



HHS Public Access

Author manuscript

Subst Use Misuse. Author manuscript; available in PMC 2021 July 09.

Published in final edited form as:

Subst Use Misuse. 2020 ; 55(13): 2079–2086. doi:10.1080/10826084.2020.1790008.

“When you’re getting high... you just don’t want to be around anybody.” A qualitative exploration of reasons for injecting alone: perspectives from young people who inject drugs.

Abigail K. Winiker^{*a}, Karin E. Tobin^b, Rachel E. Gicquelais^c, Jill Owczarzak^d, Carl Latkin^e

^aDepartment of Health, Behavior and Society, Johns Hopkins School of Public Health, 2213 McElderry Street, 2nd Floor, Baltimore, Maryland 21205, USA

^bDepartment of Health, Behavior and Society, Johns Hopkins School of Public Health, 2213 McElderry Street, 2nd Floor, Baltimore, Maryland 21205, USA

^cDepartment of Epidemiology, Johns Hopkins School of Public Health, 2213 McElderry Street, 2nd Floor, Baltimore, Maryland 21205, USA

^dDepartment of Health, Behavior and Society, Johns Hopkins School of Public Health, 624 N. Broadway, Room, Baltimore, Maryland 21205, USA

^eDepartment of Health, Behavior and Society, Johns Hopkins School of Public Health, 624 N. Broadway, Room 737, Baltimore, Maryland 21205, USA

Introduction

From 1999–2017, 702,568 overdose deaths were reported in the United States, of which 56.8% involved opioids (Seth, P., Scholl, Rudd, & Bacon, 2018). Opioid overdose deaths increased more than five-fold during this period, with 9,050 in 1999 and 47,600 in 2017 (National Institute on Drug Abuse, January, 2019; O’Donnell, Gladden, & Seth, 2017). With the introduction into its heroin supply of illicitly manufactured fentanyl (IMF), a substance 80–100 times more potent than morphine, the U.S. has seen dramatic increases in overdose rates from synthetic opioids (Gladden, 2016; O’Donnell, Halpin, Mattson, Goldberger, & Gladden, 2017; Seth, P. et al., 2018). Longitudinal trends in the U.S. from 2013–2016 showed an 87.7% increase in rates of death involving synthetic opioids (Seth, Puja, Rudd, Noonan, & Haegerich, 2018). In the state of Maryland, drug-related intoxication deaths reached a record high in 2016 after a six-year continuous rise. From 2015 to 2016, the state witnessed the largest single year increase ever recorded. Further, 89% of deaths during this one-year period involved opioids, with those related to fentanyl more than tripling (from 340 to 1,119) (Maryland Department of Health and Mental Hygiene, 2017).

The philosophy of harm reduction has guided the design and implementation of many policies and programs adopted to combat the opioid crisis. Frequently, harm reduction-based

^{*}Corresponding author Department of Health, Behavior and Society, Johns Hopkins School of Public Health, 2213 McElderry Street, 2nd Floor, Baltimore, Maryland 21205, USA, Awinike1@jhu.edu, (410) 502-5368.

Disclosure of interest: The authors disclose no conflict of interest.

overdose prevention strategies have focused upon messaging that targets individual-level behaviors, such as encouraging people who inject drugs (PWID) to recognize and avoid those factors that increase the risk of overdose (Bardwell, Kerr, & McNeil, 2019). These include mixing drugs, awareness of possible fentanyl contamination, engaging in periods of abstinence during which one's tolerance level can change, and using drugs alone (Bardwell et al., 2019; BMORE POWER, 2019; British Columbia Centre for Disease Control, 2015; Clark, Wilder, & Winstanley, 2014). Many community Opioid Overdose Prevention Programs (OOPPs) in the United States promulgate such messaging, particularly instructing PWID to never inject drugs alone (Clark et al., 2014).

The City of Baltimore has a long history of harm reduction programming. Since the City Health Department's initiation of the Staying Alive Drug Overdose Prevention and Response Program in 2004, extensive overdose trainings, medication assisted treatment facilities, syringe exchange programs, and public awareness campaigns have been in place throughout the city to support those struggling with opioid use disorders. Such efforts have included a campaign in recent years which promotes the message not to use drugs alone (Baltimore City Health Department, 2018; Health Resource Center-Baltimore Health, 2016). Yet despite being an early adopter of the harm reduction model, opioid and fentanyl-related overdoses began to rise in the city of Baltimore in 2011, culminating in a sharp increase from 2015–2016 (Maryland Department of Health and Mental Hygiene, 2017).

Some criticism has been levied against harm reduction methodology over concerns that the model places the onus of change on the individual, failing to account for the greater socio-contextual factors that influence injection behaviors (Bardwell, Kerr, & McNeil, 2019; Kerr, Small, Hyshka, Maher, & Shannon, 2013). While instructing people not to use alone has become a widespread overdose prevention strategy in Baltimore City and other communities, minimal research has been conducted to understand the reasons why PWID *do* use drugs alone or assess the feasibility, acceptability, and barriers to adoption of the practice of always injecting drugs around others (Bardwell et al., 2019). In this context, we sought to address this gap in the literature, employing a qualitative approach to understand influences on individual behavior regarding injection practices in the city of Baltimore. In this paper, we explore young PWID's drug use practices related to injecting alone, examining influences on decision-making regarding when and with whom injecting drugs occurs.

