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Safe and unsafe spaces: non-fatal overdose, arrest, and receptive syringe sharing among people who inject drugs in public and semi-public spaces in Baltimore City

Kyle Hunter[1], **Ju Nyeong Park**[1,2], **Sean T. Allen**[1], **Patrick Chaulk**[3,4,5], **Taeko Frost**[6], **Brian W. Weir**[1], and **Susan G. Sherman**[1,§]

[1]Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, 624 N. Broadway, Baltimore, MD 21205, USA

[2]Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, 615 N. Wolfe St, Baltimore, MD 21205, USA

[3]Baltimore City Health Department, 1001 East Fayette Street, Baltimore, MD 21202, USA

[4]Department of Health, Policy and Management, Johns Hopkins Bloomberg School of Public Health, 624 N. Broadway, Baltimore, MD 21205, USA

[5]Division of Infectious Diseases, School of Medicine, Johns Hopkins University, Baltimore, MD 21205, USA

[6]Harm Reduction Coalition, 22 West 27th Street, 5th Floor, New York NY 10001, USA

Abstract

The spaces in which drug use occurs constitutes a key aspect of the "risk environment" of people who inject drugs (PWID). We aimed to add nuance to the characterization of "safe" and "unsafe" spaces in PWID's environments to further understand how these spaces amplify the risk of morbidities associated with injection drug use. PWID were recruited through the Baltimore City syringe service program and through peer referral. Participants completed a socio-behavioral survey. Multivariable logistic regression was used to identify associations between utilization of public, semi-public and private spaces with arrest, non-fatal overdose, and receptive syringe sharing. The sample of PWID (N=283) was mostly 45 years and older (54%), male (69%), Black (55%), and heroin users (96%). Compared to PWID who primarily used private settings, the adjusted odds of recent overdose were greater among PWID who mostly used semi-public and public locations to inject drugs. We also found independent associations between arrest and semi-public spaces, and between receptive syringe sharing and public spaces (all $p<0.05$). This study highlights the need for safe spaces where PWID can reduce their risk of overdose, likelihood of arrest and blood-borne diseases, and the dual potential of the environment in promoting health and risk.

§ Corresponding author: Susan G. Sherman, Johns Hopkins Bloomberg School of Public Health, 624 N. Broadway, Baltimore, MD 21205, USA.

Keywords

heroin; HIV risk; drug; overdose; substance use

Introduction

The opioid epidemic in the United States has resulted in the loss of almost a half a million lives since 2000 (Rudd, Seth, David, & Scholl, 2016). In Baltimore City alone, overdose deaths increased 76% from 393 in 2015 to 694 in 2016. The need to understand and find solutions to this crisis at both national and local levels has never been more urgent. The physical settings in which injection drug use occurs is one feature of the "risk environment" and significantly influences the behaviors and health of people who use drugs (PWID) (Rhodes, 2002; Rhodes, 2009). Paying attention to the microenvironment of the physical location within which injections occur shifts singular focus from individual behavior as the primary determinant of health outcomes to the primacy of context as a key determinant of health (Rhodes, 2002). Further, a risk environment framework brings to fore the influences of macro-structural factors such as economics, government policies, and social organizations as significant determinants of health outcomes, which are often mediated through more proximal micro-injecting environments, the environment surrounding the act of injecting (Rhodes, 2009; Rhodes et al., 2003; Tempalski & McQuie, 2009).

Furthermore, existing research identifies micro-injecting environments as a site of significant risk in the injecting lives of PWID (Small, Rhodes, Wood, & Kerr, 2007; Weeks et al., 2001). Public injection is defined as injecting behavior that occurs in any public place, including alleyways, hidden alcoves, and public toilets. The practice of public injecting has been associated with increased potential for physical assault, robbery and police intervention, which in turn precipitates rushed injection and unsafe or less hygienic injection practices (Ickowicz et al., 2017). Research has demonstrated that public injection is significantly associated with detectable HIV viral load among PWID with HIV infection, greater risk injection practices, as well as greater likelihood of overdose, abscesses, vein damage, and blood-borne viruses including Hepatitis C (Ickowicz et al., 2017; Klee, 1995; Marshall, Kerr, Qi, Montaner, & Wood, 2010; Rhodes et al., 2006; Small et al., 2007).

