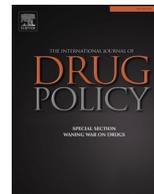




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## Research Paper

## Urban, individuals of color are impacted by fentanyl-contaminated heroin

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## ABSTRACT

The present phase of the overdose epidemic is characterized by fentanyl-contaminated heroin, particularly in the eastern United States (U.S.). However, there is little research examining how changes in drug potency are affecting urban, racial minority individuals who have been affected by both the “old” epidemic of the 1940s through 1980s, as well as the “new” present day epidemic. A focus on the drug using experiences of racial minorities is needed to avoid perpetuating discriminatory responses to drug use in communities of color, which have characterized past U.S. policies. This qualitative study was conducted from March through June 2018 to examine recent experiences of urban, individuals of color who inject drugs to assess the impact of the current overdose epidemic on this understudied population. Interviews were conducted with 25 people who reported current injection drug use. The interviews were transcribed and analyzed using a general inductive approach to identify major themes. Fifteen of 25 participants reported experiencing a non-fatal overdose in the past two years; eight suspected their overdose was fentanyl-related. Likewise, 15 had ever witnessed someone else overdose at least once. Overdoses that required multiple doses of naloxone were also reported. Participants employed several methods to attempt to detect the presence of fentanyl in their drugs, with varying degrees of success. Carrying naloxone and utilizing trusted drug sellers (often those who also use) were strategies used to minimize risk of overdose. Contaminated heroin and increased risk for overdose was often encountered when trusted sources were unavailable. This population is suffering from high rates of recent overdose. Removal of trusted drug sources from a community may inadvertently increase overdose risk. Ensuring access to harm reduction resources (naloxone, drug testing strips) will remain important for addressing ever-increasing rates of overdose among all populations affected.

## Introduction

Rates of opioid use and overdose in the United States (U.S.) continue to increase. Drug overdose deaths in the U.S. have been described as an epidemic, with rates increasing four-fold between 1999 and 2017 to an alarming 72,000 overdose deaths occurring in 2017 alone. This number is higher than the peak number of deaths from AIDS, gun violence, and car accidents (National Center for Health Statistics, 2018; Sanger-Katz, 2018). The current overdose epidemic has been characterized as having three intertwined phases, the most recent of which, beginning in 2013, includes an increased prevalence of heroin contaminated with synthetic

opioids, predominantly fentanyl (Dasgupta, Beletsky, & Ciccarone, 2018). Fentanyl has been linked to a surge in overdose deaths due both to its high potency and the fact that it is frequently cut into heroin without users' knowledge (Amlani et al., 2015; Carroll, Marshall, Rich, & Green, 2017; Dasgupta et al., 2018). Rates of heroin overdose in the U.S. are currently increasing at 31% (95% confidence interval [CI] = 27, 35) per year for white individuals and 34% (95% CI = 30, 40) for Black individuals (Alexander, Kiang, & Barbieri, 2018). Less reliable national surveillance data is available concerning racial differences in synthetic opioid overdose, however emerging evidence from the local and state levels have shown increasing mortality among Black

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Americans (Peñaloza, 2018). Among all races, national rates of fentanyl-related fatal overdose spiked 540% between 2013 and 2016 (Centers for Disease Control & Prevention, 2018; Katz, 2017).

Fentanyl-related overdose is on the rise nationwide but is a particularly pressing problem in the eastern United States. The eastern U.S. heroin market consists largely of white powder heroin, which is easier to cut with fentanyl due to its color and consistency compared to western black tar heroin (Ciccarone, 2009, 2017). Fentanyl is easier to produce than heroin, can be smuggled in small batches, and offers high profit margins for sellers. These characteristics have contributed to its increased prevalence in U.S. drug markets (Rothberg & Stith, 2018). Fentanyl seizures in the U.S. increased by 426% from 2016 to 2017 and are strongly correlated with observed increases in synthetic opioid overdoses (Ciccarone, 2017). In North Carolina (NC), the rate of overdose deaths doubled from 2010 to 2016 (N.C. Division of Public Health, 2017). The Centers for Disease Control (CDC) predicts an increase in the number of overdose deaths in NC of 14.5% from 2017 to 2018. This is the fourth highest predicted increase among all US states (Centers for Disease Control & Prevention, 2018). NC experienced an estimated 98.8% increase in fentanyl-involved overdose fatalities from 2015 to 2016 (Miller & Winecker, 2017).

