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HIV Pre-Exposure Prophylaxis Prevention Awareness, Willingness, and Perceived Barriers among People Who Inject Drugs in Los Angeles and San Francisco, CA, 2016–2018

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Abstract

Background: Pre-exposure prophylaxis (PrEP) for HIV prevention is indicated for people who inject drugs (PWID), yet most studies exclude PWID. This study examines factors associated with PrEP awareness and willingness, and identifies perceived barriers to PrEP among PWID.

Methods: PWID were interviewed in Los Angeles and San Francisco, CA from 2016 to 2018. We analyzed data from self-reported HIV-negative participants who had injected drugs within the past 6 months (n=469). Questions on PrEP included awareness, willingness, barriers, and uptake. Multiple logistic regression models of factors associated with awareness of, and willingness to, take PrEP were developed. Descriptive statistics on perceived PrEP barriers are reported.

Results: Among HIV-negative PWID, 40% were aware of PrEP, 59% reported willingness to take PrEP, and 2% were currently taking PrEP. In multivariable analysis, PrEP awareness was associated with study site and sexual minority status, higher educational attainment, and HIV testing in the last 6 months. Willingness to take PrEP was associated with self-reported risk (paying sex partner in the last 6 months, sharing drug paraphernalia, and being injected by another PWID) and perceived HIV risk. The most common perceived barriers to PrEP were copays, concerns about increase in HIV or sexually transmitted risk with PrEP, and concerns about reduction of medication efficacy without daily use.

Conclusion: PrEP awareness among PWID remains inadequate. Willingness to take PrEP was moderate and was most desired by PWID who engaged in high-risk behaviors. Interventions to increase PrEP awareness and willingness, and to facilitate PrEP uptake among PWID are needed.

Keywords

Pre-exposure prophylaxis (PrEP); persons who inject drugs (PWID)

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1. Introduction

People who inject drugs (PWID) are at risk for HIV infection with several recent HIV outbreaks attributed to injection drug use in the United States (US), including in rural Indiana in 2015 (Peters et al., 2016) and more recently in Massachusetts, Washington, and West Virginia (Cranston et al., 2019; Evans et al., 2018; Golden et al., 2019). Additionally, the US is experiencing increases in acute hepatitis C virus (HCV) infections related to injection drug use (Zibbell et al., 2018), indicating that PWID are engaging in injection practices that increase risk for HIV transmission. Importantly, PWID face a dual risk for HIV from injection and sexual behaviors (Hill et al., 2018; Kral et al., 2001; Neaigus et al., 2013; Strathdee & Sherman, 2003), including transactional sex (Astemborski, Vlahov, Warren, Solomon, & Nelson, 1994; Jenness et al., 2011; Rondinelli et al., 2009) and forced sex (Williams, Dangerfield, Kral, Wenger, & Bluthenthal, 2018). This may be why there is a higher prevalence of sexually transmitted infections among PWID compared to the general population (Roth et al., 2016), leading to a growing need to prevent infectious disease spread among PWID.

