving from face-to-face to online-based meetings) contributed to their relapse:

“When the pandemic started and that, I was clean for ten months, and when I relapsed – like, I belong to AA [alcoholics anonymous], and then I relapsed, and I just started getting back to going to the meetings and then, like the meetings were closed down and that.” (ON.37)

Participants elaborated on the ways in which relapsing had affected them, with some explaining that they had been doing really well and in recovery before COVID-19 and since their relapse, their use had accelerated which had resulted in a number of negative impacts: *“I just recently had a relapse and I ended up getting Hepatitis C. So now I guess that’s a concern with me regarding, you know, being sick and how that potentially could affect me. You know what I mean?” (AN.20)*

Others explained that their relapse was due to experiencing intense mental health issues and related stress that COVID-19 elicited. Some participants explained that they had relapsed because using substances was the only coping mechanism they knew.

Decreased substance use. While most participants who discussed changes to their substance use reported an increase, a relatively smaller percentage (38%; $n = 75$) indicated using less since COVID-19. Explanations for this included not wanting to go out into public and limiting social interactions to avoid the risk of contracting the virus, which was especially common among immunocompromised individuals. A few participants indicated using less because they no longer had access to the places that they previously visited to obtain and utilize their substances, including public spaces and supervised consumption sites. For some this

contributed to a decrease in use as they preferred to engage in substance use in private, yet had fewer places to do this:

“It [drug use] has slowed down. I usually use, like in a bathroom or something, but because of the lockdown and, like not a lot of places are open, like you can’t even go inside, so now I just have to wait for, like at home to use.” (ON.38)

Some participants explained that they were no longer able to financially support their substance use habits as a result of experiencing increased income insecurity during the pandemic. Other reasons for decreased substance use were related to substance supply such as decreased quality and increased prices, which deterred participants from using. Participants explained that they did not trust the potentially toxic substance supply, and did not want to ingest a substance they were unsure of:

“Drugs are harder to get and people are less willing to part with supplies, and then also I found that, say for example, cocaine, the quality has really went down. It’s really hard to find good quality product. I don’t know what it was cut with, but it’s not good product and it scares me. I like to know what I’m ingesting.” (AN.17)

For some participants, decreases in use were perceived as a beneficial unintended effect of COVID-19, as explained by one participant: *“I’m using less amphetamines. I’m pretty sure my kidney is shutting down every time I use it, and it’s painful, so the limited access to it has had a positive health outcome for me” (AN.17)*.

Risky substance use behaviors. Some participants also expressed changes to their substance use patterns, such as who they typically used substance with, and the location where they consumed their substances. Many indicated that they were more likely to use alone and at home due to COVID-19. This was largely due to the necessity to self-isolate as enforced by public health measures, as well as to the inaccessibility of services and places where they would typically use substances. Those who were homeless or street-entrenched indicated that they had a harder time finding places to use since many restaurants and public washrooms were now closed, and supervised consumption services were operating in a reduced capacity, or sometimes not at all:

“I was using public washrooms or public spaces, there’s a space in downtown in [city name]. It’s not a safe shoot zone or anything like that but you can go there to use, and that’s shut down. Tim Hortons is shut down. You know, everything has shut down so public spaces aren’t really a thing.” (AN.33)

Some participants also reported reusing or sharing paraphernalia such as syringes or pipes and smoking stems. Among those who referenced re-using paraphernalia (32%; $n = 64$), nearly half (47%; $n = 30$) of those specified that this was something they had only done due to the pandemic. One of the more common justifications for this behavior was the reduced capacity of harm reduction services and/or needle exchange programs that typically provided supplies:

“Harm reduction supplies, I’m running out more often than not. And I’m actually at times using my own needles even because I can’t access new ones. It’s just been harder to get and they’re less available. Because I can’t attend the health unit, they’re closed down. I have to make an appointment to go pick them up whereas before I could just drop in. The place that is open 24 h, the drop in, has run out twice since it started. Like a few days they were just out of needles. Just out, with no other option. So at least twice since it started, I had no supplies and none were available.” (ON.56)

Some participants expressed frustration with the inability to obtain a consistent supply of safe and sterile paraphernalia, and recognized that this directly increased their risk of experiencing health-related complications such as an abscess or blood-related infections.