Methods

Between October 2015 and April 2016, trained research staff at the Lighthouse Studies at Peer Point, a community-based research facility in urban Baltimore, Maryland, conducted a series of one-on-one in-depth interviews with 23 young PWID. Participants were recruited as part of a larger behavioral intervention for PWID living with HIV. Due to the under-representation of young PWID noted in the sample, a sub-study was convened in attempt to understand injection behaviors of this population and develop new recruitment strategies. To participate in the sub-study, individuals had to be between 18–30 years old and self-report injection drug use within the past six months. Recruitment activities included posting flyers in community facilities, word of mouth, and referrals from community-based organizations.

Participants gave written consent and were compensated \$25.00 for completion of an interview. The Johns Hopkins School of Public Health IRB approved all study protocols.

An in-depth interview guide was used to inquire about individuals' day to day lives, with questions designed to illicit information regarding participants' drug use history, daily routines, knowledge of and experience with overdose, interpersonal and trusting relationships, motivations for participating in research projects, and drug use practices (such as where participants procured and used drugs and with whom). All interviews were audio recorded.

Data analysis

Interview recordings were transcribed verbatim and uploaded into MAXQDA, a qualitative data management and analysis program (VERBI GmbH, 2019). Two research assistants reviewed each transcript to identify the common themes using principles of grounded theory analysis, including both deductive and inductive analysis (Strauss & Corbin, 1997). The research team discussed themes and organized codes collaboratively to ensure reliability and consistency (Carey, Morgan, & Oxtoby, 1996). During open coding, both research assistants read the same transcript to identify coding categories, creating and applying both a priori and inductive codes. Deductive codes included drug type, initiation of drug use, overdose, activity spaces, and social support. The inductive coding process exposed emergent themes around participants' reasons for injecting alone, including the circumstances in which this practice occurred.

Once a final codebook was generated, the research assistants independently coded the remaining transcripts based on this finalized version. To maintain consistency across coders, the research assistants each coded every fifth transcript. A PhD-trained qualitative researcher reviewed these commonly coded transcripts to compare for consistency in the research assistants' coding techniques. In addition, each coder's independently coded transcripts were reviewed by a senior researcher to ensure that the coding scheme was applied consistently throughout the coding process. The coders and senior researchers met regularly to discuss how codes were being applied and resolve any discrepancies. The team then completed an axial coding process, where themes were related to one another to identify broader categories. This consisted of an analysis of the coded segments related to injection practices, including activity spaces, trust, attitudes toward addiction/drug use, belonging, isolation/loner mentality, social support, drug use norms & practices, overdose, and cost/affordability. Coded segments within each category and within intersecting categories were reviewed by the research team to conceptualize the social and environmental scenarios in which participants injected drugs. Analysis explored participants' decision-making around when, where, and with whom drugs were used, with a focus on those who described frequently injecting alone.

Results

Of the 23 participants, 15 self-identified as male and 8 as female, 4 identified as African American/Black and 19 as White. The average age of participants was 25 years. Participants

started using drugs at an average age of 15.4 years, and the amount of time participants reported that they had been injecting drugs ranged from 2 months to 18 years.

Of all 23 participants interviewed, only one explicitly stated a preference for injecting exclusively with other people. The remaining 22 described using alone at least some of the time. Their reasons for doing so fell into five domains: 1) the desire to alleviate withdrawal symptoms, 2) feelings of stigma and shame regarding their drug use, 3) lack of knowledge about Good Samaritan Laws and overdose response, 4) financial circumstances, and 5) a lack of trusted peers with whom to inject, often due to disrupted social networks.

The desire to “get well”

A key reason for which participants injected alone stemmed from a desire to avoid the intense physical effects of opioid withdrawal, which can involve aching, pain, cramps, agitation, and anxiety (American Psychiatric Association, 2013; Ries, Miller, & Fiellin, 2009; Wang, 2018). Several participants expressed that their priority after procuring drugs was to simply “get well,” or quell the experience of opioid withdrawal. As a result, many PWID injected almost immediately after purchasing drugs in any location available, including alleys, abandoned homes, backyards, public restrooms, or inside a parked car, with little thought to who else was around.