Physical settings that serve as injection locations can have any number of characteristics that are associated with risky injection practices: lack of access to sterile water and sterile injecting equipment; exposure to public view and to the elements; and the social relationships and hierarchies in sites that regulate injection behaviors (Weeks et al., 2001). Police activity in public locations can also negatively affect use of syringe service programs (SSP) and can lead to rushed injections; both of which can increase syringe sharing and unsanitary injection environments (Shaw et al., 2015; Stoltz et al., 2007). Encounters between police and PWID are also associated with overdose and HIV infection; these meetings affect street-based PWID acutely (Beletsky et al., 2015). Existing literature demonstrates that many elements of a given injection location combine to create the specific risks facing PWID.

Public spaces as related to injecting behaviors are defined in different ways in existing literature. Existing research often groups together public and semi-public spaces when characterizing drug use or discussing health outcomes (Rhodes, 2009; Shaw et al., 2015; Stoltz et al., 2007; Weeks et al., 2001). A great deal of drug use in urban spaces occurs in environments on a gradient between purely public or purely private, and there is some definitional overlap in these terms (e.g., a shooting gallery may be run out of a private home) (Dovey, Fitzgerald, & Choi, 2001; IDUHA, 2015; Weeks et al., 2001). The relevant differences between these spaces are numerous: hygienic conditions like access to sterile water; the presence of other PWID; accessibility to law enforcement; proximity to drug markets; and visibility to the public. For example, a previous study suggests that shooting galleries—a semi-public injecting space—actually promote some harm reduction behaviors (cleaning used needles) even though the space is also host to unsafe injection practices like needle-sharing (Metsch et al., 1999; Weeks et al., 2001). Research also demonstrates that people who use shooting galleries perceive these spaces as "safe environments" where assistance is available in the case of an overdose but injecting in a shooting gallery is also associated with an elevated risk of overdose (Kimber & Dolan, 2007; Philbin et al., 2008). In this sense, the space can be both safe (e.g., someone present in the advent of an overdose) and unsafe (e.g., needles can be shared). Similarly, a spatial analysis and ethnography of PWID in a neighborhood in Melbourne, Australia identified the multiple dimensions of risk (police vs. overdose) and the dilemmas facing PWID in choosing places to inject (Dovey et al., 2001). Fear of arrest and concern about police presence were often reported along with unsafe injection practices, suggesting a relationship between the two (Small et al., 2007).

Our study aims to add nuance to the discussion of "safe" and "unsafe" spaces in terms of injection environments and to further understand how these spaces amplify the risk of morbidities associated with injection drug use. We characterize *public spaces* as open-air and visible places such as streets, parks and stairwells (Small et al., 2007). *Semi-public spaces* include abandoned buildings and shooting galleries, vehicles, and public bathrooms. These spaces are characterized by some form of enclosure and separation from street-level activity, but are still public in character (Linas et al., 2015) Although the definition of public and semi-public vary in the literature, they are distinct from *private spaces*, most commonly considered homes of PWID or the homes of others which are spaces wholly enclosed and generally inaccessible to anyone except residents (Weeks et al., 2001). We also differentiated between public and semi-public spaces because they were distinct in terms of risk. Specifically, we characterize the association between the primary use of public, semi-public and private injection spaces with significant risks associated with drug injection: arrest; non-fatal overdose; and receptive syringe sharing.

Methods

The current analysis is a part of a larger study examining the impact of a change in syringe distribution practices of the Baltimore City Health Department's SSP from one-for-one to a needs-based distribution model. Data collection for this cross-sectional study occurred from April to November 2016. SSP clients were recruited through targeted sampling methods with all SSP sites (N=16) included in the sampling frame and recruitment targets at each site weighted by client volume. Study staff approached clients after they exited the SSP van and

briefly explained the study, conducted a brief screening, and invited eligible clients to participate in a 30-minute interviewer-administered Computer Assisted Personal Interview (CAPI) survey. Eligibility criteria included: being a registered SSP client and being at least 18 years of age. As the parent study examined differences in risk behaviors between PWID who did and did not attend the SSP, we simultaneously recruited non-client peers. Recruitment of peers occurred through referral from previously-interviewed clients of the SSP. Eligibility criteria included: (1) never having been a client of SSP, (2) being at least 18 years of age, and (3) self-report injection drug use in the past 30 days.