Overdose risk. Among those who discussed their perceived overdose risk (87%; $n = 173$), some reported notable changes to their level of risk, with 38% ($n = 66$) of those expressing the perception that their risk had increased since COVID-19. Reasons for believing that their level of risk had increased differed, were often based on individual substance use histories and substances used, and largely revolved around supply-related issues such as an increasingly contaminated and toxic substance supply (e.g., significant fluctuations in the potency and/or quality of substances):

"I've been using all my life and I've never once overdosed until just a couple weeks ago. I think it's because the drugs are so bad because they can't get them across the borders and stuff now that they're mixing anything and everything with them. So whatever was mixed with the drug that I was doing – I think it was fentanyl or something. The drugs are terrible now and they're cut with everything and anything. You really never know what you're getting." (AN.38)

Compounding this issue were other supply-related issues, such as fluctuations in availability. This would often lead participants to substitute for other substances, or use inconsistently, which also affected their tolerance levels, leaving them at an increased risk for experiencing an overdose: *"So I would say like more fluctuations in my use, or inconsistency in my use, which is going to increase overdose risk"* (ON.06).

Further, participants explained that not only had their risk of experiencing an overdose increased, but that due to social isolation and increases in using alone, they felt especially vulnerable, indicating that they feared an inadequate emergency response if they were to experience an overdose.

Discussion

PWUD have been negatively impacted by the pandemic in ways that put them at greater risk for experiencing substance and health-related harms, including overdoses and a decreased ability to mitigate risk behaviors. Major impacts included significant disruptions to the substance supply, and increases in the frequency of substance use.

As noted, one of the most commonly reported impacts of COVID-19 was changes to substance supply, with most participants indicating that their supply had been disrupted during COVID-19. While disruptions were often substance-specific, overall participants commonly reported substantial decreases in the quality and availability of substances, and increases in price. Participants detailed accounts of substances being contaminated with unknown substances or chemicals, suggesting that substance supply has become particularly toxic since the pandemic began, and that it is directly placing them at a greater risk for experiencing harms. This is in line with preliminary international and national literature which has highlighted major disruptions in substance supply during COVID-19 (CCSA, 2020a; ECMDDA, 2020c) while some jurisdictions across the country have reported that both fatal and non-fatal overdose rates have drastically escalated during the pandemic (British Columbia Coroners Service, 2020a; PHAC, 2020; TPH, 2020).

The rise in overdose incidence is likely related to a combination of decreased substance accessibility which has led to fluctuations in tolerance levels, combined with an increase in highly potent opioids (e.g., fentanyl and fentanyl analogs) and other unknown substances in the illicit drug supply market (United Nations Office on Drugs & Crime, 2017). For instance, in British Columbia, roughly 14% of overdose cases had extreme fentanyl concentrations from April-August 2020, compared to 8% from January 2019-March 2020 (British Columbia Coroners Service, 2020b). In Toronto, an increasing number of 'unexpected' substances (e.g., Carfentanil, horse tranquilizers, synthetic cannabinoids, benzodiazepines, and parasitic infection treatment drugs, among others) have been found in drug samples since COVID-19 (McDonald, Maghsoudi, Thompson, & Werb, 2020). It is therefore plausible that contaminated street drug supply has played a role in the rising overdose rates among PWUD during the pandemic. Our study highlights

an important link between illicit drug supply and health harms such as drug poisoning, overdose risk, and unsupported withdrawals. Illicit drug supply should be considered an important indicator and target for future health policy and pandemic planning. Additionally, public health measures such as stay-at-home orders resulted in increased isolation, which impacted the ability for PWUD to mitigate the risks related to drug use. These risks are exacerbated when PWUD are increasingly using alone in private dwellings where they are less likely to have an overdose attended to, or are using substances as a coping mechanism to support their isolation, boredom or stress.

Supply disruptions have had further unintended consequences such as 'substitution' effects, where PWUD have had to supplement their preferred substance for other – potentially more dangerous – products because of accessibility and affordability issues. This has created an unprecedented vulnerability for PWUD who no longer feel 'safe' using unfamiliar substances. Moreover, this has contributed to changes in tolerance levels and increased withdrawal symptoms, forcing PWUD to spend more time, energy and resources obtaining substances, increasing their risk of contracting COVID-19.