One male participant described finding a secluded area where he could inject as soon as he obtained drugs. *“I just park up the street somewhere, away from the area...I do it in my truck. That way I’m not sick. Once you get it, you want to do it as soon as possible”* [Male, 19 years old, White]. Another shared that while he would prefer to use “at his home in peace,” he more often injected in an abandoned building:

“Sometimes, if I’m too sick, I’ll find an abandoned building and do it in there, if I’m too sick to wait and go home and do it. But if I’m not too sick I usually like to catch the bus home and do my drugs at home in peace...I’m usually by myself when I inject. It’s usually a lot of the time I’m too sick to wait and catch the bus home, so...maybe 75% of the time I go down to cop I end up leaving that group and going right to the closest abandoned building to, you know, shoot up.” [Male, 22 years old, White]

Although some PWID might wish to prioritize health, safety, or cleanliness by injecting in private areas or with other people, the desire to alleviate symptoms of withdrawal often took precedence over those considerations, leading many to inject wherever possible as soon as drugs were procured.

Drug related stigma and shame

Self-stigma, embarrassment, or shame regarding one’s use of drugs was frequently described as a reason for using alone, often resulting in participants actively hiding their drug use activities from others. One 21-year-old female described her efforts to hide her drug use by injecting alone in a hotel bathroom, even though others were sharing the hotel room with her. She expressed actively trying to hide her injection practices by both using drugs in the bathroom where others were not around and by injecting in areas of her body that were not

visible so that “*if you look at me, you really wouldn’t be able to tell*” [Female, 21 years old, White].

Another female participant described a similar habit of going to a bathroom to inject heroin by herself, even when friends were around.

“When you’re getting high, you just don’t think about it, and you just don’t want to be around anybody. I don’t want people to see, you know what I mean? Like, even when I get high around my friends and stuff, I’ll go in the bathroom myself and use, because - the guilt and just the disgust from it, you know what I mean?” [Female, 22 years old, White]

In one case, a 28-year-old male articulated that shame motivated him to use alone:

“No, I’ve had buddies before where I’ll go use with them and hang out with them and stuff. Not frequently, though. The majority of my using, IV using, has been by myself, because obviously I’m just - I’m embarrassed by what I’m doing. I’m going to do it anyway because I feel like I need to, but I’m embarrassed, and so I’d say the majority of my IV using is alone.” [Male, 28 years old, White]

These statements demonstrate how feelings of embarrassment or shame about using drugs lead some PWID to actively choose to inject drugs alone so others were not aware of their activities.

Lack of Knowledge about Good Samaritan Laws and Overdose Prevention

Though Good Samaritan laws now protect those present at an overdose from arrest or legal responsibility in many states in the U.S., several participants did not know about Maryland’s Good Samaritan law or still feared arrest or charges if present at another person’s overdose (Maryland Department of Health and Mental Hygiene, 2016). After describing a case in which his friend overdosed in his car, a male participant stated, “*I’m getting out of the car, and shit. What the hell? If his ass is dead, I’m with him. They going to lock me up*” [Male, 24 years old, African American].

In addition to uncertainty regarding legal implications, some participants were hesitant to inject drugs with others out of concern for having to assume responsibility for an overdose should it occur. Participants feared the implications of having someone die of an overdose in their presence. One participant explained:

“Like I said, I don’t get high with anybody. And that’s another reason why I don’t get high with people, because I don’t know what your tolerance is. And I’m not trying to have you die on me. And not only that, I’m not trying to have you die in my house. I’m not having my house be labeled as a drug house because you didn’t know how to handle your drugs and you wanted to get high at my house.” [Male, 25 years old, African American]

Participants reported concerns about both the legal and practical implications of being present for another person’s overdose, both of which served to discourage PWID from using around others.

Financial Circumstances

Another reason for which some participants used alone was an explicit desire not to share drugs with other PWID due to financial restraints. Several participants reported the challenges of a daily life focused on making enough money to purchase drugs through various means, including panhandling, stealing, selling drugs, dancing, and sex work. Therefore, many participants expressed reluctance to share drugs with people who did not help generate income and contribute to purchasing drugs. One male participant who was experiencing homelessness at the time of the interview stated:

I'm not going to be able to do it – \$25 is not stretching with two people. I'm not giving nobody nothing. Like my stomach is rumbling. My body hurts from sleeping outside. Today is not the day to be sharing with somebody. And I don't have to share with nobody, because I know where to get it myself. I don't just use with people. I'm not going to be in a shooting gallery. I'm not going to be in a crack house. That's not what I do. Normally I get high in a house, but lately I've been getting high outside, and there is no need for me to be getting high with anybody else." [Male, 25 years old, African American]

For those PWID with limited resources, injecting alone was preferred, as it served to conserve one's drug supply. This factor may be particularly pertinent for PWID who are also currently experiencing homelessness.

Trusting Relationships

One commonly expressed theme regarding the social context of injecting was that participants preferred to inject drugs only around a close, trusted friend or ally whom they could count on to care about their safety and well-being. Because many participants described the social environment of drug use as dangerous and unpredictable, overdosing around strangers created potential exposure to perceived risks. One participant described an overdose event that exemplified this fear. He had been selling drugs in a Baltimore neighborhood but had run out of his supply when a stranger approached him, recommending an area where he could purchase more heroin. Together, they drove to this location in the participant's car to buy drugs together.