Informed consent was provided verbally and participation was anonymous. The survey instrument ascertained socio-demographics, housing status, police interactions, drug use behaviors, perceptions of fentanyl presence in drugs, drug treatment, and experiences with overdose, overdose response training and naloxone use. Participants were compensated with a $25 USD Visa card. The study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

The primary outcomes of interest were: non-fatal overdose in the past 12 months; arrest/incarceration in the last 12 months; and receptive syringe sharing in the last 30 days. Non-fatal overdose was constructed from the question, “have you ever experienced an overdose” and, if yes, “when was the last overdose” (within last week/month/6 months/year). Arrest/incarceration was constructed from the question, “Have you been arrested or incarcerated in the last year?” Receptive syringe sharing was constructed from the question “In the last 30 days, how many times did you inject using needles or syringes that you know have been used by someone else?” Race/ethnicity was collapsed into a three-tier variable for multivariable analysis (Non-Hispanic White vs. Non-Hispanic Black vs. Other i.e. Hispanic, multiracial or other). Housing status was captured using the question, “In the last 3 months, where did you usually sleep at night?” with responses grouped into three categories: own or rent a house or apartment; staying with family or friends/other people; and homeless (streets/car/abandoned houses/shelter/no set place/don’t know).

Exposures of interest included primary location of injection in the last 30 days in a public space or a semi-public space (vs. private). We asked about places in the community where drugs were injected using two items: “In the last 30 days did you inject in the following places?” with responses including: own home; somebody else’s home; abandoned building; street or park; vehicle; shooting gallery; public bathroom; and other. Further, we asked, “Of those places you injected in the last 30 days, where did you inject the most?” Response options to the most frequent place of injection were grouped into private (own home or somebody else’s home), semi-public (abandoned building, vehicle, shooting gallery, public bathroom) and public (street, park).

Drug injection frequency was measured using the question “in the past six months, how often did you inject any drug?” Responses were collapsed into a binary variable consisting of daily or more (more than once a day/once a day) and less than daily (more than once a week/once a week/more than once a month/once a month/less than once a month). Responses from the number of times injected per day item were categorized as 1–3 (once/2–

3 times) and >3 times. Binary (yes/no) variables for injection and non-injection drug use in the past six months were constructed using, “When was the last time you [insert route of administration] [insert drug type]?” Fentanyl presence perception was captured using, “When you inject drugs, how often do you think it is laced with fentanyl?” Responses were dichotomized (never, rarely or don’t know vs. about half the time, most of the time, or always).

Statistical Analysis

Prevalence of socio-demographics, non-fatal overdose, arrest/incarceration, receptive syringe sharing, encounters with the police, and injection drug use behaviors were calculated. Initial tests for association with primary injection location were calculated using Pearson’s chi-square test with $p<0.05$ indicating statistical significance. To examine the factors associated with each of the three outcomes (non-fatal overdose, arrest, and receptive syringe sharing), we executed bivariate logistic regression models of the correlates and selected the sub-set of correlates significant at the $p<0.20$ level for consideration in multivariable logistic regression modeling. Models were selected for parsimony, and because risk pathways for the three outcomes differ, the three models include different covariates. A post hoc Pearson’s chi-square test was used to test the association between homelessness and public injection. Public injection was strongly associated with homelessness and thus the latter was not retained in the final models. Post hoc analysis was also conducted to compare SSP client and non-client characteristics to help consider how these might inform our results. All analyses were executed using Stata/SE 14.2. (College Station, Texas).

Results

As shown in Table 1, more than three-quarters of the participants in the study were male (69%) and slightly more than half were Black (55%). One-third of participants were homeless at the time of the interview (33%) and 29% lived with friends or family. Nearly one-third (29%) of participants had recently (past 12 months) been arrested or incarcerated and 53% reported experiencing police harassment without arrest. Roughly half of respondents reported ever having syringes confiscated, destroyed, or discarded by police (48%).

Table 2 demonstrates that more than half (57%) of participants reported primarily injecting in a home while 43% reported primarily injecting in a semi-public or public space in the past 30 days. The most commonly used semi-public or public spaces were abandoned buildings (30%) and streets or parks (8%). Most participants injected heroin alone (96%), followed by speedball (heroin and cocaine) (62%). Non-injection drug use was also common, ranging from 24% for illicitly obtained Buprenorphine/Suboxone to 51% for crack cocaine. Among the sample, 16% reported having injected with a needle used previously by someone else in the last 30 days. One-third of participants had experienced a non-fatal overdose in the past 12 months.