Popular narratives about how the overdose epidemic came about and who it is affecting have predominantly focused on white, rural individuals (Cicero, Ellis, Surratt, & Kurtz, 2014; Netherland & Hansen, 2016; Quiñones, 2015). Per this narrative, trajectories into substance use often began with an opioid prescription for pain management, evolved into opioid use disorder, and resulted in a shift to regular heroin use once policy changes restricted access to that prescription supply. Less attention, however, has been given to the substance use trajectories of urban populations and people of color (Shihpar, 2019). Although white Americans die from opioid-related causes in the highest numbers each year, opioid-related death rates have doubled among Black Americans since 2000 (James & Jordan, 2018). Opioid-related deaths have markedly increased among Black Americans since the fentanyl-fueled phase began in 2013. In 2017, 12% of all opioid-related overdose deaths were among Black individuals – up from 8% in 2013 (Kaiser Family Foundation, 2019). This trend is particularly pronounced in urban areas. According to recent estimates, the rate of drug overdose death among urban Black individuals is 22.7% compared to 6.7% for rural Black individuals. In Washington, D.C., more than 80% of opioid overdose deaths are among Black people, which local medical personnel have linked to fentanyl-contaminated drugs (Peñaloza, 2018).

The whitewashed portrayal of the overdose epidemic is consistent with the history of drug discourse in America, which criminalizes minority substance use and medicalizes white substance use (James & Jordan, 2018). Following World War II, young Black and Latino Americans living in cities became the largest demographic of heroin users (Schneider, 2008). This surge of heroin use among Black individuals was initially linked to “hipster” subculture in jazz clubs, which portrayed heroin use as a socially desirable behavior and facilitated its spread to inner city youth. However, government officials and media outlets were quick to link illicit drug use to rising crime rates in inner cities, exacerbating racial tensions and declaring drug use a menace to American youth (Schneider, 2008). A moral panic followed, resulting in punitive responses, such as mandatory minimum sentencing that set the precedent for America’s ongoing War on Drugs (Schneider, 2008). Despite gentler policy responses to the current epidemic, racial disparities in outcomes persist. Black individuals are still arrested at higher rates for heroin offenses and are undertreated for substance use disorders in comparison to whites (James & Jordan, 2018). Popular discourse regarding the “new” [white] heroin epidemic serves to marginalize Black communities by ignoring a long history of racially discriminatory responses to similar drug epidemics and minimizing their current need for public health resources and programming (James & Jordan, 2018).

Therefore, in the current study, we explored the experiences of a sample of urban, mostly Black individuals who inject drugs. Little research has explored how the current, fentanyl-fueled phase of the overdose epidemic has entered into and affected minority populations. This knowledge is necessary for informing tailored intervention efforts and reducing the potential for unequal allocation of resources to populations in need.

## Methods

Participants were recruited from May and July 2018 through one of two strategies: (1) on-site at syringe access programs in Durham, NC, and (2) by referral from syringe exchange staff or other participants. To be eligible to participate, participants met the following criteria: self-reported current (within the last month) injection drug use; age  $\geq 18$  year at study enrollment; able to understand and speak English or Spanish; and able to provide verbal informed consent. All of the participants had previously accessed local harm reduction services where they are able to access syringes and, more recently, fentanyl test strips. Consenting participants were interviewed (by R.H. and L.B.R.) and were offered \$50 for completing the interview. Interviews were administered by phone or in a private room at a community-based venue convenient for the participant (e.g. the public library, a community center). Participants were asked about pathways to injection drug use, experience with overdose, use of harm reduction services, experiences with illicitly-manufactured fentanyl, contact with law enforcement, previous incarceration, and HIV risk and prevention strategies. All interviews were digitally recorded and professionally transcribed. This protocol was approved by the University of North Carolina Institutional Review Board.

A general inductive approach was used for analysis (Thomas, 2006). A preliminary codebook was developed based on the content of the interview guide. Two separate coders, B.R. and L.B.R., coded 6 of the 25 transcripts in order to test the coding scheme and establish intercoder reliability. The two coders met following coding of transcripts 1–3 to compare coding and resolve areas of discrepancy. At this time, inductive codes were added to capture additional emerging themes of interest. This process was repeated using the revised codebook for transcripts 4–6. Following initial coding and finalization of the codebook, B.R. completed coding of all remaining transcripts. Data was summarized and organized by emerging themes using NVivo 11 (QSR International, Burlington, Massachusetts, USA).