PrEP, a pill taken daily to prevent HIV, is a biomedical intervention that has been proven effective (over 90% in one study) in preventing HIV (Baeten et al., 2012; Choopanya et al., 2013; Grant et al., 2010; Thigpen et al., 2012). There has only been one randomized trial of PrEP with PWID, the Bangkok Tenofovir Study, and it found a decreased risk of HIV infection of 48.9%. However, PWID who took PrEP at least 71% of the time had increased protection against HIV of 74% (Choopanya et al., 2013). In 2011, the Centers for Disease Control and Prevention (CDC) provided interim guidance to health care providers for administering PrEP to men who have sex with men (MSM) (Smith et al., 2011). In 2012, the Food and Drug Administration approved PrEP for public use (Food & Drug Administration, 2012). Following, in August 2012, the CDC released interim guidance for PrEP among heterosexually active adults (Smith et al., 2012), and in 2013 the CDC released guidelines for PWID (Smith, Martin, Lansky, Mermin, & Choopanya, 2013). Additionally, the US Preventative Services Task Force (USPSTF) recently gave PrEP an A rating for prevention (Chou et al., 2019). However, for the most part PWID have not been targeted for PrEP (Walters et al., 2020) and they have had less engagement in the PrEP care continuum. For example, PWID have much lower PrEP awareness, compared to MSM (Walters, Rivera, et al., 2017). Studies focusing on MSM report PrEP awareness between 85%–86% (Goedel, Halkitis, Greene, & Duncan, 2016; Hood et al., 2016). Conversely, studies focusing on PrEP awareness among PWID have shown a range of PrEP awareness from 13% to 57% (Jo et al., 2020; Kuo et al., 2016; McFarland et al., 2019; Roth et al., 2018; Sherman et al., 2019; Walters, Reilly, Neaigus, & Braunstein, 2017). Importantly, the study showing PrEP awareness at 57% among PWID reported that only 39% of PWID sampled knew that PrEP could prevent HIV transmission from sharing injection equipment, suggesting that PWID are seeing PrEP as a pill to prevent the sexual transmission of HIV and not injection-related transmission (McFarland et al., 2019). This may be why we have seen increased rates of PrEP awareness among self-identified gay and bisexual men who inject drugs, highlighting the importance of sexual identity for PrEP awareness (Walters et al., 2020).

The lower PrEP awareness (and the possible incorrect PrEP knowledge) among PWID is troubling. According to CDC guidelines (Centers for Disease Control and Prevention, 2018) which outline indications for PrEP prescribing based on injection and sexual behaviors, most PWID (84–95%) meet indications for PrEP (Centers for Disease Control and Prevention, 2014; Roth et al., 2018) and when PWID are informed about PrEP, willingness of PWID to take PrEP is fairly high. For instance, a 2019 study found 25% of PWID in Baltimore were aware of PrEP, and when PWID were told about PrEP, 63% of PWID were interested in taking it, and 89% of PWID reported that they thought taking PrEP would be “very or somewhat easy.” (Sherman et al., 2019). This study suggests that not only are PWID willing to take PrEP, but that PrEP is a feasible regimen for PWID to follow. Other research has shown willingness to take PrEP among PWID to be associated with sharing injection paraphernalia (Kuo et al., 2016), higher perceived HIV risk (Martin et al., 2017; Shrestha et al., 2017; Stein, Thurmond, & Bailey, 2014), and meeting CDC indications for PrEP use among samples of PWID (Sherman et al., 2019). Unfortunately, high levels of willingness to take PrEP have not translated into PrEP use among PWID even though PWID enrolled in treatment using medications for opioid use disorder (MOUD) such as methadone and buprenorphine have successfully adhered to PrEP regimens (Shrestha, Altice, Karki, & Copenhaver, 2018; Shrestha & Copenhaver, 2018). One study reported 2.6% of PWID sampled had received a PrEP prescription (Roth et al., 2018) and another study found less than 1% of PWID (2 out of 265) were currently taking PrEP (Sherman et al., 2019). In contrast, a study sampling MSM in 2015 found 23% of MSM were currently taking PrEP (Hood et al., 2016).

Given the lack of attention to PWID for PrEP, including the dearth of literature about PrEP for PWID, this study sought to identify demographic, socioeconomic, behavioral, and health factors associations with PrEP awareness and willingness among PWID residing in Los Angeles and San Francisco, California. This information can be used to target interventions that increase PrEP awareness, willingness, and uptake among PWID.