Non-fatal Overdose

Unadjusted and adjusted associations of experiencing a non-fatal overdose are displayed in Table 3. In unadjusted regression models, factors significantly associated with increased odds of having non-fatal overdose included: injecting primarily in semi-public spaces (unadjusted odds ratio [uOR]=2.76, 95% confidence interval: 1.60–4.74) or injecting in public spaces (uOR=3.44, 95% CI: 1.43–8.32) compared to a private space; illicit use of Buprenorphine/Suboxone use (uOR=3.63, 95% CI: 2.06–6.40); and having been injected by others in the past 30 days (uOR=2.41, 95% CI: 1.45–4.02). In a multivariable model, factors significantly associated with increased odds of experienced a non-fatal overdose were: injecting primarily in semi-public spaces (aOR=2.31, 95% CI: 1.29–4.12); injecting primarily in public spaces (aOR=3.32, 95% CI: 1.28–8.53); illicit use of Buprenorphine/Suboxone use (aOR=3.20, 95% CI: 1.74–5.90); and having been injected by others in the past 30 days (aOR=2.13, 95% CI: 1.23–3.69).

Arrest or Incarceration

Unadjusted and adjusted correlates of arrest or incarceration in the past 12 months are in Table 4. In unadjusted regression models, factors significantly associated with increased odds of arrest included: injecting primarily in semi-public spaces (uOR=1.97, 95% CI: 1.15–3.36); being Non-Hispanic White (vs. Non-Hispanic Black) (uOR=0.37, 95% CI: 0.21–0.65); younger age (uOR=0.58, 95% CI: 0.46–0.74); police harassment (uOR=2.34, 95% CI: 1.38–3.97); and being a SSP client (uOR=3.02, 95% CI: 1.59–5.74). In a multivariable model, factors significantly associated with increased odds of having been arrested or incarcerated were: injecting primarily in semi-public spaces (aOR=1.96, 95% CI: 1.10–3.51); younger age (aOR=0.59, 95% CI: 0.43–0.79); and being a SSP client (aOR=2.98, 95% CI: 1.47–6.04).

Receptive Syringe Sharing

Unadjusted and adjusted correlates of receptive syringe sharing in the past 30 days are displayed in Table 5. In unadjusted analyses, factors significantly associated with receptive syringe sharing included: semi-public injection (uOR=2.42, 95% CI=1.20–4.91); public injection (uOR=4.5, 95% CI =1.67–12.15); being Non-Hispanic Black (vs. Non-Hispanic White), (uOR=0.27, 95% CI=0.13–0.55) younger age (uOR=0.59, 95% CI: 0.43–0.77); having been injected by others in the past six months (uOR=2.90, 95% CI=1.47–5.73); and homelessness (uOR=2.44, 95% CI=1.16–5.13). In a multivariable model, factors significantly associated with an increased odds of receptive syringe sharing (past 30 days) were: public injection (aOR=4.5, 95% CI =1.67–12.15); being Non-Hispanic Black (vs. Non-Hispanic White) (aOR=0.27, 95% CI=0.13–0.55); and having been injected by others in the past six months (aOR=2.75, 95% CI: 1.34–5.64).

Discussion

We found that using public and semi-public spaces as primary injection locations was associated with greater odds of overdose, arrest, and receptive syringe sharing among PWID in Baltimore, MD. Compared with private locations, we observed increased odds of recent overdose among PWID who used semi-public or public locations; increased odds of arrest

among PWID who used semi-public spaces; and increased odds of receptive syringe sharing among PWID who used public spaces. The study adds to a large body of literature that articulates the impact and relevance of environments in which drug use occurs, pointing to the necessity of targeting interventions on salient aspects of physical environments. Though our analysis distinguished public, semi-public, and private spaces, there is of course overlap and fluidity between these categories.

The study is one of the first to distinguish between and explore morbidities associated with two types of public spaces: semi-public (e.g., public bathroom, abandoned house, public transit) which are somewhat privatized public spaces; and public spaces (e.g., street, parks, and stairwells). Although there is similarity between each category's locations, we found public spaces to be associated with an increased odds of both non-fatal overdose and receptive syringe compared to semi-public spaces, in separate multivariable models. The nuanced examination of these two categories of seemingly similar spaces provides insight into gradations of risks associated with even a seemingly modest shift in the degree of "public" or "private" nature of a given space.

