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Young Drug Users: A Vulnerable Population and an Underutilized Resource in HIV/HCV Prevention

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Abstract

Background: The social networks of people who inject drugs (PWID) have long been studied to understand disease transmission dynamics and social influences on risky practices. We illustrate how PWID can be active agents promoting HIV, HCV and overdose prevention.

Methods: We assessed drug users' connections and interactions with others at risk for HIV/HCV in three cities: New York City (NYC), USA (n=539); Pereira, Colombia (n=50); and St. Petersburg, Russia (n=49). In NYC, we measured young opioid users' health-related actions to support fellow users ("intraventions") and the age composition of opioid user networks, and examined associations between knowing older PWID and being HCV-positive. In Pereira, we measured characteristics of PWID's injection, sexual and high-risk friendship networks. In St. Petersburg, we examined young PWID's actions to help others prevent HIV and overdose.

Results: In all three cities, the majority of participants' network members were of a similar age as themselves, yet connections across age groups were also present. In NYC, knowing any opioid user(s) older than 29 was associated with testing HCV-positive. In NYC and St. Petersburg, a large proportion of PWID engaged in intravention activities to support safer injection and overdose prevention. In Pereira, PWID injected, had sex and interacted with other key groups at risk.

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Conflict of Interest

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Human and Animal Rights and Informed Consent

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Conclusions: People who use drugs can be active players in HIV/HCV and overdose risk-reduction; their networks provide them with ample opportunities to disseminate harm reduction knowledge, strategies and norms to others at risk. Local communities could augment prevention programming by empowering drug users to be allies in the fight against HIV and facilitating their pre-existing health-protective actions.

Keywords

People Who Inject Drugs; HIV/HCV Prevention; Young Drug Users; Opioid Use

Introduction

Worldwide, the illicit opioid market is expanding, with increasing availability of heroin and opioid analgesic medications (either diverted or counterfeited). Many people who use illicit opioids rely on injection as route of drug administration and opioids are among the most frequently injected illicit drugs. Worldwide, it is estimated that over 80% of the 15.6 million people who inject drugs (PWID) inject opioids. Injection drug use is a key driver of blood-borne disease. Globally, 17.8 % of PWID are living with HIV [1]; excluding sub-Saharan Africa, nearly 30% of HIV infections are due to unsafe drug injection [2]. Additionally, an estimated 52% of PWID worldwide are HCV antibody-positive, about 28%% of whom are younger than 25 years old [1].

The World Health Organization (WHO) recommends four interventions that, if delivered at scale, can contain and reduce HIV prevalence among PWID: needle and syringe programs (NSPs); opioid substitution therapy (OST) and other evidence-based drug treatment; HIV testing and counselling (HTC); and antiretroviral therapy (ART) to leverage the benefits of "treatment as prevention" [3]. Despite these WHO recommendations, and an increase in the number of countries where injection drug use is taking place [1], the predictable HIV and HCV epidemics associated with drug injection are often met with equally predictable policy debates regarding the merits of introducing harm reduction interventions of proven efficacy such as syringe exchange. In many nations, these preventive strategies are not in place or are implemented at insufficient scale to effectively prevent or halt HIV epidemics in local populations of PWID [4]. These policy debates often result in impeding or delaying prevention efforts that could be most effective if implemented in the early stages of HIV/HCV epidemics, when background prevalence among PWID is relatively low [5–6].

This seemingly contradictory pattern – the spread of HIV/HCV among PWID, along with slow public health policy responses – was true in past decades and remains true in many countries and geographical regions today despite robust evidence of harm reduction programs' efficacy and cost-effectiveness in curbing the spread of blood-borne viral diseases [7]. In the U.S., for example, numerous states are facing an increase in the number of people who inject opioids [8, 9]. Despite mounting evidence of increasing incidence of acute HCV attributed to injection drug use [10, 11], in many hard-hit regions of the U.S. there is little implementation of harm reduction services that could prevent the spread of HCV and potentially HIV [12]. Given this unfortunate mismatch between known epidemiological risk

and public health response, it is worth asking if other health-protective measures could be taken while the struggles to implement comprehensive prevention strategies continue.

In this paper, we present data suggesting that drug users themselves can be a key resource in spreading knowledge of safer drug use and injection practices and safety-enhancing social norms that prioritize the prevention of HIV, HCV and overdose. The social networks of PWID have long been studied to better understand disease transmission dynamics and social influences on risky and safe injection practices [13–18]. This research has found that PWID can be effective change agents and opinion leaders, disseminating HIV-related knowledge and promoting safer sexual and injection practices among their peers [19, 20]. Informed by these findings, we suggest that, in the face of policy indifference (and, at worst, policies that criminalize and further stigmatize drug use), drug users themselves function as the primary agents of prevention on the ground. We discuss how communities can help address their HIV/HCV epidemics in PWID populations by encouraging and facilitating the health-related preventive actions that drug users may already be engaging in to support their fellow users. Supporting, encouraging and facilitating drug users as a community prevention resource could have a rapid effect on slowing the spread of HIV and HCV among PWID, especially in the early stages of epidemics.