Supply issues often directly and indirectly impacted participant's substance use frequency and related characteristics. While participant experiences with substance use varied greatly and were influenced by personal, social and environmental factors, many indicated substantial changes to their use patterns and practices in light of COVID-19. The most common impacts reported were changes to the frequency of use, including increases in substance use and perceived level of overdose risk, as well as increases in risky use behaviors such as using alone and at home more often, and sharing and re-using substance supplies. Sharing drug use paraphernalia is a contributor to debilitating and chronic diseases such as hepatitis (Craine et al., 2009) and HIV (Chaisson et al., 1989) while using alone and at home are risk factors for fatal overdoses (Davidson et al., 2003; Siegler, Tuazon, Bradley, O'Brien & Paone, 2014). For instance, in British Columbia, 84% of illicit drug toxicity deaths in 2020 (January-September) occurred inside a private residence (British Columbia Coroners Service, 2020b).

It is therefore important that interventions to address these risks are developed and implemented during the pandemic. For example, it is imperative that services which provide sterile supplies (e.g., syringes) to PWUD remain operating at full capacity during the pandemic, and that there are outlets, such as toll-free numbers that PWUD can access for substance use support. Innovative solutions have also been developed, for instance in British Columbia, an application has been developed (the Lifeguard Application) to provide assistance to PWUD who become unresponsive when using alone, thus reducing the risk of fatal overdoses. According to a news source, the app saved 15 lives in a 45-day trial period and a follow-up trial found similar success (Sawyer, 2020). Other interventions, such as peer-developed and run 24/7 overdose prevention-based anonymous hotlines also exist (Grenfell Ministries, n.d.). Further interventions such as increased access to telemedicine and other critical mental health and support services should be made available and accessible to PWUD. Interventions such as these must be scaled-up and widely marketed in order to provide unobstructed access to critical life-saving supports during the pandemic.

Beyond these measures, greater access to take-home naloxone (THN) and drug-testing kits must also be made available. THN programs have led to improved survival rates and reduced opioid overdose mortality, and are associated with a low rate of adverse events (e.g., withdrawal) (McDonald & Strang, 2016). On May 29, 2020, in light of the pandemic, the medical officer of health recommended expansion of the criteria for naloxone distribution to allow any organization serving PWUD to distribute naloxone (TPH, 2020). Some regional efforts exist, such as the expansion of naloxone access in Saskatchewan through pharmacies (Taylor, 2020). However, to-date, there is a lack of systematic efforts to scale up access to THN across Canada during COVID-19.

While THN is an important life-saving tool, it may not be of up-most relevance for those who are using alone and do not have someone

nearby to administer it. Therefore, drug-testing kits are an alternative intervention which can help PWUD test their substances prior to using them. This allows PWUD to understand their level of potential risk for harms, and make informed choices when using substances, ultimately reducing the risk related to the disrupted drug supply. Emerging evidence suggests that off-label (at-home) use of fentanyl test strips by PWUD may lead to safer consumption practices such as reducing their dose (Karamouzian et al., 2018), using less (Peiper et al., 2019), as well as taking precautions such as using with others and/or keeping naloxone nearby (Goldman et al. (2019)). In Canada, self-testing fentanyl strips are becoming increasingly available for home use and are distributed for self-testing outside of supervised consumption services (McGowan, Harris, Platt, Hope, & Rhodes, 2018). Given the evidence, careful implementation of drug-testing kits in combination with other important information (e.g., service referrals) has the potential to help prevent the rising overdose cases during the pandemic.