The overall prevalence of recent non-fatal overdose among study participants (33%) is reflective of sustained increases in opioid overdose morbidity and mortality throughout the U.S. (Rudd, Aleshire, Zibbell, & Gladden, 2016). One notable finding was that SSP clients and their peers in our study experienced overdose at similar levels (32% of clients and 34% of non-clients) even though the SSP provides free access to take-home naloxone. While this finding could be attributable to peer distribution of naloxone, it also may suggest that attending syringe service programs alone might not have a protective effect in the context of a drug market containing potent levels of synthetic opioids such as fentanyl and its analogues. Non-clients and clients in our study reported thinking their drugs were laced with fentanyl at similar levels (76% and 71%, respectively), suggesting a possible relationship between overdose rates and fentanyl adulteration. Overall, more than half of participants thought that their drugs were laced with fentanyl "half or all the time," likely contributing to overdose occurrence. Injection by someone else ("hit doctor") conferred a two times higher odds of experiencing a non-fatal overdose, echoing previous research (Kerr et al., 2007; Kral, Bluthenthal, Booth, & Watters, 1998; Novelli, Sherman, Havens, Strathdee, & Sapun, 2005). Social dynamics that are expressed in injecting practices often have implicit power imbalances that can potentiate risk. Attention to the nature of the social environment and its role in promoting or reducing the occurrence of deleterious outcomes such as overdose is an important intervention target. Having been injected by a "hit doctor" has previously been associated with receptive syringe sharing and HIV infection without the necessary harm reduction training (Wood et al., 2001; Wood et al., 2015). This result underscores the importance of tailored harm reduction interventions focused on nuances around the relationship and context of receiving an injection form a "hit doctor." Our study further lends credence to the importance of promoting safe consumption spaces (SCSs), which are physical sites where PWID can bring previously-purchased illicit drugs to self-inject. SCSs are sterile environments operated within the supervision of trained personnel where clients can receive various services: sterile injection equipment, naloxone, as well as in many instances, case management, primary care, and referrals to drug treatment providers. SCSs have been proven to have significant health impact and are cost-effective due to their

reduction in HIV and HCV transmission as well as a reduction in abscesses and fatal overdose deaths (Potier, Laprevote, Dubois-Arber, Cottencin, & Rolland, 2014). Further, SCSs have alleviated a number of negative consequences of public injection practices (Potier et al., 2014; Shaw et al., 2015; Stoltz et al., 2007; Wood et al., 2001).

Finally, our study found that illicit Buprenorphine/Suboxone use was independently associated with overdose, as was injection by others in the last six months. While caution must be taken given the potential for reverse causality due to the discordant time periods between these two factors, Buprenorphine/Suboxone diversion is common and this association is supported by previous research which found illicit Buprenorphine/Suboxone to be associated with acutely recent (past four weeks) non-fatal overdose among a large sample (N=1,355) of Norwegian PWID (Bretteville-Jensen, Lillehagen, Gjersing, & Andreas, 2015). Studies have found that the primary reasons provided for diverted Buprenorphine/Suboxone include treatment of opioid withdrawal symptoms, the desire for opioid cessation but lack of access to treatment, and the inability to afford drug treatment (Bazazi, Yokell, Fu, Rich, & Zaller, 2011; Genberg et al., 2013; Gwin Mitchell, 2009). SSPs are well equipped to help PWID get into treatment when they lack of access to Buprenorphine/Suboxone, reducing their risk of overdose (Fox, Chamberlain, Sohler, Frost, & Cunningham, 2015).

Arrest and incarceration in the previous 12 months was significantly associated with primarily injecting in semi-public locations but was not significantly associated with injection in public spaces. The lack of significance in this relationship may be explained by chance, given the extremely small sample size of PWID injecting publically that had been arrested in the previous 12 months (n=2), or it could be explained by a temporal discordance between most common injection location in the past 30 days and arrest/incarceration in the previous 12 months. Conversely, nearly 50% of PWID who injected in semi-public spaces experienced recent arrest or incarceration, indicating that PWID in a variety of spaces are at risk for negative encounters with law enforcement. This is consistent with research in other cities that found PWID who injected publically are at increased risk for arrest and using riskier injection practices because of fear of interruption or arrest (Shaw et al., 2015; Small et al., 2007). In Baltimore, many PWID who inject “publicly” use spaces with a degree of separation from the street, largely to avoid the hazards associated with public injections such as interaction with the police (Linas et al., 2015). Despite these self-protective measures, it is evident from this study that the risk of law enforcement encounters is more likely when injecting drugs in semi-public spaces. Previous studies have demonstrated that law enforcement know these semi-public spaces as sites of drug use and activity, suggesting one explanation for this finding (Wood, Taylor, Groff, & Ratcliffe, 2015).