We present data from three cities in three different countries – NYC (USA), St. Petersburg (Russia) and Pereira (Colombia) – in order to highlight several characteristics that make PWID especially well-suited to be key players in supporting the health of the drug-using community in three distinct drug policy and drug-use contexts. Because drug use is often initiated and sustained in a social context with peers, drug users, particularly those who are young, have varying numbers of social network ties with others in the drug-using community. As the members of these social networks interact, they share norms about safe (or unsafe) drug use, and often engage in drug use (and sex) together. Drug users' network connections can, therefore, serve as a pathway for the transmission of HIV/HCV infection if these connections involve unprotected sex and/or unsafe drug injection practices. However, these same networks can also function to enhance safety; for example, a drug user may teach a fellow user safe injection techniques or suggest an alternative route of administration to an individual who is considering injecting drugs for the first time.

In the next sections, we briefly outline salient macro-contextual factors that influence HIV and HCV transmission dynamics among local PWID populations in the U.S., Russia and Colombia. In comparing patterns of prevention efforts and social network linkages among drug users in these three countries, we aim to illustrate the role of PWID as active agents for HIV, HCV and overdose prevention and the potential of their efforts to help protect drug users from health-related harms even when government-led prevention efforts are insufficient.

The Opioid Epidemic in the U.S.

Starting in the early 1990's, the U.S. experienced a sharp increase in prescribing rates of opioid analgesic medications rooted in changing attitudes towards pain treatment within medicine that was abetted by pharmaceutical companies' aggressive promotion of new extended-release opioid formulations marketed as around-the-clock treatments for chronic

pain. These changes led to a dramatic and widespread increase in the availability of prescription opioids (POs) throughout the country which, in turn, led to widespread diversion and misuse of POs, particularly among youth [21], and concomitant increases in overdose mortality that continue today [22, 23]. Many young people who initiated opioid use with the misuse of POs have subsequently transitioned to the use of heroin [24, 25] and to injection as a route of opioid administration [26, 27], leading to an emerging U.S. epidemic of HCV among young PWID especially in non-urban areas [28]. More recently, a new trend has emerged with the rise in consumption of and mortality due to illicitly manufactured fentanyl and fentanyl analogs, drugs which are many orders of magnitude more potent than other opioids.

In prior research, our team has found that drug users commonly engage in health-related actions aimed at supporting their fellow drug users and embedding safety in their networks; we refer to these actions as “intraventions” [29]. A better understanding of the network characteristics and intravention activities of young opioid users may suggest how their indigenous harm reduction efforts can be supported and strengthened to maximize their effectiveness in preventing HIV/HCV and overdose. To this end, we present structured assessment data from a NYC study of young adult opioid users (ages 18–29) recruited using Respondent-Driven Sampling (n=539). We examine three aspects of young opioid users’ network connections to other opioid users: 1) the age composition of participants’ opioid user networks; 2) associations between the age of participants’ network members and participants’ likelihood of being HCV-positive; and 3) the prevalence of intravention activities engaged in by participants with members of their opioid user networks.

The HIV Epidemic in Russia

The Russian Federation (Russia) has the largest HIV epidemic in Eastern Europe and Central Asia. In Russia, the number of people newly diagnosed with HIV has risen by 149% since 2006; 54% of those newly diagnosed with HIV were infected via unsafe injection drug use [30]. Funding for NSPs in Russia is low (none from government sources), resulting in extremely low coverage. OST remains illegal and its use is punishable by prison [31]. PWID are heavily stigmatized and criminalized in Russia with extrajudicial policing practices leading to fear, terror [32] and sexual violence [33]. Within this structural context characterized by a lack of services for and severe hostility to PWID, our exploratory mixed-methods study of 18–26 year-old drug users in St. Petersburg examined actions that young PWID engage in to prevent HIV transmission and overdose. These actions are especially relevant given that Russian prevention policies fall far short of addressing the overwhelming needs and have failed to curb the country’s expanding injection-driven HIV epidemic [34].

Heroin Production Driving Drug Injection in Colombia

While in the U.S., a major structural factor changing drug use dynamics among youth over the past 20 years has been pharmaceutical opioids leading to increases in nonmedical use of POs and heroin, in Colombia the factor of change has been heroin production. In Colombia, starting in the early 1990’s, illicit drug production diversified to include heroin as well as cocaine [35]. Heroin production led to the development of a local market for heroin and the uptake of heroin use among young people [36, 37]. The growth in the country’s production

and distribution of heroin has corresponded with an increase in its local consumption, including the use of heroin by injection. There is evidence that heroin uptake is increasing among young people in Colombia and is more prevalent than previously assumed [38–40]. Since the mid-1990's, Colombia has also had an increase in the number of PWID who now face a rising prevalence of HIV [36–39]. Colombia ranks third in HIV prevalence among PWID in Latin America [41] and, since 2011, has also experienced an increase in the number of reported HIV infections among PWID [36].