Although these interventions are necessary to address increased risk for overdoses and health concerns which have been exacerbated by the pandemic, they do not address the root cause of these issues, which is primarily related to the contaminated substance supply. As such, there need to be options for PWUD who are at risk of overdose to have access to an uncontaminated supply of pharmaceutical-grade substances (e.g., opioids or stimulants), alternatively known as 'Safe Supply'. Providing eligible PWUD with greater and timely access to a safe supply of substances is critical during the pandemic, as it would not only alleviate concerns related to overdose risk, but would obviate the need for PWUD to spend time in public obtaining their substances, which would also reduce their risk for virus exposure (Bonn et al., 2020; Tyndall, 2020). While there is limited data on safe supply programs to-date, clinical trials conducted in Canada have found that among severe opioid-dependent users, injectable heroin was more effective in reducing illicit substance use compared to opioid agonist treatments such as methadone (Oviedo-Joekes et al., 2009), while hydromorphone was found to be as effective as heroin, indicating the benefits of these formulations for PWUD who are resistant to other treatments (Oviedo-Joekes et al., 2016). Recognizing these potential benefits, particularly in light of the current pandemic, organizations have called on the government to implement safe supply programs across the country (Alliance for Healthier Communities, 2020; Fleming, Barker, Ivsins, Vakharia, & McNeil, 2020). Although a select few pilot safe supply programs already exist in Canada (e.g., in Toronto, London, and Ottawa, Ontario, as well as in Vancouver, B.C.) (Ontario HIV Treatment Network, 2020), there is critical need to further expand this intervention as it is an important solution for preventing substance use-related harms during a time where PWUD are at an increased risk of experiencing them.

While our study had a number of strengths, such as the large sample size and sizable geographic representation, limitations should be noted. Given the cross-sectional nature of the study in conjunction with the rapidly developing pandemic, findings should be interpreted with caution. The concerns and experiences expressed by those interviewed for this study may differ from the general PWUD community. Participants' current substance use should also be interpreted with caution as not all participants provided this information.

Conclusion

Overall, as our findings suggest, PWUD have experienced significant changes to their lives in light of COVID-19. For many, this included heightened use of toxic and adulterated substances, and subsequent risk for experiencing related harms, including overdoses. As such, the ways in which COVID-19 may be disproportionately affecting PWUD must be taken into consideration, and specific supports and services to address these issues must be made available. These findings warrant the need for increased accessibility of safe supply programs, THN and drug-testing kits, as well as novel approaches to help ensure that PWUD have the necessary tools available to make informed choices and mitigate risk.

Declarations of Interest

The authors declare that they have no conflict of interest.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.drugpo.2021.103237.

References

- Alliance for Healthier Communities. (2020). *Over 100 organizations endorse call for access to emergency safe supply*. Retrieved November 5, 2020, from: <https://www.allianceon.org/news/Over-100-organizations-endorse-call-access-Emergency-Safe-Supply>.
- Armitage, R., & Nellums, L. B. (2020). Substance misuse during COVID-19: Protecting people who use drugs. *Public Health*, 183, 63. 10.1016/j.puhe.2020.05.010.
- Bahorik, A. L., Satre, D. D., Kline-Simon, A. H., Weisner, C. M., & Campbell, C. I. (2017). Alcohol, Cannabis, and Opioid Use Disorders, and Disease Burden in an Integrated Health Care System. *Journal of Addiction Medicine*, 11(1), 3–9. 10.1097/ADM.0000000000000260.
- Bonn, M., Palayew, A., Bartlett, S., Brothers, T. D., Touesnard, N., & Tyndall, M. (2020). Addressing the Syndemic of HIV, Hepatitis C, Overdose, and COVID-19 Among People Who Use Drugs: The Potential Roles for Decriminalization and Safe Supply. *Journal of Studies on Alcohol and Drugs*, 81(5), 556–560. 10.15288/jsad.2020.81.556.
- British Columbia Coroners Service. (2020a). *Illicit drug toxicity deaths in bc January 1, 2010 – May 31, 2020*. Retrieved June 1, 2020, from: <https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/illicit-drug.pdf>.
- British Columbia Coroners Service. (2020b). *Illicit drug toxicity deaths in bc January 1, 2010 – August 31, 2020*. Retrieved October 4, 2020, from: <https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/illicit-drug.pdf>.
- Canadian Centre on Substance Use and Addiction (CCSA). (2020a). *Changes related to COVID-19 in the illegal drug supply and access to services, and resulting health harms*. Retrieved from <https://www.ccsa.ca/sites/default/files/2020-05/CCSA-COVID-19-CCENDU-Illegal-Drug-Supply-Alert-2020-en.pdf>.
- Canadian Centre on Substance Use and Addiction (CCSA). (2020b). *Impacts of the COVID-19 pandemic on people who use substances: What we heard*. Retrieved from <https://www.ccsa.ca/sites/default/files/2020-07/CCSA-COVID-19-Impacts-on-People-Who-Use-Substances-Report-2020-en.pdf>.
- Canadian Research Initiative in Substance Misuse- Initiative canadienne de echerché en abus de substances (CRISM-ICRAS). (n.d.). *HEPCO Cohort*. Retrieved October 4, 2020, from: <https://www.crismqbecatlantic.ca/en/cohorte-hepco/#:~:Text=The%20Cohort%20of%20People%20Who,in%20people%20who%20use%20substance>.
- Chaisson, R. E., Bacchetti, P., Osmond, D., Brodie, B., Sande, M. A., & Moss, A. R. (1989). Cocaine use and HIV infection in intravenous drug users in San Francisco. *Journal of the American Medical Association*, 261(4), 561–565. 10.1001/jama.1989.03420040099027.
- Chou, K. L., Liang, K. K., & Sareen, J. (2011). The association between social isolation and DSM-IV mood, anxiety, and substance use disorders: Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry*, 72, 1468–1476.
- Craine, N., Hickman, M., Parry, J. V., Smith, J., Walker, A. M., Russell, D., et al. (2009). Incidence of hepatitis C in drug injectors: The role of homelessness, opiate substitution treatment, equipment sharing, and community size. *Epidemiology and Infection*, 137(9), 1255–1265. 10.1017/S095026880900212X.