2. Methods

2.1 Sampling and recruitment

As part of a randomized controlled trial to determine the efficacy of an intervention to prevent injection initiation assistance by PWID, we recruited 979 PWID in Los Angeles and San Francisco, California during 2016 and 2018 using community outreach and targeted sampling methods (Bluthenthal & Watters, 1995; Kral et al., 2010; Watters & Biernacki, 1989). The intervention did not address help seeking behaviors nor did it mention biomedical HIV prevention. The control condition was an attention control intervention and there were no differences in the time participants spent in the intervention. Study eligibility included being 18 years of age or older and self-reported drug injection within the past 30 days, which was confirmed by visual inspection of injection sites (Cagle, Fisher, Senter, Thurmond, & Kastar, 2002). After providing informed consent, participants answered questions on demographic characteristics, drug use, PrEP, and other items in a one-on-one computer assisted personal interview using the Questionnaire Development System (Nova Research, Bethesda, MD). Participants received \$15 for completing this interview.

The sample included 600 PWID, of which 67 did not report injection drug use in the last 30 days. Of the remaining 534 PWID, 45 PWID self-reported HIV-positive (n=40) or refused to answer (n=5), 11 were on PrEP, and 8 responded “don’t know” to the item on their self-assessment of HIV risk. The analytic sample therefore consisted of 469 participants. All study procedures were reviewed and approved by the institutional review board at the Keck School of Medicine at the University of Southern California.

2.2 Study measures

PWID who self-reported HIV-negative status or refused to answer were asked a series of questions about PrEP (i.e., only self-reported HIV-positive PWID were excluded). PrEP awareness was measured by asking: “Have you ever heard of a pill that is safe and effective at lowering transmission of HIV?” Willingness to use PrEP was measured by asking: “Would you be willing to take a once a day pill, every day to lower your risk of becoming HIV infected by 90%?” Participants responding “don’t know” were reclassified as “no” for these analyses. Barriers to PrEP uptake were asked only of PWID who reported willingness to take PrEP, and included the following: 1) seeing a clinician every 3 to 6 months for a new prescription, 2) taking blood tests every 3 to 6 months to check kidney functions, 3) getting regular HIV tests, 4) being charged a copay or fee for PrEP at the pharmacy, 5) taking PrEP daily, 6) PrEP use if a friend found out they were taking PrEP and might suggest they were at risk for HIV, 7) beliefs and concerns about increased risk behaviors resulting from the belief that they would be protected with PrEP (i.e., risk compensation), and 8) required condom use. Participants who responded “don’t know” to the barrier questions were reclassified as “no” for these analyses. These questions have been used previously to assess PrEP awareness and willingness in other samples of PWID (Eisingerich et al., 2012). Finally, PrEP uptake was measured through the question: “Are you currently taking a daily pill to lower your risk for HIV transmission? This pill is typically referred to as PrEP or pre-exposure prophylaxis.”

We collected participant information on demographic and socioeconomic characteristics including age (<30, 30 to 39, 40 to 49, or 50 or older), sex (female, male, transgender, other), race/ethnicity (non-Hispanic White, Latinx, Black, Asian/Pacific Islander, Native American, and mixed race), relationship status (single, married, living as married), and sexual identity (heterosexual, bisexual, gay, or lesbian). Socioeconomic characteristics included monthly income (<\$1,000, \$1,000-\$1,400, \$1,401-\$2,100, \$2,101 or more), self-reported homelessness (Do you consider yourself to be homeless or unstably housed (yes/no)), and education (less than a high school diploma, high school graduate or equivalent).

Drug use measures included injection frequency, types of drugs injected, injecting others or being injected by someone else, injection sharing, overdose experiences, and whether PWID had been in alcohol or drug treatment within the last 6 months. Injection frequency was the sum of self-reported injection times with the following drugs: cocaine, crack cocaine, methamphetamine, heroin, speedball (admixture of cocaine and heroin), goofball (admixture of heroin and methamphetamine), prescription opiates, stimulants, sedatives, tranquilizers, methadone, and buprenorphine in the last 30 days. We converted injection frequency in last 30 days into a categorical variable with the following classifications: less than daily use (<30