We present results of a pilot conducted in Pereira, Colombia (n=50) to study injection and sexual risk behaviors among PWID and their sexual, injection and high-risk friendship (MSM/transgender/sex worker) networks. Pereira is one of the Colombian cities with the highest prevalence of heroin consumption [42]. Located in the main coffee-producing region of the country, by 2008 Pereira had become the trafficking epicentre for heroin produced in Colombia, leading to an oversupply of heroin in local drug markets (36). In response to an increasing prevalence of viral infections among PWID, a pilot syringe exchange and naloxone distribution program was opened in Pereira [43]. Results of our pilot study show how, in some contexts, PWID are connected via social network ties to members of other groups at high risk for HIV infection – specifically, men who have sex with men (MSM), transgender individuals and sex workers. Therefore, supporting PWID in their prevention efforts could have effects that ramify beyond communities of drug users, potentially benefiting other vulnerable groups.

Methods

New York City (U.S.A.)

In NYC, young adult opioid users (n=539) were recruited in 2014–2016 via Respondent-Driven Sampling, a form of chain-referral sampling designed to engage hard-to-reach populations. Twenty eligible index participants ("seeds") were directly recruited by research staff, interviewed and invited to refer up to three opioid-using peers to the study. This process was repeated with the seeds' recruits and for successive sampling waves. Eligible participants were English-speaking NYC residents ages 18–29 who had used POs nonmedically and/or heroin in the past 30 days. Structured interviews assessed participants' sociodemographic and opioid user network characteristics, drug use behaviors and intravention activities. HCV and HIV status was established via rapid antibody testing. Network questions focused on the number of NYC residents participants knew personally who use opioids nonmedically and the number of such people they saw in the past 30 days.

Based on formative qualitative research, we developed a 26-item instrument to measure participants' lifetime intravention activities in the following domains: a) drug use management (7 items); b) supporting injection-related risk reduction (10 items); and c) overdose prevention and response (4 items). An additional domain inquired about "health-negative activities" – i.e., actions that are intended to help other opioid users cope with the exigencies of opioid dependence, but which may inadvertently foster risky behaviors (5 items). (See Table 3 for a list of the items included in each domain.) All intravention items addressed either opioid use-related health advice given by participants to fellow opioid users (e.g., advised not to mix too many downers; discouraged from hanging out with heroin

users) or actions aimed at supporting fellow opioid users (e.g., provided sterile syringes; administered naloxone; helped cope with withdrawal symptoms).

To analyze the age composition of participants' opioid user networks, participants were categorized into 3 age groups (18–21, 22–24, 25–29) and network members into 4 groups (<18, 18–24, 25–29, >29), and proportions of total network members within participant age group and injection status were calculated.

Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for the associations of knowing at least one network member older than 29 and having seen at least one network member older than 29 in the past 30 days with testing HCV antibody-positive. These models were run for the sub-sample of participants who reported ever injecting drugs and were stratified by participant age group. Bivariate descriptives were used to characterize prevalence of engagement in intravention activities and number of people participants engaged with for each intravention activity. Chi-square and t-tests were used to compare differences between injectors and non-injectors.

St. Petersburg (Russia)

The St. Petersburg pilot study of young adult "hard drug" users aimed to better understand emerging drug use patterns and young drug users' social networks. The study, conducted in 2016 and 2017, employed a mixed-method research design with semi-structured qualitative interviews (Phase 1; n=10) followed by structured assessments (Phase 2; n=39). To be eligible for Phase 1, participants had to: be 18–26 years of age; report any drug use (other than cannabinoids) in the past 30 days; be a current resident of St. Petersburg; and speak Russian. Participants were recruited from a local drug treatment program and a local Narcotics Anonymous group. Semi-structured interviews assessed drug use practices and patterns, social network characteristics, attitudes towards heroin users, sexual practices and overdose history. Interviews were conducted in a private setting, lasted about 90 minutes and were digitally audio-recorded. Thematic analysis of the qualitative data was conducted using the program Open Code 3.6.

In Phase 2, modified Respondent-Driven Sampling (i.e., structured and incentivized peer-based chain-referral) techniques were used to recruit young "hard" drug users (i.e., opiates, stimulants, novel psychoactive substances). Eligible participants were Russian-speakers aged 18–26 who reported using any illicit drug(s) besides cannabis/cannabinoids in the past 30 days and were willing to perform HIV and HCV self-tests in the presence of an interviewer. Screening procedures included age verification via photo ID and a visual check for injection marks for those reporting recent injection. Structured assessments were based on Phase 1 findings and covered the same topical domains as the qualitative interviews. Assessments lasted between 90 to 120 minutes and were followed by OraQuick rapid HIV and HCV oral fluid antibody tests.

Pereira (Colombia)

A pilot study conducted in Pereira, Colombia in 2017 sought to describe network connections among different HIV risk groups (PWID, MSM, sex workers and transgender individuals) to better understand the spread of HIV to and from PWID and other risk groups.

Using modified Respondent-Driven Sampling recruitment procedures, 5 HIV-positive PWID were recruited by research staff to serve as initial seeds, with the remainder of the sample (n=45) recruited by targeted chain-referral. Each seed was asked to recruit up to 9 peers, up to 3 in each of the following 3 networks: a) people with whom the participant had injected drugs in the past 30 days; b) sex partners in the past 6 months; and c) friends in key groups at risk for HIV in Colombia (MSM/transgender persons/sex workers). Seeds and referrals (total n=50) were interviewed about their injection and sexual risk behaviors and provided blood samples for HIV and HCV RNA testing. Also, as part of the interview, participants were asked to name and describe characteristics of up to 9 people (3 per network) from their injection, sexual and high-risk friendship networks.