Other factors independently associated with being arrested included being an SSP client and experience of police harassment. Client status might be associated with increased odds of arrest because of the street-level exposure clients have walking to and from the SSP site, in addition to a greater number (nearly double) of clients compared to non-clients in this study. This is consistent with previous research in Baltimore that found more active SSP clients reported more adverse police interactions (Beletsky et al., 2015). Self-reported police harassment was significantly associated with arrest, though the time frame (“ever

experienced") and the bias that can accompany reporting harassment after arrest led us to omit this variable from the adjusted model. Other studies demonstrate that police activity can impact drug injection behavior and overdose (Wood et al., 2004).

The final outcome of interest, receptive syringe sharing, demonstrated a direct association between public injecting and needle sharing. PWID who primarily injected in public had three times the odds of receptive syringe sharing compared to those who primarily injected in a home. This finding is consistent with other research suggesting that rushed injections and unhygienic conditions are prevalent among this population (Small et al., 2007). Although injection in semi-public vs. private locations was associated with significantly greater odds of needle sharing in the unadjusted analyses, it was no longer significantly associated in the adjusted analysis, despite a nearly two-fold greater odds. This suggests that other variables in the adjusted model, such as being injected by another individual, may be associated with receptive sharing *and* injecting in semi-public locations. Further, the feeling of relative "safety" may encourage less syringe sharing in semi-public spaces as other research has demonstrated (Rhodes et al., 2006; Tempalski & McQuie, 2009). Ironically, this feeling of safety that might facilitate safer injecting practices conflicts with the finding that PWID who inject in semi-public places experience arrest more often than those who inject privately. While our data is not specific enough to understand exactly where arrests happen, we know from other research that negative law enforcement encounters are common around SSP sites and places such as abandoned buildings that are known to be sites of drug activity (Beletsky et al., 2015; Wood et al., 2015). Highlighting this tension between a space that is simultaneously "safe" and "unsafe" for PWID is one of the central aims of this paper.

Taken together, these findings indicate an urgency in reducing the multiple risks associated with injecting drugs in public and semi-public spaces. SCSs are effective in addressing the risks associated with unsafe physical injecting environments. They are supported by an extensive body of evidence from Vancouver and Australia and have been shown to: decrease rates of overdose in the areas surrounding the facility; decrease public injecting, nuisance, and litter; successfully connect PWID with detox and treatment; decrease public costs associated with delivering care to PWID who are hospitalized or contract a blood-borne virus; and save lives through on-site medical supervision (Potier et al., 2014; Stoltz et al., 2007; Wood, Tyndall, Montaner, & Kerr, 2006) Our findings on arrest also indicate the need for continuing collaboration between law enforcement and public health officials to align policy and communication. Collecting more precise geospatial data on arrest locations would help in designing targeted interventions in the future (Beletsky et al., 2015; Wood et al., 2015). Beyond a sanctioned SCS, there are other strategies such as unsanctioned SCS, including peer-based harm reduction initiatives, that can be developed to combat elevated rates of overdose and the absence of organizational programming (Kral & Davidson, 2017). Peers provide a unique connection to PWID's health and safety needs, and can facilitate harm reduction activities such as syringe distribution among their social networks (Newland, Newman & Treloar, 2016).

Our study has several limitations. We had a modest sample size of participants; this could limit the statistical power of our findings. Recruiting non-client PWID was challenging at times and subject to potential sampling bias and therefore may not be representative of all

non-client PWID in Baltimore. Survey data may be subject to recall bias and social desirability bias. The cross-sectional design of this study and different time periods of available variables do not allow assessment of temporality so there may have been discordance between the location of injection and the outcomes we measured with the exception of syringe-sharing and injection location. Furthermore, we were unable to distinguish the timing of arrest and incarceration, as the occurrences of both were asked in a single question. The combination of arrest and incarceration could obfuscate both temporal issues related to measurement as well as include incarceration that is unrelated to the given outcomes, although likely related distally or directly to drug use. Lastly, injection drug use in Baltimore may differ from other locales thus limiting the generalizability of our findings.