- Davidson, P. J., McLean, R. L., Kral, A. H., Gleghorn, A. A., Edlin, B. R., & Moss, A. R. (2003). Fatal heroin-related overdose in San Francisco, 1997-2000: A case for targeted intervention. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 80(2), 261–273. [10.1093/jurban/jtg029](https://doi.org/10.1093/jurban/jtg029).
- European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2020a). *EMCDDA update on the implications of COVID-19 for people who use drugs (PWUD) and drug service providers*. Retrieved from <https://www.emcdda.europa.eu/system/files/publications/12879/emcdda-covid-update-1-25.03.2020v2.pdf>.
- European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2020b). *Impact of COVID-19 on drug services and help-seeking in Europe*. Retrieved from <https://www.emcdda.europa.eu/system/files/publications/13073/EMCDDA-Trendspotter-Covid-19-Wave-1-2.pdf>.
- European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2020c). *EU drug markets: Impact of COVID-19*. Retrieved from https://www.emcdda.europa.eu/system/files/publications/13097/EU-Drug-Markets-Covid19-impact_final.pdf.
- European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2020d). *Impact of COVID-19 on patterns of drug use and drug-related harms in Europe*. Retrieved from https://www.emcdda.europa.eu/system/files/publications/13130/EMCDDA-Trendspotter-Covid-19-Wave-2_1.pdf.
- Fleming, T., Barker, A., Ivsins, A., Vakharis, S., & McNeil, R. (2020). Stimulant safe supply: A potential opportunity to respond to the overdose epidemic. *Harm Reduction Journal*, 17(1), 6. [10.1186/s12954-019-0351-1](https://doi.org/10.1186/s12954-019-0351-1).
- Goldman, J. E., Wayne, K. M., Periera, K. A., Krieger, M. S., Yedinak, J. L., & Marshall, B. (2019). Perspectives on rapid fentanyl test strips as a harm reduction practice among young adults who use drugs: A qualitative study. *Harm Reduction Journal*, 16(1), 3. [10.1186/s12954-018-0276-0](https://doi.org/10.1186/s12954-018-0276-0).
- Government of Canada. (2020). *Community-based measures to mitigate the spread of coronavirus disease (COVID-19) in Canada*. Retrieved June 1, 2020, from: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/public-health-measures-mitigate-covid-19.html#_Preamble.
- Grenfell Ministries. (n.d.). *About the overdose prevention line*. Retrieved November 5, 2020, from: <https://www.grenfellministries.org/overdose-prevention-line>.
- Karamouzian, M., Dohoo, C., Forsting, S., McNeil, R., Kerr, T., & Lysyshyn, M. (2018). Evaluation of a fentanyl drug checking service for clients of a supervised injection facility, Vancouver, Canada. *Harm Reduction Journal*, 15(1), 46. [10.1186/s12954-018-0252-8](https://doi.org/10.1186/s12954-018-0252-8).
- McDonald, K., Maghsoudi, N., Thompson, H., & Werb, D. (2020). *What's in Toronto's drug supply? results from samples checked by Toronto's drug checking service: October 10, 2019 – March 31, 2020*. Toronto: Centre on Drug Policy Evaluation. Retrieved from https://cdpe.org/wp-content/uploads/2020/04/DCS-Report_Oct2019-Mar2020_final.pdf.
- McDonald, R., & Strang, J. (2016). Are take-home naloxone programmes effective? Systematic review utilizing application of the Bradford Hill criteria. *Addiction*, 111(7), 1177–1187. [10.1111/add.13326](https://doi.org/10.1111/add.13326).