injections), once or twice a day (30 to 89 injections), and three or more times a day (≥ 90). Any injection and non-injection use of the drugs listed above was also considered along with marijuana, bath salts or synthetic cathinone's, and synthetic cannabinoids (i.e., Spice). We collected information on peer-to-peer injection assistance which includes injecting another PWID (but not for their first injection) and receiving an injection from another PWID (Kral, Bluthenthal, Erringer, Lorvick, & Edlin, 1999; Lamb, Kral, Dominguez-Gonzalez, Wenger, & Bluthenthal, 2018). We collected data on injection equipment sharing (e.g., syringe, water, cooker, filter) within the last 6 months and whether PWID experienced an overdose within the last 6 months.

Sexual behaviors included were transactional sex (i.e., exchanged sex for money or drugs) in the last 6 months, had a steady sex partner in the last 6 months, and had a casual sex partner in the last 6 months. We also collected data on the type of sexual partners (steady, casual, transactional (i.e., exchange sex for money or drugs). Finally, we asked whether or not participant's sex partners were people who use drugs and about condom use with partners. We assessed experiences with the criminal justice system (currently on probation, currently on parole, arrested in the last 6 months, jailed in the last 6 months). Lastly, we measured HIV risk self-assessment by asking "What is your risk of becoming HIV infected in the next 12 months?" with response options of no, low, average, moderately, and very high risk. We also asked if they had received an HIV test within the last 6 months.

2.3 Analysis

All analyses were conducted using IBM SPSS version 25. Descriptive statistics (e.g. frequencies, means, standard deviations, among others) were examined for all study variables. Bivariate analysis was conducted to determine factors correlated with PrEP awareness and willingness to take PrEP using only participants who had injected in the last 30 days, were currently not taking PrEP, and were HIV negative. Statistical significance of bivariate comparisons was set at $p < 0.05$ and was tested using chi-square test for categorical variables and t -test for continuous variables. Variables significant at the bivariate level were assessed through collinearity using correlation matrices. Collinear variables (Pearson correlation coefficient ≥ 0.300) were removed from the final analysis based on strength of association with the dependent variable. The final models used binary multiple logistic regression models (using listwise deletion) to determine variables independently associated with PrEP awareness and willingness to take PrEP. Variables found to be significant at the $p < 0.05$ level were considered to be independently associated with PrEP awareness and/or PrEP willingness and were retained in the final models accordingly. We ran models with and without the intervention variable. There were no significant changes in our models with the intervention variable, and we therefore did not include the study intervention in the models. Since the questions about PrEP barriers were only asked to PWID who reported willingness we did not create multivariate models to identify associations with PrEP barriers.

3. Results

Of the 469 PWID included in this analysis, the majority of the sample was male (74%) (Table 1). In terms of race/ethnicity, 41% of PWID were white, 23% Latinx, 22% Black (1

person who identified as Black and Latino was placed in this category because the Black experience is different from other racial and ethnic categories (Brown, 2003; Du Bois & Eaton, 1899)), 7% Native American, 6% mixed-race or other, and 1% Asian or Pacific Islander. Most PWID reported heterosexual identity (83%) and reported having a high school diploma or more (73%). The majority of PWID also reported current homelessness (77%), ever receiving a mental health diagnosis (60%), and living in poverty with a monthly income less than \$1,000 (58%). PWID ages ranged from 16% of PWID being aged between 18–29 years, 23% aged 30–39 years, 27% aged 40–49, and 34% aged 50 and older.

Overall, 40% of PWID were aware of PrEP, 59% were willing to take PrEP, and only 2% were on PrEP (n=11). PWID who reported willingness to use PrEP were asked about hypothetical barriers to PrEP. Among those 276 PWID who reported willingness, willingness to use PrEP remained high when asked about required doctor visits (92%), and regular HIV (92%) and blood tests (90%). Willingness dropped from concerns related to discovery of PrEP use by friends (78%), requirement to use condoms (78%), reduced efficacy of medication without daily use (64%), risk compensation (62%), and copays (59%).