Conclusion

Our goal was to enhance our understanding of the dimensions of public injection for PWID in Baltimore City and in other urban settings. Qualitative work has demonstrated how users experience the contradictions of feeling “safe” and “unsafe” in these locations and we aimed to add quantitative evidence to demonstrate the specific health and safety outcomes facing users of public and semi-public spaces who are often the most socially and structurally vulnerable PWID. Effective interventions with a robust impact are urgently needed as mortality increases during the current opioid crisis. This study substantiates more evidence in favour of creating safe spaces where PWID can reduce their risk of overdose, arrest and receptive syringe sharing. Additionally, SCSs could connect PWID with drug treatment and other necessary and desired services that are often difficult to access. Finally, the study underscores the potential of the environment to generate risk and offer safety simultaneously.

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Table 1

Socio-demographic characteristics of PWID in Baltimore, Maryland (N = 283)

	Total *N* (%)
Age	
18–34	68 (24)
35–44	63(22)
45–54	70 (35)
≥ 55	40 (19)
Female Gender	88 (31)
Race/ethnicity	
Non-Hispanic White	102 (36)
Non-Hispanic Black	155 (55)
Hispanic, multiracial, or other race/ethnicity	26 (9)
Educational attainment	
Less than high school	107 (38)
12th grade or GED	123 (43)
College, some college, associate's degree, or technical degree	53 (19)
Usual housing in past 3 months	
Own or rent a house/apartment	107 (38)
Staying with family or friends or other	81 (29)
Homeless[#]	95 (33)
Client of Baltimore City NEP	193 (68)
Arrested or incarcerated in the past 12 months	83 (29)
Ever harassed by police	151 (53)
Police ever confiscate, destroy, or throw away syringes	135 (48)

[#]streets, car, abandoned houses, shelter, no set place or don't know; GED = General Educational Development; NEP = needle exchange program

Table 2

Drug use and behaviors among PWID; Baltimore, MD (N = 283)

	Total *N* (%)
Primary location of injection drug use in the past 30 days	
Private	160 (57)
Own home	132 (47)
Somebody else's home	28 (10)
Semi-Public	99 (35)
Abandoned building	84 (30)
Public bathroom	2 (1)
Car or other vehicle	8 (3)
Shooting gallery	5 (2)
Public	24 (8)
Street or park	22 (8)
Stairwell	2 (1)
Drugs injected (past 6 months)	
Heroin alone	271 (96)
Speedball (heroin and cocaine)	176 (62)
Prescription opioids	36 (13)
Injected drugs laced with fentanyl ≥half of the time	164 (58)
Non-injection drug use (past 6 months)	
Crack cocaine	145 (51)
Heroin	106 (38)
Prescription benzodiazepines	90 (32)
Prescription opioids	87 (31)
Buprenorphine/Suboxone	69 (24)
Injection by someone else in the past 6 months	134 (47)
Non-fatal overdose in the past 12 months	92 (33)
Receptive syringe sharing in the past 30 days	45 (16)

Table 3

Factors associated with non-fatal overdose (past 12-months) among PWID; Baltimore, Maryland (N = 283)

	uOR	(95% CI)	p-value	aOR	95% CI	p-value
Injection location (most-used last 30 days)						
Private (own home/someone else's)	REF	--	--	--	--	--
Semi-public (public bathroom, abandoned house, public transit)	2.76	(1.60–4.74)	<0.001	2.31	1.29–4.12	0.005
Public (street, park, stairwell)	3.44	1.43–8.32	0.006	3.32	1.28–8.53	0.013
Race/ethnicity						
Non-Hispanic White	REF	--	--	--	--	--
Non-Hispanic Black	0.58	0.34–0.99	0.047	0.55	0.27–1.13	0.103
Hispanic, multiracial, or other race/ethnicity	1.38	0.58–3.39	0.463	2.79	1.01–7.69	0.048
Age	0.91	0.73–1.22	0.360	1.22	0.91–1.64	0.180
Bupe/Suboxone use in the last 6 months	3.63	2.06–6.40	<0.001	3.20	1.74–5.90	0.000
Injection by others in the last 30 days	2.41	1.45–4.02	0.001	2.13	1.23–3.69	0.007
Client/Non-client status of Baltimore NEP						
Non-client	REF	--	--	--	--	--
Client	3.02	1.59–5.74	0.001	2.98	1.47–6.04	0.002
Gender						
Male	REF	--	--	--	--	--
Female	0.88	0.52–1.50	0.635	--	--	--
Housing Status						
Own or rent house/apartment	REF	--	--	--	--	--
Family or friend's house/apartment	1.37	0.71–2.66	0.350	--	--	--
Homeless	3.11	1.70–5.71	<0.001	--	--	--