Results

New York City

NYC participants had a mean age of 24.5 years (SD=3.1). Sixty-six percent were male; 72% identified as White, 27% as Latino and 10% as multiracial. Fifty-five percent reported growing up in a household with an annual income of $51,000 or higher. Fifty-seven percent had been homeless at some point in their lives, and 66% reported ever injecting drugs.

The 539 participants reported knowing a total of 26,507 NYC residents who used opioids (mean network size=43, SD=111, range=0–1000). Although the majority of participants' network members were a similar age as themselves, network connections across age groups were also present (Table 1). Of all the opioid users younger participants (ages 18–21) reported knowing, 14% were older than 29 and 18% were younger than 18. For slightly older participants (ages 25–29), 27% of their opioid-using acquaintances were older than 29. Participants who injected drugs had a higher proportion of network members older than 29 than non-injectors, ranging from 17% for younger participants (ages 18–21) to 32% for the oldest group.

Considering injectors of all age subgroups together, knowing any opioid user(s) older than 29 had a moderately strong association with testing HCV-positive. A similarly strong association was found between having seen any opioid user older than 29 in the past 30 days and HCV-positive status). When stratified by participant age group, although not significant, participants ages 18–21 had 3 ½ times the odds of testing HCV-positive if they knew any opioid user(s) older than 29 (Table 2).

Large proportions of participants reported engaging in intravention activities in all four domains (Table 3), and the total number of peers "intravened upon" by all participants combined ranged in the thousands for most activities. For 22 of 26 intraventions, significantly higher proportions of lifetime injectors than non-injectors ever engaged in these activities, and for 21 of the 26 intraventions, they engaged in them with greater numbers of people (Table 3). For example, in the drug use management domain, injectors were significantly more likely than non-injectors to urge peers to enter drug treatment (74.3% vs. 62.4%), encourage peers to sniff opioids instead of inject (45.7% vs. 30.2%) and help peers cope with withdrawal symptoms (83.1% vs. 57.7%). The two activities in the drug use management domain in which all participants, regardless of drug injection experience, were

equally likely to intravene were helping peers reduce drug intake and recommending that their peers not use heroin. Not surprisingly, the domain of supporting injection-related risk reduction presented the largest differences between injectors and non-injectors, both in terms of the proportion who reported ever engaging in the activities and the mean number of people intravened upon. For example, 84.6% of injectors (vs. 7.4% of non-injectors) ever gave sterile syringes to fellow users, with a mean of 11.9 people (vs. 0.4 people for non-injectors). Injectors were also significantly more likely to intravene and to intravene with a larger number of people for 3 of the 4 overdose prevention and response activities (e.g., administered naloxone to reverse overdose: 30.9% vs. 3.2%; mean number of people=1.6 vs. 0.05). This same pattern of responses was observed for the 5 health-negative intraventions, with injectors significantly more likely to report engaging in these activities and doing so with more members of their opioid user networks (e.g., 52.3% of injectors vs. 21.7% of non-injectors had encouraged fellow users to use benzodiazepines as a way to cope with opioid withdrawal; mean number of people=4.5 vs. 1.5).

St. Petersburg

The 39 participants who completed the structured assessment had a mean age of 22.4 years (SD=2.4); 57% were male, 73% were full or part-time employed and 15% had ever been homeless. The majority of participants (58%) reported that they never socialized with older drug users (≥age 30) and 36% reported rarely doing so. Participants in qualitative interviews reported proactively engaging with fellow drug users in order to prevent injection risk and overdose (e.g., providing money so fellow users can buy sterile syringes which are available for purchase over-the-counter in Russia; discouraging the reuse of syringes; carrying naloxone). These findings are reflected in the results of the structured assessment. Table 4, based on the 24 respondents who reported recent injection (past 6 months), indicates that a majority of PWID engaged in most (5 of the 6) health- and safety-related intraventions in the past 6 months. More specifically, considerable proportions of young PWID engaged in the following activities with high frequency (either “most” or “all” the time): discussing the need to inject safely (21%); providing sterile syringes to their injection network (33%); carrying enough syringes to provide to anyone who needs one (25%); and discussing protection from police or other people not involved with drugs (33%).

Pereira

Among the 5 seeds and 45 network members recruited (total n=50), the mean age was 29 years (SD=9); 70% were 18–29 and 30% were older than 29. Forty-eight percent were male, 42% were female, and 10% were transgender. Just over half (56%) of the sample were PWID (defined as having injected drugs in the previous 6 months), and all but 7% of PWID reported sharing syringes in the past 6 months, including 71% who shared with 1–2 people and 22% who shared with 3 or more. Potentially high-risk sexual behaviors were prevalent in the PWID subgroup: with regard to the past 6 months, 39% of PWID reported engaging in sex work, 18% in group sex, and 36% had same-sex partners. Accordingly, HCV (52%) and HIV (24%) prevalence was high among PWID. While PWID and non-injectors had the same HIV prevalence, non-injectors had lower HCV prevalence (33%). Among all 50 participants, HIV prevalence was highest among those in the high-risk friendship subgroup (i.e., MSM/transgender/sex workers; 35%), close to the mean among those with whom participants

reported injecting (21%), and lowest among those with whom participants reported having sex (9%). Despite the high HIV prevalence in the overall sample, only 40% of HIV-positive participants had seen a doctor in the past 12 months.