In multivariable analysis of PrEP awareness (Table 3), we found that city and sexual identity were associated with PrEP. Heterosexual PWID in San Francisco (adjusted odds ratio [AOR]=3.00; 95% confidence interval [CI]=1.90, 4.73), lesbian, gay, or bisexual (LGB) PWID in Los Angeles (AOR=2.88, CI=1.34, 6.20), and LGB PWID in San Francisco (AOR=4.35, CI=2.15, 8.79) had greater odds of PrEP awareness compared to heterosexual PWID in Los Angeles. PWID with a high school education or more had higher odds of being PrEP aware (AOR=2.35; 95% CI=1.45, 3.82) compared to PWID with less than a high school education. Finally, PWID who reported having a HIV test in the last 6 months had higher odds of being PrEP aware (AOR=1.68; 95% CI=1.08, 2.63) compared to PWID who did not have a HIV test.

In multivariable analysis of willingness to use PrEP (Table 4), we found that PWID who perceived their HIV risk to be greater, in general, had higher odds of willingness to use PrEP. Compared to PWID reporting no HIV risk, PWID who perceived their HIV risk to be low (AOR=2.07; 95% CI=1.34, 3.21) and moderately high (AOR=3.71; 95% CI=1.63, 8.45) had significantly higher odds of willingness to use PrEP. We also found that PWID who reported having a paying sex partner had higher odds of being willing to take PrEP (AOR=4.91; 95% CI=1.82, 13.23), as were PWID who were injected by another person within the last 6 months (AOR=1.88; 95% CI=1.26, 2.80), and PWID who reported sharing a filter within the last 6 months (AOR=1.70; 95% CI=1.09, 2.65).

4. Discussion

In this study we found higher PrEP awareness (40%) among PWID as compared to other studies (Kuo et al., 2016; Shrestha et al., 2017; Stein et al., 2014; Walters, Reilly, et al., 2017). Although the higher PrEP awareness among PWID in these two California cities is encouraging, PrEP awareness among PWID is still low and may be a significant barrier to PrEP uptake. Further complicating the matter, past research has shown that PrEP awareness

does not equate to PrEP knowledge because PWID often report being aware of PrEP, or having heard of PrEP, but then are not able to fully describe PrEP or they might conflate PrEP with post-exposure prophylaxis (PEP) (Bazzi et al., 2018). Therefore, we caution that the 40% PrEP awareness may not accurately reflect true understanding about the medication.

Increased PrEP awareness was associated with city of residence and sexual identity. Both heterosexual and LGB PWID residing in San Francisco had greater odds of PrEP awareness compared to heterosexual PWID in Los Angeles. LGB PWID residing in Los Angeles had greater odds of PrEP awareness compared to heterosexual PWID in Los Angeles. Our finding that LGB PWID had greater odds of PrEP awareness is encouraging since LGB PWID may be more likely to engage in behaviors that place them at risk for HIV and are more likely to be HIV positive, compared to heterosexual PWID (Friedman et al., 2003; Maslow, Friedman, Perlis, Rockwell, & Des Jarlais, 2002; Young, Friedman, Case, Asencio, & Clatts, 2000). This finding is further encouraging as it points us to potentially efficient means for disseminating information about PrEP, through sexual minority social networks (Walters et al., 2020) since self-labeling of sexual identity allows for group membership, community, and social networks (Young & Meyer, 2005). Furthermore, the fact that San Francisco had greater PrEP awareness may also be linked to the history of HIV activism (much of which was championed by LGB persons) (Adam, 1995).

We also found PrEP awareness to be associated with higher educational attainment and recent HIV testing. Our finding that PWID with high education had greater PrEP awareness is not surprising, as many studies have found a positive association between higher education and health (Ross & Wu, 1995). Similarly, the association between HIV testing and PrEP awareness likely reflects the impact of standard counseling following an HIV test that typically includes discussion of PrEP. Other studies with PWID have found that PrEP awareness was associated with service utilization including drug treatment (Roth et al., 2018) and receiving HIV prevention counseling at syringe service programs (Walters et al., 2020; Walters, Reilly, et al., 2017).