"I went there with him, and I got one pill. I used it. I got to where I was going at that gas station. When I got out... I just went in the gas station and went out – just fell, and I went out. He got out the car, took my money out my pocket, got back in the car, and pulled off. Luckily the gas station attendant knew me personally. I've been around there my whole life. He called the ambulance for me. I woke up in the ambulance. They asked me, 'Do you know your name and what happened?' I was scared for my life." [Male, 24 years old, African American]

To counter the potential dangers of using around strangers, participants expressed the desire to inject drugs with someone they *could* trust, such as a close friend or significant other. One male participant reported only injecting with his girlfriend and explained the benefits of being around a trusted person when injecting:

“I just don’t like using around people I don’t know. It’s like a trust thing... So I guess it’s me and [my girlfriend] together, ‘cause we’re the only ones we got. And I feel like I don’t really need nobody else. Like I do need people, but obviously I can’t reach out for help to certain people... Just me and her, just try to make sure each other is safe. I guess it’s a comfort thing. Kind of like a safety thing. I feel like she’s got my back and I got her back. And I don’t feel that way with other random people, people I don’t know.” [Male, 29 years old, African American]

Though many participants could identify one or more trusted friends or peers, their social networks were frequently disrupted, and these network members were not always available. Participants reported that friends cycled rapidly through treatment programs, shelters or other housing facilities, or prisons, and some were lost to fatal overdose. One participant shared that six friends had recently died from overdose, and another described that the one “homeboy” with whom he injected was currently incarcerated. Another reported having only one trusted person network member, stating “*You can’t trust everybody when you’re out on the street*” [male, 26 years old, African American]. Yet this friend had been out of town visiting his mother for three weeks, leaving him alone.

These participants demonstrated the important role of trust in decision-making around the social context of drug use. While many expressed that having trusted network members facilitated not using alone, this was not always a feasible option. Frequent social network disruption due to friends moving, becoming incarcerated, or experiencing a fatal overdose served as a barrier to participants injecting with others, leaving many with no one available whom they felt they could safely or comfortably inject.

Discussion

Interview participants described several reasons for injecting alone, challenging the feasibility and acceptability of the “don’t use alone” message. These included the alleviation of withdrawal symptoms as quickly as possible, an experience of shame surrounding their drug use, a lack of knowledge about Good Samaritan Laws and overdose response, financial limitations, and a desire to inject with only close or trusted peers or friends. These findings suggest that always injecting drugs around others, or never using alone, may be unrealistic for many PWID given the social and environmental contexts which impact their decisions about when and with whom to inject. Harm reduction methodology emphasizes the importance of meeting all drug users “where they’re at,” offering a spectrum of options for reducing risk (The Harm Reduction Coalition, 2017). Thus, to truly address the needs of PWID, it is important to recognize that while some may be able to always inject around other people, others are likely to continue injecting drugs alone due to the many competing priorities described in these interviews. Therefore, overdose prevention programs should disseminate information about a range of options for preventing or reducing overdose risk, including means of improving safety for those who do inject alone.

One such strategy is to encourage PWID to test the strength of their drugs, either by snorting first before injecting or by “going slow” (injecting only a small amount and waiting a short period before using the whole dose, also referred to as taking a “test hit”) (Carroll, Marshall,

Rich, & Green, 2017; Desmon, 2018; Harm Reduction Coalition, 2018; Unger, August, 2019). These methods provide PWID with a means of controlling their intake and an indicator of the potency of their heroin or the presence of fentanyl (Forseth, 2016). Those who do inject alone could then adjust the amount of drugs consumed based on the potency assessed during testing. This could allow PWID to relieve the physical symptoms of withdrawal, potentially enabling them to find peers with whom to use greater quantities of drugs. Relieving withdrawal symptoms may also confer other public health benefits, as it is during these periods of withdrawal that PWID are more likely to engage in high risk behaviors such as sharing needles or injection equipment with more partners and using in unsafe public settings (Connors, 1994; Mateu-Gelabert, Sandoval, Meylaks, Wendel, & Friedman, 2010; Ross, Wodak, Stowe, & Gold, 1994; Stein, DUBYAK, Herman, & Anderson, 2007). While going slow and testing small amounts of drugs may not be feasible for someone who is rushing to use in a public space or experiencing extreme withdrawal symptoms, both have been proposed in peer-led overdose prevention programs in Baltimore City and San Francisco as viable methods to improve safety and reduce risk among this population, demonstrating their merit as an option for some PWID (Desmon, 2018; Harm Reduction Coalition, 2018; Unger, 2019)

Another risk reduction option for those who inject alone is the use of fentanyl test strips, which allow PWID to test for the presence/absence of fentanyl in their heroin (Krieger et al., 2018). Studies of fentanyl test strip distribution programs have demonstrated acceptability, positive changes in overdose risk behavior, and increased perceived overdose safety in PWID who test their drugs before injecting (Krieger et al., 2018; Peiper et al., 2019). However, such options are only feasible for those in places such as Baltimore, in which fentanyl test strips are available and accessible. It is therefore important to communicate the effectiveness of fentanyl test strips in reducing overdose deaths, promoting their access and distribution among PWID and ensuring that they are included in overdose prevention trainings on a larger scale.