## Results

### Study sample

Sample demographics are presented in Table 1. A total of 25 individuals reporting injection drug use within the past month were interviewed. Only three participants reported that their illicit substance use began with a legally prescribed opioid. Substance use often began with alcohol or marijuana before using heroin and/or cocaine and was frequently described as socially normative in the participants’ adolescent social networks; histories of illicit polydrug use were commonly reported.

### *High prevalence of fentanyl-contaminated heroin, fentanyl-related overdose, and the need for multiple naloxone doses*

Fifteen of 25 participants had ever witnessed someone else overdose, with some witnessing multiple overdoses. Additionally, 15 of 25 participants reported experiencing a non-fatal overdose in the past two years. Of the participants who had experienced a non-fatal overdose, eight suspected that their overdose could be attributed to fentanyl-contaminated heroin. Reasons to suspect exposure to fentanyl included: positive urinalysis after the overdose, confirmation of fentanyl by a

**Table 1**  
Participant Demographics.

	Mean (Range)	N (%)
Age		
Age at 1 <sup>st</sup> substance use	39.2 (22-65)	
15+ years injecting	15.0 (7-36)	7 (28)
Race		
Black		19 (76)
Multiracial		5 (20)
White		1 (4)
Hispanic		3 (12)
Gender		
Male		11 (44)
Female		13 (52)
Transgender		1 (4)
Sexual Orientation		
Heterosexual		20 (80)
Bisexual		3 (12)
Other		2 (8)
Illicit Substance Use History		
Opioids		24 (96)
Cocaine/crack cocaine		21 (84)
Methamphetamine		4 (16)
Benzodiazepines		1 (4)
MDMA/Ecstasy/Molly		1 (4)
Marijuana		15 (60)

seller, confirmation of fentanyl by another user with a fentanyl test strip, perceived potency of the drugs consumed, and differences in embodied effects.

Interview responses also indicated that naloxone use has become normalized in the substance using community. Thirteen participants reported that they usually carry naloxone on their person, with another five reporting that they keep it nearby (i.e. in their home or car). Fourteen participants reported personally administering or witnessing another community member administer naloxone during a recent overdose event. During their own overdose experiences, eight participants received naloxone from non-medical personnel (i.e. bystanders). When asked, “What do people usually do [for an overdose]? Do they usually call 9-1-1 or not?” One participant responded, “No, they usually get them with Narcan [naloxone]...But sometimes if people can't bring you back with Narcan, that's when they start calling the ambulance or the police (Black male, 38).”

Seven participants reported that multiple doses of naloxone were needed to reverse their overdose, with one also reporting the need to use multiple doses when a relative overdosed (ostensibly due to the potency of the drugs consumed). One participant stated, “Normally, she probably wouldn't have called 9-1-1. But she had already pumped me with four Narcan and I wasn't waking up. She said I was still seizing. She said I had a seizure for like 15 minutes (Biracial female, 23).” Another participant recounted, “They hit me with that Narcan about twice and I still didn't respond. They put ice and everything on me. I didn't – but the only thing I know when I came to, all I seen was a whole lot of white people with black on and they had me in a body bag (Black female, 44).”

#### *Recognizing and responding to fentanyl-contaminated heroin before injection*

Participants who reported exposure to fentanyl were asked if and how they were able to recognize the presence of fentanyl in their drugs. The method considered most reliable was assessing the “feel” or type of high they experienced. Participants also reported side effects that differed from their experiences with only heroin. The side effects included shakes, sweats, “brown outs” or memory loss, difficulty breathing, feeling light-headed, and vomiting.

When the presence of fentanyl was suspected, participants stated that they would typically throw the heroin out or use a smaller amount

than usual and do so more slowly. Participants described these strategies by stating, for example, “I didn't shoot as much that day;” “I tried to slow down;” and “I might dump a few cc's [of prepared heroin] out.” Four participants reported using a fentanyl test strip distributed by their local harm reduction agency to identify fentanyl-contaminated heroin. In one instance reported by a participant, the drug sample tested positive for fentanyl, at which point the participant and her friends chose to use a smaller amount of the drug while keeping naloxone on hand. Another participant reported identifying fentanyl-contaminated heroin with the test strips and subsequently stopped buying from that particular seller.