PWID reported injecting drugs with a total of 155 individuals in the past 6 months. The majority of those with whom PWID in both the younger (18–29 years old) and older (>29 years old) age categories reported injecting were 18–29 years old. Participants named a total of 82 people with whom they injected in past 30 days; 112 people with whom they had sex in past 6 months and 117 high-risk friends (MSM, transgender individuals or sex workers) with whom they interacted also in the past 6 months (see Table 5). A large number of sexual, injection and social network connections overlap across HIV risk groups (e.g., of the 112 named individuals with whom participants reported having sex, 21% were MSM; 13% were sex workers and 18% were PWID).

Discussion

Networks of People Who Use Drugs: Large, Interconnected and Supportive

Results of recent research conducted by members of our team in NYC, USA, St. Petersburg, Russia and Pereira, Colombia indicate that people who use drugs (PWUD) can be active players in promoting risk reduction, and that their large social networks provide them with ample opportunities to help fellow drug users with drug-related supportive activities. We report widespread efforts on the part of members of drug-using communities to support other PWUD in various health-related domains including drug use management, injection-related risk reduction and overdose prevention and response.

Present findings also show that PWID are more likely than non-injecting drug users to report engaging in health-related actions to support their fellow drug users (i.e., “intraventions”) and to do so with larger numbers of people. A possible explanation for these findings is that PWID may know more people who engage in serious drug use, and are therefore in greater need of support. PWID’s greater involvement in intravention activities might also be due to their greater situational opportunity. That is, for some activities (i.e., those directly related to drug injection), PWID’s intravention potential is enhanced because they are likely to be present when and where risky injection situations take place. For example, 54% of PWID in our St. Petersburg study reported supplying sterile syringes to those with whom they inject. Because drug injection is often a group activity, PWID are likely to witness potentially risky injection events in which they could effectively intervene. Additionally, data from Pereira indicate that PWID not only are well connected with fellow drug users, but also interact socially, sexually and within injection contexts with members of other stigmatized groups at high risk for HIV including sex workers, transgender people and men who have sex with men. Such interconnections between PWID and members of other risk groups place PWID in a key position to potentially spread HIV prevention knowledge and resources to other vulnerable groups beyond drug-using populations.

Supporting PWUD, particularly PWID, as Key Players in the Fight against HIV, HCV and Overdose

This paper demonstrates that drug users themselves – and particularly PWID – are often proactive players vested in contributing to the well-being of their fellow PWUD. This finding is especially important when we consider how rare it is to think of PWUD as allies in the fight against HIV/AIDS and how often PWUD are instead the targets of punitive measures, such as arrest and incarceration, which heighten their risk of viral infection and other health-related harms. Data from St. Petersburg suggest that young drug users engage in extensive intravention efforts even in settings characterized by minimal harm reduction services and open hostility toward drug users.

Although frequently neglected, drug users could become a critical resource for HIV/HCV prevention if supported, especially in localities where emerging epidemics are taking hold, yet harm reduction services are in short supply (e.g., regions of the U.S., such as rural Appalachia, New England and the Midwest, that have been deeply affected by the opioid epidemic and now face an expanding population of young PWID and increasing incidence of acute HCV infection; Colombian cities with increasing numbers of young people who inject heroin). In short, we suggest that in the face of policy indifference (and, worse, policies that criminalize and further stigmatize drug use), PWUD themselves can become primary prevention agents on the ground and indeed, in many ways are already doing so.

Professional prevention efforts may benefit by supporting and building on the self-initiated health-protective actions that local communities of drug users are already engaged in. Facilitating, encouraging and expanding these indigenous harm reduction efforts could have rapid effects on slowing the spread of HIV/HCV among PWID, especially in the early stages of new epidemics. Formal harm reduction services such as NSPs could support existing intravention activities by providing or facilitating PWUD's access to the resources needed to enact safer practices (e.g., sterile injection equipment).

Efforts to expand upon PWUD's intravention efforts would need to be tailored to existing structural limitations in a given location. For example, NSPs in Colombia and Russia are very limited in number and scope while most pharmacies can sell sterile syringes over-the-counter. A simple public health intervention could support PWID's efforts to promote safe injection practices by subsidizing the cost of syringes with coupons to be redeemed at designated, "drug-user-friendly" local pharmacies. Other intravention-enhancing modalities could involve the distribution of the overdose-reversal medication naloxone to PWUD. The promotion of intravention activities needs to be adapted for specific locations and drug-use contexts—research can help identify areas of high need. For example, promoting the use of NSPs could be a futile exercise if such services are unavailable or inaccessible or if the cost of transportation to them is too high. Local context should also inform which prevention measures may be feasible (although not necessarily most effective) in a given area. For example, in Canada, harm reduction services discourage the cleaning of syringes with bleach in favor of advising PWID to use a new, sterile syringe for every single injection. Such a recommendation in a setting with a severe syringe scarcity could be unattainable and even counter-productive; where syringes are scarce it may more feasible to support PWID by

disseminating instructions and supplies for effectively cleaning syringes with bleach [44], especially if the current practice is cleaning syringes with water only.