These findings also highlight the importance of promoting opportunities to increase the likelihood of PWID choosing to inject around others. One reason participants injected alone was the fear of legal repercussions if found on the scene of an overdose. This demonstrates a lack of awareness of Good Samaritan Laws, which protect those present at an overdose from arrest or legal prosecution despite involvement in illegal activity on the scene. Such laws have been in place in Maryland since October of 2015 (Maryland Department of Health and Mental Hygiene, 2016; Maryland Department of Health Behavioral Health Administration, 2018). Given the timing of this project, information about these laws had likely not yet reached their target population. Yet this underscores the need for rapid and targeted informational campaigns designed to spread awareness of such protective laws. A public awareness campaign about Good Samaritan Laws in Washington State resulted in 88% of opiate-using respondents reporting being more likely to call 911 during a future overdose (Banta-Green, Kuszler, Coffin, & Schoeppe, 2011). However, whether reporting higher willingness to call 911 translates to action during a witnessed overdose merits further evaluation. Studies on law enforcement response to overdose events are also warranted to assess whether police are behaving consistently with Good Samaritan Laws.

An additional consideration is the presence of drug-induced homicide laws, a series of state-specific statutes which serve as a basis to authorize the criminal liability and prosecution of those who furnish or deliver controlled substances to another individual who has died from their use (Prescription Drug Abuse Policy Systems, 2019). As of January of 2019, such laws were not in effect in the state of Maryland. Nonetheless, in the 25 jurisdictions in which drug-induced homicide laws exist, they are likely to complicate how PWID understand Good Samaritan Laws and may deter some individuals from seeking medical assistance for a witnessed overdose due to fear of prosecution. Further exploration is thus warranted to understand how such laws might influence PWID to use alone.

Another option for reducing overdose risk and improving safety among PWID is to expand the scope of overdose response and preparedness trainings, enabling participants to both feel more equipped to respond to an overdose event and to reduce their own personal overdose risk. While overdose response interventions have been in place in Baltimore City for many years, overdose rates continue to rise, implying the need to broaden their reach and expand upon current strategies. Community-based peer-level trainings on the use of take-home naloxone (THN) provide a means of allowing individuals to disseminate knowledge and skills to network members while developing and reinforcing their own social norms regarding harm reduction and injection safety (Bardwell, Kerr, Boyd, & McNeil, 2018; Latkin, Sherman, & Knowlton, 2003; Mihailovic, Tobin, & Latkin, 2015; Tobin, Kuramoto, Davey-Rothwell, & Latkin, 2011). Evaluations of such programs have shown high acceptability and even reductions in fatal opioid overdoses amongst trainees compared to non-participants (Bennett & Holloway, 2012; McDonald & Strang, 2016). Yet such interventions could be enhanced by encouraging participants to develop their own safety plans or adopt strategies to reduce overdose risk if they do choose to use alone. Focusing messaging and training on how to use alone more safety might increase the impact of such programs, providing valuable risk reduction options to those who do continue to inject alone.

Finally, many participants expressed a preference to inject around a trusted network member, yet this was often infeasible due to frequent social network disruption. Further, some participants experienced a sense of shame about their drug use, seeking to hide it from those peers with whom they did spend time. The establishment of supervised injection facilities (SIFs) could serve to address these barriers to injecting around others. SIFs eliminate the need for PWID to find trusted peers with whom to use or expose their drug use to those in their networks if they do not wish to, as they can inject under the supervision of trained professionals without the fear of being exploited or stigmatized. SIFs have demonstrated positive results amongst PWID: Canada opened its first SIF in Vancouver in 2003, and evaluations have demonstrated an association of SIF use with safer injection practices, reduced needle sharing, safer syringe disposal, and a 35% decrease in fatal overdose deaths within a 500-meter radius of the site (Kennedy, Karamouzian, & Kerr, 2017; Marshall, Milloy, Wood, Montaner, & Kerr, 2011). While such sites have been highly effective in reducing injection-related harms and overdose deaths internationally, recent survey results demonstrate that only 29% of Americans support the legalization of safe consumption sites in the U.S. (McGinty et al., 2018). However, non-government sanctioned injection sites could serve similar purposes if they were stocked with naloxone and clean injection

equipment, and staffed by community members or paraprofessionals trained in overdose response. Regardless, until such sites are operationalized in the U.S., harm reduction programs must continue to provide PWID with access to other options to improve safety and reduce overdose risk.

Though injecting alone increases risk of fatal overdose due to the absence of bystanders, it is important to consider that injecting alone can also confer some benefits. One study of young PWID in five U.S. cities found that exclusively injecting alone was associated with lower rates of injection risk behavior including receptive syringe sharing, sharing of other injection equipment, and lower prevalence of hepatitis C relative to those who injected with others (Hagan et al., 2007). These findings are noteworthy, as PWID who do use alone are still reducing their risk of some injection drug-related harms. However, data for this study was collected in 2006, prior to the dramatic increase of fentanyl into the U.S. heroin supply.