The most commonly-reported method for identifying fentanyl-contaminated heroin before injection was visual inspection of the drugs for color. One participant described her observation of unusual color directly preceding her overdose, saying: “I fell over my lap and he pushed me. He was like, 'Move, you dead bitch.' He thought I was playing because right before I asked – I saw the [muddy brown] color of it. And I said, 'Oh, shit, y'all got Narcan, right?' I was just joking and I don't joke like that. I should've taken that as a gut instinct, but come on, it's heroin (Biracial female, 36).”

However, this method is, reportedly, not consistently reliable. Seven participants reported that fentanyl-contaminated heroin looks different than pure heroin, while 5 others reported that the color of the two substances is the same: as one participant described, “You can't really tell by looking at it.” Participants who said they could recognize fentanyl-contaminated heroin by its color described meaningful differences in appearance, but those differences were inconsistent across interviews. People indicated that “sometimes it could be either a little darker or a little lighter” or simply “the color was a little off.” One participant noted specific color differences once the drug was dissolved in solution, stating: “You can see through it like water in the needle. Heroin got a little tint to it. Fentanyl is straight clear like water, and it's powerful. That's how you know it's fentanyl. (Black male, 54).”

#### *Strategies for avoiding fentanyl-contaminated heroin*

Exposure was accidental and unknowing, mixed into the local heroin supply without their knowledge. Three participants explicitly stated that they did not want or would not use contaminated heroin; six more participants who had encountered fentanyl-contaminated heroin stated that they purposefully stopped buying from the seller whose supply was contaminated in an attempt to avoid it in the future. No participants stated that they were actively seeking to buy and use fentanyl-contaminated heroin.

Many participants mentioned using trusted or familiar drug sellers as a strategy for avoiding fentanyl-contaminated drugs. One participant reported that their seller stopped selling a particular batch after “a lot of people OD'd.” Trusted sellers were often individuals who both sold and used heroin. Participants perceived that sellers who were also users had a better idea of their product's potency, stating “I try to deal with the people who get high. I know they got the good stuff (Black male, 50),” and “He know what he got, you know? As far as the other one [non-users], they don't do it. They just take [sell] it and get the money (Black male, 50).” There were also concerns about inconsistent availability when dealing with people who both sold and used: “Cause they're all users. By the end of the day, they're all out (Biracial female, 36).”

Many participants reported that they most frequently encountered fentanyl-contaminated heroin when they were unable to buy from sellers that they knew and trusted: “See, that's the thing. Once I do use different people, I run across it [fentanyl]. If I can't get my people... Sometimes I just wait, you know. Because in the end, like I said, a lot of my friends have died (Black male, 43).” The risk of buying from unknown sellers was expressed through general sentiment that the local heroin supply was unpredictable. One participant stated, “I know somebody's not gonna sell me crap [weak or low-quality drugs]. [But] here lately, I'm not sure that they're not gonna sell me something that's

hot [contaminated] (Black female, 44).”

## Discussion

Our results show that urban, communities of color are suffering many of the same consequences of the current phase of the opioid epidemic as rural, white populations. We found that a majority of our participants reported either witnessing or experiencing a recent overdose—many of which they expected were the result of fentanyl-contaminated heroin. High uptake of naloxone by participants and their local community appears to have reduced mortality associated with the use of heroin and fentanyl-contaminated heroin. However, some reported that multiple naloxone doses were required to counteract more potent drugs. Although some existing studies have found evidence of fentanyl drug-seeking behavior, our participants were more likely to report engaging in protective behaviors (Ciccarone, Ondocsin, & Mars, 2017; Peiper et al., 2019). For example, participants used trusted sellers to avoid fentanyl-contaminated heroin. Although they were not seeking out fentanyl-contaminated heroin, participants largely agreed that it produces a more intense high after injection. Prior to injection, participants reported that fentanyl-contaminated heroin looked different, although they disagreed on exactly what those differences were.