Intravention activities are conducted and sustained through on-going actions by and for drug-using communities. Promoting these health-focused collective actions has the potential to achieve broader impact than individual-focused interventions. Because intraventions are enacted in a community by members of that community, they are likely to reach larger numbers of drug users than traditional, individual-level interventions. Like drug use itself, intraventions operate at all hours of the day and night; they are, therefore, likely to be available in the precise location and moment of need. Promoting these internally-driven cultures of support may help foster the development of health-protective group norms, thus laying a foundation for self-sustaining behavior change rather than requiring constant (and labor-intensive) external interventions delivered by trained personnel or professionals. It could also be useful to engage drug users' civic potential by using online and offline strategies to promote HIV- and drug use-related activism, and encouraging the formation of grassroots drug users' organizations.

We do not mean to suggest that supporting drug users' intravention efforts should be a substitute for policy work to allow for the implementation of formal harm reduction services for PWUD. Rather, we believe that supporting drug users' pre-existing intravention activities could help overcome existing shortcomings of a given community's HIV/HCV policy response while the struggle to implement comprehensive harm reduction services continues. We believe this supportive work should be tailored for specific drug-use contexts in collaboration with members of local drug-using communities. Contextually specific harm reduction strategies would insure that at least basic safety measures are in place should efforts to implement formal and professionalized harm reduction services (e.g., opening NSPs) fail.

PWID's Risky Health-Related Activities

While this paper highlights drug users' proactive engagement in actions designed to protect their own and other drug users' health, drug users/injectors can also promote risky behaviors within their drug-using networks and serve as sources of viral infection. Most HIV epidemiological research focuses on PWID's network connections and interactions as a potential source of viral transmission risk. In this paper, we identified five health-negative intraventions: a) encouraging the use of benzodiazepines to cope with opioid withdrawal; b) injecting others with drugs; c) providing another injector with a syringe containing leftover drug solution; recommending d) heroin use and e) drug injection as means to reduce the cost of opioid use. Similar to health-positive intraventions, we found that drug injectors were more likely than non-injectors to engage in these actions and to do so with larger numbers of PWUD. We believe these negative health-related actions are best understood in a context of situated rationality [45]. As such, the risks associated with these actions (e.g., risk of viral infection when providing leftover drug in a used syringe; injecting others) might be counterweighed by other rationalities of more immediate priority such as supporting fellow injectors in avoiding drug withdrawal. Therefore, negative intravention actions can be understood as pragmatic responses by members of a stigmatized community to structural

constraints. As such there are two possible ways to address negative health related interactions in the PWUD community. One—the ideal—would be to eliminate the structural constraint that drives the need for a negative health-focused action (e.g., providing free sterile syringes would greatly reduce the need to share syringes). Another option could be to redirect the health negative action in a more health-promoting direction while enabling drug users to continue supporting their fellow users. For example, PWUD could be encouraged to provide referrals to OST programs instead of injecting a fellow user for the first time. Such redirection, of course, requires the availability of viable, health-promoting alternatives such as OST. Prevention efforts should count on PWUD to become key contributors to prevention efforts while taking into consideration the risk environments they face.

Limitations

This study is limited by the disparate data available from each of the three cities (e.g., intravention activities were not assessed in Pereira; data from St. Petersburg lacks detail about participants' social network connections with other drug users). The data from NYC are the most extensive, while the data are much more limited for the other two locations. The small sample sizes in the Pereira and St. Petersburg pilot studies limit the conclusions we can draw about drug users in these locations. Because most of the data presented in this paper derives from studies of young adult drug users, it is unclear to what extent our findings are specific to young drug users or more broadly applicable to drug users in general. Future research is needed to assess the generalizability of the findings to drug users of different age groups. In view of these limitations, the findings should be interpreted with caution.

Young PWUD Associate with Similar-Age Peers, But Also Interact with Older PWUD

Data presented in this paper suggest that young PWUD tend to associate mostly with other drug users close to their own age group. However, despite this general tendency, a smaller, yet not insubstantial, proportion interacts with older PWUD. For young PWID (ages 18–29) in NYC, knowing older drug users (>29 years old) was associated with increased likelihood of exposure to HCV. Therefore, the observed tendency of young PWID to interact with drug users of a similar age as themselves could serve as a partial barrier to the spread of HIV/HCV from groups of older PWID (who tend to have higher rates of viral infections, given their longer injection histories and greater opportunities for exposure to pathogens) to groups of younger PWID. Prevention efforts focusing on recently-initiated PWID (typically young PWID under age 30 with lower HIV/HCV prevalence), even in settings such as NYC or St. Petersburg where the overall prevalence of HIV/HCV in PWID is high, could help prevent viral transmission among young PWID while their sub-group HIV/HCV prevalence is still relatively low and they are less likely to interact with older PWID. Given the evidence of PWID's willingness to enact health-positive preventive actions, older PWID could be recruited to assist these efforts. For example, older PWID could be encouraged not to initiate young drug users into injection, to promote safe injection practices within their injection networks and, given the greater likelihood of serodiscordant HIV/HCV status, to be especially cautious when injecting with younger PWID. Raising awareness among all PWID of the heightened vulnerability of young, recent PWID could help foster intravention efforts within PWID networks by preventing transition to drug injection among youth and

intensifying safe injection practices when younger and more experienced injectors use drugs together.