Our findings should be interpreted in the context of certain limitations. These interviews were conducted in 2015–2016. While its use was on the rise during this time, there was far less fentanyl in the heroin supply in Baltimore compared to current levels. Overdose patterns have continued to increase as street heroin/fentanyl has become more and more potent (Prekupec, Mansky, & Baumann, 2017). The heightened risk of overdose from fentanyl may have led to changes in PWID's behaviors since these experiences were reported. In addition, the participants interviewed were young PWID between the ages of 18–30. Research has shown that new and younger PWID exhibit higher-risk injecting behaviors and are less informed about overdose awareness and response strategies than older PWID (Frank et al., 2015), so patterns of drug use in this sample may not represent a broader population of those who inject drugs. Further study to understand injection patterns of older PWID who may adopt different overdose prevention strategies or maintain distinct injection habits is warranted.

Additionally, while many injection drug use behaviors have been found to differ by race and gender (Cooper, Friedman, Tempalski, Friedman, & Keem, 2005; Doherty, Garfein, Monterroso, Latkin, & Vlahov, 2000; Metsch et al., 1999; National Institute on Drug Abuse, 2020; Sherman et al., 2005), our sample was not recruited purposively and thus does not necessarily reflect demographic trends of the broader community of PWID in Baltimore. This therefore limits our ability to draw conclusions based upon the race or gender of our sample. However, this presents an opportunity to conduct similar future work to explore how long-standing gender and racial dynamics may apply to injection behaviors in today's drug use landscape. It is also important to note that participants' knowledge of the risks of injecting alone was not assessed in these interviews. Thus, we cannot interpret their behaviors based upon whether or not they knew that injecting alone increased their risk of overdose death. This also highlights an important opportunity for future work to evaluate knowledge and perceptions of overdose risk as it relates to actual practice. Finally, the study was conducted in Baltimore City, an urban area with a long history of harm reduction services and programs available for PWID. The experiences of these participants may differ from PWID who live in rural areas or even other cities in which there is little access to these kinds of resources.

Conclusions

Despite these limitations, the results of this study have important implications. PWID inject alone for a variety of reasons due to competing physical, mental, and emotional priorities. By understanding some of the reasons for which injecting alone occurs, public health practitioners and policy makers can alter harm reduction messaging and strategies to best align with the needs and lived experiences of PWID. While not using alone may not be a viable harm reduction strategy for some, the experiences and testimonies of our interview subjects can help inform the design and implementation of other more accessible harm reduction strategies and options that most effectively help to reduce the risk of fatal overdose amongst PWID.

Acknowledgments

Funding: This work was supported by the National Institutes of Health [grant numbers 1R01DA040488 and T32AI102623]

References

- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (DSM-5®) (5th ed.). Arlington, VA: American Psychiatric Pub.
- Baltimore City Health Department. (2018). Baltimore City's response to the opioid epidemic. Retrieved from <https://health.baltimorecity.gov/opioid-overdose/baltimore-city-overdose-prevention-and-response-information>.
- Banta-Green C, Kuszler P, Coffin P, & Schoeppe J. (2011). Washington's 911 Good Samaritan drug overdose law-initial evaluation results. Alcohol & Drug Abuse Institute, University of Washington.
- Bardwell G, Kerr T, Boyd J, & McNeil R. (2018). Characterizing peer roles in an overdose crisis: Preferences for peer workers in overdose response programs in emergency shelters. *Drug and Alcohol Dependence*, 190, 6–8. [PubMed: 29960202]
- Bardwell G, Kerr T, & McNeil R. (2019). The Opioid Overdose Epidemic and the Urgent Need for Effective Public Health Interventions that Address Men Who use Drugs Alone. *The American Journal of Men's Health*, 13(3).
- Bennett T, & Holloway K. (2012). The impact of take-home naloxone distribution and training on opiate overdose knowledge and response: An evaluation of the THN project in Wales. *Drugs: Education, Prevention and Policy*, 19(4), 320–328.
- BMORE POWER. (2019). Go slow fentanyl is here: Harm reduction tips. Retrieved from <http://www.20secondssaves.org/>.
- British Columbia Centre for Disease Control. (2015). Fentanyl campaign launches to raise awareness about the dangers of the drug. Retrieved from <http://www.bccdc.ca/about/news-stories/news-releases/2015/fentanyl-campaign-launches-to-raise-awareness-about-the-dangers-of-the-drug>.
- Carey JW, Morgan M, & Oxtoby MJ (1996). Intercoder agreement in analysis of responses to open-ended interview questions: Examples from tuberculosis research. *CAM Journal*, 8(3), 1–5.
- Carroll JJ, Marshall BD, Rich JD, & Green TC (2017). Exposure to fentanyl-contaminated heroin and overdose risk among illicit opioid users in Rhode Island: A mixed methods study. *International Journal of Drug Policy*, 46, 136–145. [PubMed: 28578864]
- Clark AK, Wilder CM, & Winstanley EL (2014). A systematic review of community opioid overdose prevention and naloxone distribution programs. *Journal of Addiction Medicine*, 8(3), 153–163. [PubMed: 24874759]
- Connors MM (1994). Stories of pain and the problem of AIDS prevention: Injection drug withdrawal and its effect on risk behavior. *Medical Anthropology Quarterly*, 8(1), 47–68.
- Cooper H, Friedman SR, Tempalski B, Friedman R, & Keem M. (2005). Racial/ethnic disparities in injection drug use in large US metropolitan areas. *Annals of Epidemiology*, 15(5), 326–334. [PubMed: 15840545]