Our results support similar findings from New England by Carroll et al. (2017), who found low desirability for fentanyl-contaminated heroin and limited utility of inspection for color in identifying contamination. However, color could serve as a useful cue to use a fentanyl test strip prior to injection. Test strips have been shown to detect fentanyl contamination with high sensitivity and specificity (Sherman et al., 2018). In preliminary U.S.-based studies, the majority of opioid users surveyed expressed concern about contamination and interest in checking their drugs for fentanyl before use (Krieger et al., 2018; Sherman et al., 2018). A recent study of a syringe exchange program serving another urban population in Greensboro, NC found that 81% of participants reported using a strip before consuming drugs and 43% modified their behavior to be more cautious (i.e., using less heroin than typical) after receiving their result (Peiper et al., 2019). Distribution of test strips is the most promising means of drug checking. Both stakeholders and users have expressed concerns about the feasibility of fixed-site machine-based testing, including the potential for discriminatory policing near facilities (Glick et al., 2019; Goldman et al., 2019).

Also mirroring other recent findings in studies with white or rural samples, overdose was commonly experienced and witnessed, and overdose was frequently attributed to fentanyl-contaminated heroin. Moving forward, it is important that users continue to have adequate access to naloxone and are prepared for the eventuality that reversing an overdose may require multiple doses or a stronger formulation of Naloxone (Fairbairn, Coffin, & Walley, 2017). Somerville et al. (2017) reported the need for multiple Naloxone doses to reverse fentanyl-related overdoses among a majority white sample in Massachusetts. Our results provide evidence of this trend in communities of color as well. While many of our participants carried Naloxone on their person, some kept it in places where it may take a few minutes to retrieve (in a home or car). As Fairbairn et al. (2017) note, fentanyl is extremely fast-acting and the time to death window is short. Our findings support the need for future harm reduction efforts that promote keeping multiple doses, or a stronger dose, within reach at all times.

Our results, and the results of similar studies conducted in other U.S. regions (Carroll et al., 2017; Bardwell, Boyd, Arredondo, McNeil, & Kerr, 2019; Brinkley-Rubinstein et al., 2018; McKnight & Des Jarlais, 2018) clearly highlight the importance of buying drugs from trusted sellers as a fentanyl avoidance (and, subsequently, overdose prevention) strategy. In a recent Canadian study, drug users reported openly discussing potency with their sellers, with one individual stating that sellers will warn about strength in order to reduce risk of overdose because they “don’t want to lose a good customer” (Bardwell et al., 2019). Participants in this study reported frequent use of this strategy:

avoiding fentanyl-contaminated heroin by purchasing from people they knew and trusted and that they suspected might also use heroin themselves. In fact, in our study sample, distinctions were rarely made between “users” and “sellers,” as many people in this community engage in both activities to some degree. This corroborates existing literature that discusses collaborative partnering, wherein people share or obtain their substances from friends or family (Green et al., 2013; Inciardi, Surratt, Kurtz, & Cicero, 2007). This phenomenon, also referred to as “social supply,” is often perceived as safer than engaging with unknown sellers (Moyle, Coomber, & Lowther, 2013). Social suppliers of heroin have been identified as “minimally commercial,” meaning that they focus sales on existing users, obtain marginal profits, and largely use profits to finance their own drug use (Coomber & Moyle, 2013; Moyle et al., 2013).

This finding has two timely implications. First, our results highlight that the category of “seller” is not always distinct from the category of “user.” This is particularly relevant in the context of a recent proliferation in drug-induced homicide laws, which require charging people who have sold fentanyl to someone who subsequently overdosed with manslaughter or murder (LaSalle, 2017). Our results indicate that targeting “sellers” for harsh punishments may only be ramping up the incarceration of people who use drugs—a strategy that has been historically deployed with little demonstrated success, especially in communities of color. Secondly, our results imply that removing trusted sellers from the community may have the opposite of the intended effect. People who use drugs consequently may be forced to obtain heroin from people they do not know and, according to our participants, purchasing from an unknown source more frequently results in a fentanyl-induced overdose. Similar patterns have been observed in Manchester NH, where first responders have informally reported localized spikes in overdoses immediately following law enforcement interdiction in the local drug market (Chris Hickey, Manchester Fire Department EMS Officer, personal communication). Furthermore, recent work has suggested that sellers may have a vested interest in using drug testing strips to verify what they are buying and selling. Drug users have described certain trusted sellers as feeling responsible for their customers’ safety. Wider dissemination of testing strips to both users and sellers may increase overall knowledge of the drug supply and reduce risk (Bardwell et al., 2019). However, such widespread drug checking efforts may be hindered by fear of criminal liability related to knowingly selling fentanyl-contaminated heroin (Bardwell et al., 2019).