- McGowan, C. R., Harris, M., Platt, L., Hope, V., & Rhodes, T. (2018). Fentanyl self-testing outside supervised injection settings to prevent opioid overdose: Do we know enough to promote it? *International Journal of Drug Policy*, 58, 31–36. [10.1016/j.drugpo.2018.04.017](https://doi.org/10.1016/j.drugpo.2018.04.017).
- Ontario HIV Treatment Network. (2020). *Rapid response service. Possible benefits of providing safe supply of substances to people who use drugs during public health emergencies such as the COVID-19 pandemic*. Retrieved November 5, 2020, from: <https://www.ohtn.on.ca/rapid-response-possible-benefits-of-providing-safe-supply-of-substances-to-people-who-use-drugs-during-public-health-emergencies-such-as-the-covid-19-pandemic/>.
- Ornell, F., Moura, H. F., Scherer, J. N., Pechansky, F., Kessler, F., & von Diemen, L. (2020). The COVID-19 pandemic and its impact on substance use: Implications for prevention and treatment. *Psychiatry Research*, 289, Article 113096. [10.1016/j.psychres.2020.113096](https://doi.org/10.1016/j.psychres.2020.113096).
- Ornell, F., Schuch, J. B., Sordi, A. O., & Kessler, F. (2020b). Pandemic fear and COVID-19: Mental health burden and strategies. *Revista Brasileira de Psiquiatria*, 42(3), 232–235. [10.1590/1516-4446-2020-0008](https://doi.org/10.1590/1516-4446-2020-0008).
- Oviedo-Joekes, E., Brissette, S., Marsh, D. C., Lauzon, P., Guh, D., Anis, A., et al. (2009). Diacetylmorphine versus methadone for the treatment of opioid addiction. *New England Journal of Medicine*, 361(8), 777–786. [10.1056/NEJMoa0810635](https://doi.org/10.1056/NEJMoa0810635).
- Oviedo-Joekes, E., Guh, D., Brissette, S., Marchand, K., MacDonald, S., Lock, K., et al. (2016). Hydromorphone Compared with Diacetylmorphine for Long-term Opioid Dependence: A Randomized Clinical Trial. *JAMA Psychiatry*, 73(5), 447–455. [10.1001/jamapsychiatry.2016.0109](https://doi.org/10.1001/jamapsychiatry.2016.0109).
- Peiper, N. C., Clarke, S. D., Vincent, L. B., Ciccarone, D., Kral, A. H., & Zibbell, J. E. (2019). Fentanyl test strips as an opioid overdose prevention strategy: Findings from a syringe services program in the Southeastern United States. *International Journal of Drug Policy*, 63, 122–128. [10.1016/j.drugpo.2018.08.007](https://doi.org/10.1016/j.drugpo.2018.08.007).
- Public Health Agency of Canada (PHAC). (2020). *Statement from the chief public health officer of Canada on August 26, 2020*. Retrieved June 1, 2020, from: <https://www.canada.ca/en/public-health/news/2020/08/statement-from-the-chief-public-health-officer-of-canada-on-august-26-2020.html>.
- Sawyer, E. (2020). Made-in-B.C. app aims to prevent overdose deaths by automatically alerting 911. *CBC*. Retrieved November 5, 2020, from: <https://www.cbc.ca/news/canada/british-columbia/lifeguard-app-overdose-deaths-bc-1.5577394#:~:Text=Before%20using%20drugs%2C%20the%20user,dispatchers%20to%20a%20potential%20overdose.>
- Serafini, K., Toohey, M. J., Kiluk, B. D., & Carroll, K. M. (2016). Anger and its Association with Substance Use Treatment Outcomes in a Sample of Adolescents. *Journal of Child & Adolescent Substance Abuse*, 25(5), 391–398. [10.1080/1067828X.2015.1049394](https://doi.org/10.1080/1067828X.2015.1049394).