Table 4

Correlates of arrest (past 12 months) among PWID; Baltimore, Maryland (n = 283)

Arrested in the last 12 months, n=83 (29%)								
	N (%)	**P (χ^2)**	**uOR**	**95% CI**	**P**	**aOR**	**95% CI**	**P**
Injection location (most-used last 30 days)		0.002						
Private (own home/someone else's)	41(49)		REF	--	--	--	--	--
Semi-public (public bathroom, abandoned house, public transit)	40 (48)		1.97	1.15–3.36	0.013	1.96	1.10–3.51	0.023
Public (street, park, stairwell)	2 (2)		0.26	0.06–1.17	0.080	.25	0.05–1.17	0.079
Race/ethnicity		<0.001						
Non-Hispanic White	42 (51)		REF	--	--	--	--	--
Non-Hispanic Black	32 (39)		0.37	0.21–0.65	0.000	0.79	0.40–1.60	0.512
Other	9 (11)		0.76	0.31–1.85	0.543	0.94	0.36–2.50	0.903
Age	--	<0.001	0.58	0.46–0.74	0.000	0.59	0.43–0.79	0.001
Client/Non-client status of Baltimore NEP		0.001						
Non-client	14 (17)		REF	--	--	--	--	--
Client	69 (83)		3.02	1.59–5.74	0.001	2.98	1.47–6.04	0.002
Police harassment ever	--	0.001	2.34	1.38–3.97	0.002	--	--	--
Gender		0.737						
Male	56 (67)		REF	--	--	--	--	--
Female	27 (33)		1.10	0.63–1.90	0.737	--	--	--
Housing Status		<0.001						
Own or rent house/apartment	21 (25)		REF	--	--	--	--	--
Family or friend's house/apartment	20 (24)		1.34	0.67–2.69	0.406	--	--	--
Homeless	42 (51)		3.25	1.74–6.07	0.000	--	--	--

Table 5

Injection location and receptive syringe sharing among PWID; Baltimore, Maryland (n = 283)

Receptive syringe sharing in the last 30 days, n=45 (16%)								
	N (%)	**P (χ^2)**	**uOR**	**95% CI**	**P**	**aOR**	**95% CI**	**P**
Injection location (most-used last 30 days)								
Private (own home/someone else's)	16 (36)		REF	--	--	--	--	--
Semi-public (public bathroom, abandoned house, public transit)	21 (47)		2.42	1.20–4.91	0.014	1.95	0.92–4.11	0.078
Public (street, park, stairwell)	8 (18)		4.50	1.67–12.15	0.003	3.00	1.03–8.74	0.044
Race/ethnicity		0.001						
Non-Hispanic White	26 (58)		REF	--	--	--	--	--
Non-Hispanic Black	13 (29)		0.27	0.13–0.55	0.000	0.40	0.16–0.98	0.044
Other	6 (13)		0.88	0.32–2.42	0.030	0.90	0.31–2.64	0.852
Age	--	0.001	0.59	0.43–0.77	0.000	0.76	0.52–1.10	0.147
Injection by others in the last 6 months	31 (69)	0.002	2.90	1.47–5.73	0.002	2.75	1.34–5.64	0.006
Client/Non-client status of Baltimore NEP		0.102						
Non-client	19 (42)		REF	--	--	--	--	--
Client	26 (58)		0.58	0.30–1.12	0.104	--	--	--
Gender		0.998						
Male	31 (69)		REF	--	--	--	--	--
Female	14 (31)		1.00	0.50–1.99	0.998	--	--	--
Housing Status		0.008				--	--	--
Own or rent house/apartment	13 (29)		REF	--	--	--	--	--
Family or friend's house/apartment	8 (18)		0.79	0.31–2.01	0.625	--	--	--
Homeless	24 (53)		2.44	1.16–5.13	0.018	--	--	--