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Table 1.

Age distribution of opioid-using network members in New York City (n=26,507) known to study participants, by participant age group and lifetime injection status

Participant age group (n=539)	Injection status within participant age group n (%)	Opioid-using network members within participant age group n (%)	Proportion of total opioidusing network members n=26,507 (%)	Proportion in opioid-using network age group (%)			
				<18 years n=2,779	18–24 years n=11,083	25–29 years n=7,183	>29 years n=5,462
18–21 years (n=128, 24%)	--	**7365 (NA)**	**28**	**18**	**48**	**20**	**14**
Ever injected	68 (53)	3790 (51)	14	20	41	21	17
Never injected	60 (47)	3575 (49)	14	16	55	18	11
22–25 years (n=220, 41%)	--	**8084 (NA)**	**30**	**8**	**47**	**28**	**18**
Ever injected	138 (63)	4935 (61)	18	8	40	32	20
Never injected	82 (37)	3149 (39)	12	8	57	22	14
25–29 years (n=189, 35%)	--	**11,058 (NA)**	**42**	**7**	**35**	**32**	**27**
Ever injected	142 (75)	8202 (74)	31	4	31	33	32
Never injected	47 (25)	2856 (26)	11	16	45	26	13

Table 2.

Associations between knowing at least one opioid-user older than 29 years and HCV positive status, among NYC study participants who have ever injected drugs (n=348, 64.8% of total)

Network of all opioid users in NYC known to participant			
	Number (proportion) with one or more network member(s) older than 29 years *(referent = no network member >29)*	Odds of testing HCV+*(vs. HCV−)* OR (95% CI)	p-value for OR
Participant's age group (injectors only)			
18–21 years (n=68, 20%)	30 (44)	3.55 (0.83, 15.16)	0.09
22–25 years (n=138, 40%)	74 (54)	1.02 (0.98, 2.18)	0.9
26–29 years (n=142, 41%)	100 (70)	1.96 (0.90, 4.27)	0.09
Total 18–29 years (n=348)	204 (59)	1.87 (1.15, 3.04)	0.01
Network of opioid users in NYC whom participant has seen in the past 30 days			
Participant's age group (injectors only)			
18–21 years (n=68, 20%)	26 (38)	2.85 (0.72, 11.29)	0.1
18–24 years (n=138, 40%)	57 (41)	1.30 (0.61, 2.77)	0.5
25–29 years (n=142, 41%)	87 (61)	1.82 (0.89, 3.70)	0.1
Total 18–29 (n=348)	170 (49)	1.92 (1.20, 3.06)	0.006

Table 3.

"Intravention" activities reported by young adult opioid users in NYC, by injection status (n=539)

	Number (%) who reported giving "intravention" to >0 fellow opioid users			Total number (mean) of fellow opioid users to whom participants reported giving "intravention"		
	Injectors n=348 (64.8)	Non-injectors n=189 (35.2)	Chi-square p-value	Injectors n (mean)	Non-injectors n (mean)	t-test p-value
Drug Use Management *In your lifetime, how many fellow users have you…*						
…urged to get into drug treatment?	257 (74.3)	118 (62.4)	0.004	1714 (5.0)	612 (3.2)	0.004
…helped detox from opioids on their own?	199 (57.5)	71 (37.6)	<0.0001	801 (2.3)	236 (1.2)	0.004
…helped reduce their drug intake?	204 (59.1)	108 (57.1)	0.5	1024 (3.0)	424 (2.2)	0.1
…encouraged to sniff drugs instead of injecting?	158 (45.7)	57 (30.2)	0.0005	1011 (2.9)	448 (2.4)	0.4
…helped cope with their withdrawal symptoms?	286 (83.1)	109 (57.7)	<0.0001	2277 (6.7)	668 (3.5)	0.0002
In your lifetime, how many…						
…prescription opioid users have you told not to use heroin?	186 (54.1)	105 (55.6)	0.7	1972 (5.8)	1040(5.6)	0.8
…people who sniff drugs have you advised not to inject?	246 (71.3)	92 (48.7)	<0.0001	2562 (7.6)	865 (4.6)	0.0006
Supporting Injection-Related Risk-Reduction *In your lifetime, how many fellow drug users have you…*						
…discouraged from hanging out with heroin users?	143 (41.5)	73 (38.8)	0.6	1083 (3.2)	487 (2.6)	0.4
…told about syringe exchange programs?	192 (55.7)	18 (9.5)	<0.0001	2541 (7.7)	148 (0.8)	<0.0001
…told they can buy syringes at a pharmacy (without an Rx)?	267 (77.4)	27 (14.3)	<0.0001	3076 (9.3)	122 (0.6)	<0.0001
…given clean/sterile syringes?	292 (84.6)	14 (7.4)	<0.0001	3753 (11.9)	76 (0.4)	<0.0001
…discouraged from sharing syringes?	289 (84.0)	59 (31.2)	<0.0001	3771 (12.0)	462 (2.5)	<0.0001
…discouraged from sharing cookers?	186 (54.1)	18 (9.5)	<0.0001	2643 (8.1)	182 (1.0)	<0.0001
…discouraged from sharing cottons/filters?	190 (55.2)	22 (11.6)	<0.0001	2489 (7.7)	188 (1.0)	<0.0001
…discouraged from sharing water/water containers?	164 (47.7)	18 (9.5)	<0.0001	2074 (6.4)	148 (0.8)	<0.0001
…encouraged to get tested for hepatitis C?	162 (47.0)	32 (16.9)	<0.0001	2046 (6.1)	349 (1.9)	<0.0001
…told that injecting drugs is a risk factor for hepatitis	189 (54.8)	42 (18.2)	<0.0001	2311 (7.1)	368 (2.0)	<0.0001