The current phase of the overdose epidemic is characterized by fentanyl-contamination in the local drug market. However, there are very few fentanyl-focused studies with majority Black or racial minority samples (Ciccarone et al., 2017; James & Jordan, 2018; Park, Weir, Allen, Chaulk, & Sherman, 2018). Several recent epidemiological studies highlight the impact of fentanyl-related heroin on rural, white populations (Daniulaityte et al., 2017; Peterson, Gladden, Delcher, Spies, & Garcia-Williams, 2016; Rigg, Monnat, & Chavez, 2018; Slavova et al., 2017). While this research is important to understanding how best to address the ever-increasing rates of overdose, our results drive home the importance of thinking more broadly about who is affected and the importance of extending harm reduction services that address the risks posed by fentanyl to non-White individuals with a long history of heroin use who reside in urban communities. Of note, these communities may have needs that differ from rural, white, injecting populations. For example, local public health experts in Chicago have observed that injectable naloxone – the most widely distributed formulation by public health programs – is not a preferred option for local Black drug users who tend to use heroin intranasally (Kane-Willis & Metzger, 2016; Knopf, 2016).

No single harm reduction strategy is perfectly effective for recognizing and avoiding fentanyl overdose. Trusted sellers could be unexpectedly removed from the community and may not always reliably report drug potency; high frequency of positive drug checking results, particularly after consuming with no adverse effects, may lead

to complacency (McGowan, Harris, Platt, Hope, & Rhodes, 2018); a single Naloxone dose may not be sufficiently strong enough to counteract drug potency. Outreach that encourages regular use of multiple harm reduction techniques, including strategies we have discussed in less detail (sampling for potency/tester shots, using with others), will be critical in reducing fentanyl-related mortality. Furthermore, the ability to consistently apply harm reduction strategies may be related to other structural factors, such as a stigma, poverty, incarceration, and homelessness. These complicating factors require additional structural interventions, such as the creation of safe injection spaces (McKnight & Des Jarlais, 2018).

Finally, public health practitioners should take care to provide services that are culturally appropriate and tailored to the needs of the specific populations they serve. Underscoring our findings and the importance of expanding harm reduction outreach and services, is the emergence of what is potentially a fourth phase of the opioid epidemic in which fentanyl is increasingly being mixed with cocaine, methamphetamines, and other drugs. Nationally, from 2016 to 2017, there was a 52% increase in overdose deaths that involved fentanyl and cocaine. NC is also experiencing similar, rapid increases in fentanyl-contaminated cocaine (Dismukes, 2018). It is possible that this emerging fourth phase will increase overdose burden in communities of color, as drugs that are more frequently used by minority individuals face increasing threat of fentanyl contamination (i.e., high rates of lifetime cocaine and crack cocaine use in our sample; James & Jordan, 2018).

While this study has many strengths, it is not without limitations. The study has a small sample size that restricts our ability to generalize results to broader populations of urban, minority injection drug users. Additionally, we recognize that individuals who regularly attend syringe exchange programs may differ from the larger injecting population in meaningful ways (i.e. prioritization of personal safety, practice of protective injection-related health behaviors) and may not be representative of others' experiences with fentanyl and overdose.

## Conclusion

In summary, our results suggest that there is a need for continued policy support and funding for harm reduction resources that reach beyond the communities that have traditionally been the focus of the first and second phase of the opioid epidemic. Multi-pronged, policy-oriented strategies are needed rather than reliance on criminal justice or law enforcement approaches that disproportionately criminalize Black individuals and remove trusted sellers (who are likely also users) from the community. Harm-reduction efforts will be beneficial for all populations affected by fentanyl-contaminated heroin, both rural and urban, and for people of color and white, and will attenuate the effect of the oncoming fourth phase that includes fentanyl contamination in a wide swath of drugs other than heroin.

## Contributors

LBR was the principal investigator of the study and is the senior, supervising author of the paper. She conceptualized the study, conducted data collection, and contributed to and supervised data analysis. She contributed to and supervised the writing of the paper. She also obtained funding for the study.

BER analyzed data and led the writing of the paper.

EC contributed to the conceptualization of the study and contributed to and reviewed the writing of the paper.

LW aided in data collection and analysis. He contributed to and reviewed the writing of the paper.

RBH aided in data collection. She contributed to and reviewed the writing of the paper.

JC contributed to and reviewed the writing of the paper

WZ contributed to and reviewed the writing of the paper.

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