- Desmon S. (2018). Go slow: Using harm-reduction messages to save lives in Baltimore. Retrieved from <https://ccp.jhu.edu/2018/07/30/reducing-overdose-deaths-baltimore/>.
- Doherty MC, Garfein RS, Monterroso E, Latkin C, & Vlahov D. (2000). Gender differences in the initiation of injection drug use among young adults. *Journal of Urban Health*, 77(3), 396–414. [PubMed: 10976613]
- Forseth K. (2016). Fentanyl and overdose: Harm reduction strategies. Retrieved from [https://bha.health.maryland.gov/NALOXONE/Documents/BHA%20Webinar%20Fentanyl%20and%20Overdose%20Harm%20Reduction%20Strategies%2012.20.16%20\(1\).pdf](https://bha.health.maryland.gov/NALOXONE/Documents/BHA%20Webinar%20Fentanyl%20and%20Overdose%20Harm%20Reduction%20Strategies%2012.20.16%20(1).pdf).
- Frank D, Mateu-Gelabert P, Guarino H, Bennett A, Wendel T, Jessell L, & Teper A. (2015). High risk and little knowledge: Overdose experiences and knowledge among young adult nonmedical prescription opioid users. *International Journal of Drug Policy*, 26(1), 84–91. [PubMed: 25151334]
- Gladden RM (2016). Fentanyl law enforcement submissions and increases in synthetic opioid-involved overdose deaths—27 states, 2013–2014. *MMWR.Morbidity and Mortality Weekly Report*, 65.
- Hagan H, Campbell JV, Thiede H, Strathdee SA, Ouellet L, Latka M, . . . DUIT Study Team. (2007). Injecting alone among young adult IDUs in five US cities: Evidence of low rates of injection risk behavior. *Drug and Alcohol Dependence*, 91, S48–S55. [PubMed: 17363193]
- Harm Reduction Coalition. (2018). Tolerance: Prevention tips. Retrieved from <https://harmreduction.org/issues/overdose-prevention/overview/overdose-basics/opioid-od-risks-prevention/tolerance/>.
- Health Resource Center-Baltimore Health. (2016). Staying alive drug overdose prevention and response program. Retrieved from <https://www.baltimorehealth.org/stayingalive/>.
- Kennedy MC, Karamouzian M, & Kerr T. (2017). Public health and public order outcomes associated with supervised drug consumption facilities: A systematic review. *Current HIV/AIDS Reports*, 14(5), 161–183. [PubMed: 28875422]
- Kerr T, Small W, Hyshka E, Maher L, & Shannon K. (2013). ‘It’s more about the heroin’: Injection drug users’ response to an overdose warning campaign in a Canadian setting. *Addiction*, 108(7), 1270–1276. [PubMed: 23551565]
- Krieger MS, Goedel WC, Buxton JA, Lysyshyn M, Bernstein E, Sherman SG, . . . Marshall BD (2018). Use of rapid fentanyl test strips among young adults who use drugs. *International Journal of Drug Policy*, 61, 52–58. [PubMed: 30344005]
- Latkin CA, Sherman S, & Knowlton A. (2003). HIV prevention among drug users: Outcome of a network-oriented peer outreach intervention. *Health Psychology*, 22(4), 332. [PubMed: 12940388]
- Marshall BD, Milloy MJ, Wood E, Montaner JS, & Kerr T. (2011). Reduction in overdose mortality after the opening of North America’s first medically supervised safer injecting facility: A retrospective population-based study. *The Lancet*, 377(9775), 1429–1437.
- Maryland Department of Health and Mental Hygiene. Good Samaritan law fact sheet. (2016). Catonsville, MD: Behavioral Health Administration.
- Maryland Department of Health and Mental Hygiene. (2017). Drug- and alcohol-related intoxication deaths in Maryland, 2016. Retrieved from https://bha.health.maryland.gov/OVERDOSE_PREVENTION/Documents/Maryland%202016%20Overdose%20Annual%20report.pdf.
- Maryland Department of Health Behavioral Health Administration. (2018). Good Samaritan Law. Retrieved from https://bha.health.maryland.gov/overdose_prevention/pages/good-samaritan-law.aspx.
- Mateu-Gelabert P, Sandoval M, Meylaxhs P, Wendel T, & Friedman SR (2010). Strategies to avoid opiate withdrawal: Implications for HCV and HIV risks. *International Journal of Drug Policy*, 21(3), 179–185. [PubMed: 19786343]
- 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. [PubMed: 27028542]
- McGinty EE, Barry CL, Stone EM, Niederdeppe J, Kennedy-Hendricks A, Linden S, & Sherman SG (2018). Public support for safe consumption sites and syringe services programs to combat the opioid epidemic. *Preventive Medicine*, 111, 73–77. [PubMed: 29481827]