	Number (%) who reported giving "intravention" to >0 fellow opioid users			Total number (mean) of fellow opioid users to whom participants reported giving "intravention"		
	Injectors n=348 (64.8)	**Non-injectors n=189 (35.2)**	**Chi-square p-value**	**Injectors n (mean)**	**Non-injectors n (mean)**	**t-test p-value**
C?						
Health-Negative Activities *In your lifetime, how many fellow users have you…*						
…encouraged to use benzodiazepines as a way to cope with dope sickness?	181 (52.3)	41 (21.7)	<0.0001	1542 (4.5)	290 (1.5)	<0.0001
…injected another person with drugs?	238 (69.2)	1 (0.5)	<0.0001	3180 (9.9)	1 (0.005)	<0.0001
…given what was left in your syringe so they would not get dope sick?	99 (28.7)	0 (0.0)	<0.0001	801 (2.3)	0 (0.0)	<0.0001
…told they could use heroin as a way to reduce the cost of their opioid use?	152 (45.0)	28 (14.8)	<0.0001	1651 (4.9)	154 (0.0)	<0.0001
…told they could inject as a way to reduce the cost of their drug use?	100 (29.1)	3(1.6)	<0.0001	1096 (3.2)	14 (0.7)	0.0001
Overdose Prevention and Response *In your lifetime, how many people have you…*						
…told about naloxone?	216 (62.6)	36 (19.1)	<0.0001	2599 (8.0)	329 (1.7)	<0.0001
…administered naloxone to reverse an overdose?	107 (30.9)	6 (3.2)	<0.0001	565 (1.6)	10 (0.05)	<0.0001
…advised not to mix too many downers (e.g., alcohol, benzos, prescription opioids, heroin)?	272 (78.6)	144 (76.2)	0.5	3309 (10.0)	1536 (8.3)	0.17
…told to be careful about overdose during a period of time when they stopped or reduced their opioid use?	301 (87.0)	136 (72.0)	<0.0001	3323 (10.1)	1129 (6.1)	0.0004

Table 4.

"Intraventions" reported by PWID participants in St. Petersburg, Russia (n=24)

In the past 6 months, with the people you inject with, how often did you…	
…talk about the need to inject safely?	**n (%)**
Never	7 (29)
Rarely	7 (29)
Some of the time	5 (21)
Most of the time	5 (21)
All the time	0 (0)
…supply sterile syringes?	
Never	6 (25)
Rarely	5 (21)
Some of the time	5 (21)
Most of the time	8 (33)
All the time	0 (0)
…make sure you carry enough sterile syringes so you can provide them to anyone who needs one?	
Never	8 (33)
Rarely	5 (21)
Some of the time	5 (21)
Most of the time	4 (17)
All the time	2 (8)
…talk about how to deal with drug overdose?	
Never	5 (21)
Rarely	7 (29)
Some of the time	11 (46)
Most of the time	1 (4)
All the time	0 (0)
…discuss how to protect yourselves from cops or other people not involved with drugs?	
Never	1 (4)
Rarely	5 (21)
Some of the time	10 (42)
Most of the time	7 (29)
All the time	1 (4)
…discuss how to avoid being a victim of violence?	
Never	15 (63)
Rarely	6 (25)
Some of the time	2 (8)
Most of the time	1 (4)
All the time	0 (0)

Table 5.

Members of injection, sexual and high-risk friendship networks named by study participants (n=50) in Pereira, Colombia

Individuals Named by Participants in Each Network (Total named = 311)*			
Network Type	**Injection Network**	**Sexual Network**	**High-Risk Friendship Network** (MSM, transgender, sex worker)
Total Number of Network Members Named by Participants	**Number PWID injected with** *(past 30 days)* **Total n=82**	**Number people had sex with** *(past 6 months)* **Total n=112**	**Number people interacted with** *(past 6 months)* **Total n=117**
Risk Categories of Network Members n (%)	**MSM: 8 (10) Transgender: 0 (0) Sex Worker: 27 (33)**	**MSM: 23 (21%) Transgender: 0 (0) Sex Worker: 15 (13) PWID: 20 (18)**	**MSM: 20 (17) Transgender: 42 (36) Sex Worker: 86 (74) PWID: 35 (30)**

* Participants could name up to 3 individuals in each of the 3 networks, for a maximum total of 9 network members.