- Siegler, A., Tuazon, E., Bradley O'Brien, D., & Paone, D. (2014). Unintentional opioid overdose deaths in New York City, 2005-2010: A place-based approach to reduce risk. *International Journal of Drug Policy*, 25(3), 569–574. [10.1016/j.drugpo.2013.10.015](https://doi.org/10.1016/j.drugpo.2013.10.015).
- Sinha, R., Fox, H. C., Hong, K. A., Bergquist, K., Bhagwagar, Z., & Siedlarz, K. M. (2009). Enhanced negative emotion and alcohol craving, and altered physiological responses following stress and cue exposure in alcohol dependent individuals. *Neuropsychopharmacology: Official publication of the American College of Neuropsychopharmacology*, 34(5), 1198–1208. [10.1038/npp.2008.78](https://doi.org/10.1038/npp.2008.78).
- Statistics Canada. (2020a). *Canadians report lower self-perceived mental health during the COVID-19 pandemic*. Retrieved June 1, 2020, from: <https://www150.statcan.gc.ca/n1/pub/45-28-0001/2020001/article/00003-eng.htm>.
- Statistics Canada. (2020b). *Canadians who report lower self-perceived mental health during the COVID-19 pandemic more likely to report increased use of cannabis, alcohol and tobacco*. Retrieved June 1, 2020, from: <https://www150.statcan.gc.ca/n1/pub/45-28-0001/2020001/article/00008-eng.htm>.
- Sun, Y., Li, Y., Bao, Y., Meng, S., Sun, Y., Schumann, G., et al. (2020). Brief Report: Increased Addictive Internet and Substance Use Behavior During the COVID-19 Pandemic in China. *American Journal on Addictions*, 29(4), 268–270. [10.1111/ajad.13066](https://doi.org/10.1111/ajad.13066).
- Taylor, S. (2020). *Saskatchewan to expand naloxone access as advocates call for more action* September 2. *CBC*. Retrieved November 5, 2020, from: <https://www.cbc.ca/news/canada/saskatchewan/saskatchewan-expand-naloxone-access-more-action-1.5709003>.
- The Ontario Drug Policy Research Network (ODPRN), The Office of the Chief Coroner for Ontario/Ontario Forensic Pathology Service, Public Health Ontario, & Centre on Drug Policy Evaluation. (2020). *Preliminary patterns in circumstances surrounding opioid-related deaths in Ontario during the COVID-19 pandemic*. Retrieved from https://odprn.ca/wp-content/uploads/2020/11/Opioid-Death-Report_FINAL-2020NOV09.pdf.
- Toronto Public Health (TPH). (2020). *Toronto overdose action plan: Status report 2020*. Retrieved June 1, 2020, from: <https://www.toronto.ca/legdocs/mmis/2020/hl/bgrd/backgroundfile-147549.pdf>.
- Tyndall, M. (2020). Safer opioid distribution in response to the COVID-19 pandemic. *International Journal of Drug Policy*, 83, Article 102880. [10.1016/j.drugpo.2020.102880](https://doi.org/10.1016/j.drugpo.2020.102880).
- United Nations Office on Drugs and Crime (UNDOC). (2017). *Global smart update: Fentanyl and its analogues-50 years on*. Retrieved from https://www.unodc.org/documents/scientific/Global_SMART_Update_17_web.pdf.
- World Drug Report. (2020). *Executive summary, impact of COVID-19, policy implications*. United Nations Publication Sales No. E.20.XI.6. Retrieved from https://wdr.unodc.org/wdr2020/field/WDR20_BOOKLET_1.pdf.
- Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., et al. (2020). Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. *Lancet*, 395(10229), 1054–1062. [10.1016/S0140-6736\(20\)30566-3](https://doi.org/10.1016/S0140-6736(20)30566-3).