- Metsch LR, McCOY CB, Shultz JM, Page JB, Philippe E, & McKAY C. (1999). Gender comparisons of injection drug use practices in shooting galleries. *Population Research and Policy Review*, 18(1–2), 101–117.
- Mihailovic A, Tobin K, & Latkin C. (2015). The influence of a peer-based HIV prevention intervention on conversation about HIV prevention among people who inject drugs in Baltimore, Maryland. *AIDS and Behavior*, 19(10), 1792–1800. [PubMed: 25845530]
- National Institute on Drug Abuse. (2020). Substance use in women: Sex and gender difference in substance use. Retrieved from <https://www.drugabuse.gov/publications/research-reports/substance-use-in-women/sex-gender-differences-in-substance-use>.
- National Institute on Drug Abuse. (2019). Overdose death rates. Retrieved from <https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates>.
- O'Donnell JK, Gladden RM, & Seth P. (2017). Trends in deaths involving heroin and synthetic opioids excluding methadone, and law enforcement drug product reports, by census region - United States, 2006–2015. *MMWR.Morbidity and Mortality Weekly Report*, 66(34), 897–903. [PubMed: 28859052]
- O'Donnell JK, Halpin J, Mattson CL, Goldberger BA, & Gladden RM (2017). Deaths involving fentanyl, fentanyl analogs, and U-47700 – 10 states, July–December 2016. *MMWR.Morbidity and Mortality Weekly Report*, 66(43), 1197–1202. [PubMed: 29095804]
- Peiper NC, Clarke SD, Vincent LB, Ciccarone D, Kral AH, & Zibbell JE (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. [PubMed: 30292493]
- Prekupec MP, Mansky PA, & Baumann MH (2017). Misuse of novel synthetic opioids: A deadly new trend. *Journal of Addiction Medicine*, 11(4), 256. [PubMed: 28590391]
- Prescription Drug Abuse Policy Systems. (2019). Drug Induced Homicide Laws. Retrieved from <http://www.pdaps.org/datasets/drug-induced-homicide-1529945480-1549313265-1559075032>.
- Ries RK, Miller SC, & Fiellin DA (2009). *Principles of addiction medicine*. Lippincott Williams & Wilkins.
- Ross MW, Wodak A, Stowe A, & Gold J. (1994). Explanations for sharing injection equipment in injecting drug users and barriers to safer drug use. *Addiction*, 89(4), 473–479. [PubMed: 8025506]
- Seth P, Rudd RA, Noonan RK, & Haegerich TM (2018). Quantifying the Epidemic of Prescription Opioid Overdose Deaths. *American Journal of Public Health*, 108, 500–502. [PubMed: 29513577]
- Seth P, Scholl L, Rudd RA, & Bacon S. (2018). Overdose deaths involving opioids, cocaine, and psychostimulants - United States, 2015–2016. *Morbidity and Mortality Weekly Report*, 67(12), 349–358. [PubMed: 29596405]
- Sherman SG, Fuller CM, Shah N, Ompad DV, Vlahov D, & Strathdee SA (2005). Correlates of initiation of injection drug use among young drug users in Baltimore, Maryland: The need for early intervention. *Journal of Psychoactive Drugs*, 37(4), 437–443. [PubMed: 16480171]
- Stein MD, DUBYAK P, Herman D, & Anderson BJ (2007). Perceived barriers to safe-injection practices among drug injectors who remain HCV-negative. *The American Journal of Drug and Alcohol Abuse*, 33(4), 517–525. [PubMed: 17668337]
- Strauss A, & Corbin JM (1997). *Grounded theory in practice*. Sage.
- The Harm Reduction Coalition. (2017). Principles of harm reduction. Retrieved from <https://harmreduction.org/about-us/principles-of-harm-reduction/>
- Tobin KE, Kuramoto SJ, Davey-Rothwell MA, & Latkin CA (2011). The STEP into action study: A peer-based, personal risk network-focused HIV prevention intervention with injection drug users in Baltimore, Maryland. *Addiction*, 106(2), 366–375. [PubMed: 21054614]
- Unger L (8, 2019). “Go slow” -- Baltimore’s peer-led fentanyl harm reduction campaign. Retrieved from <https://filtermag.org/go-slow-fentanyl-harm-reduction/>.
- VERBI GmbH. (2019). MAXQDA: Professional software for qualitative & mixed methods research. Retrieved from <https://www.maxqda.com/>
- Wang S. (2018). Historical review: Opiate addiction and opioid receptors. *Cell Transplantation*, 23(3), 233–238.