We found willingness to use PrEP to be higher (59%) than PrEP awareness, but still relatively low in relation to the high prevalence of reported HIV risk. Many PWID reported situations and behaviors (e.g., homelessness, incarceration, syringe sharing) that have been attributed to recent HIV outbreaks in Massachusetts (Cranston et al., 2019) and in Washington (Golden et al., 2019). Previous studies have shown high seroprevalence (Watters, Bluthenthal, & Kral, 1995) and high HIV infection among male PWID who have sex with men (Bluthenthal et al., 2001) in the San Francisco area. In addition, a recently multi-city comparison concluded that HCV risk among PWID was elevated in San Francisco (Morris et al., 2017). Further, recent outbreaks of HIV in urban settings have been associated with homelessness (Golden et al., 2019): and homelessness among PWID in our sample is about 80%. Given prior studies and current conditions, it is not unreasonable to conclude that the potential for an HIV outbreak in Los Angeles and San Francisco might be quite high.

Importantly, PWID engaging in risk behaviors, such as transactional sex, being injected by another person, and injection paraphernalia sharing, had higher odds of being willing to take PrEP, which is a promising finding given that they could be at greater HIV risk. We also found that PWID who had higher perceived risk of HIV, had higher odds of being PrEP aware. Despite these findings, uptake of PrEP was low.

Only 2% of PWID reported taking PrEP. We found many important barriers to uptake. Willingness to use PrEP was below 60% when participants were asked if PrEP initiation required an insurance copayment. Removing copays might help increase willingness to use PrEP and PrEP uptake. Additionally, willingness to use PrEP was impacted by concerns about the reduced PrEP efficacy if not taken daily. The iPrEx study found that MSM had an estimated 76% protection when taking only 2 pills a week (Anderson et al., 2012). Future studies should address issues of PrEP adherence within PWID populations, so we have a better understanding of whether PrEP is effective even if taken less frequently.

Research on risk compensation should be conducted with PWID samples as well. The current research suggests that people (mainly MSM) may engage in additional risk behaviors after taking PrEP. For example, a study sampling heterosexual men found that men anticipated increased condomless sex if they used PrEP (Roth, Tran, Felsner, Szep, & Krakower, 2019) and research on MSM has documented increased STIs after PrEP use (Beymer et al., 2018; Chen, Guigayoma, McFarland, Snowden, & Raymond, 2018; Nguyen et al., 2017; Traeger et al., 2019). Yet, STI increases might not be attributed solely to risk compensation. For instance, Jenness et al. argue that STIs among MSM will decrease with PrEP uptake because more frequent STI screening will lead to more treatment of STIs. They argue that it appears that STIs are increasing after PrEP uptake, but that the alleged increase is likely related to increased detection due to CDC PrEP guidelines for STI screenings (Jenness et al., 2017). Given these findings, risk compensation is an area with which public health needs to be concerned, and an area that needs to be explored and clarified further. Finally, the finding that three quarters of PWID were concerned about their friends knowing they are using PrEP (if they took PrEP) signals that there may be stigma around PrEP or around HIV in general. Public health initiatives should consider the potential stigma surrounding HIV and PrEP and develop initiatives to combat stigma barriers. Currently, research on stigma and PrEP has focused on MSM (Brooks, Nieto, Landrian, Fehrenbacher, & Cabral, 2019; Franks et al., 2018) and although some PWID may identify as MSM, all PWID do not. Research on stigma, including how different types of stigmas interact, in relation to PrEP and initiatives to combat stigma should target the specific needs of PWID communities to increase PrEP willingness and PrEP uptake (Muncan, Walters, Ezell, & Ompad, 2020).

Since what often places PWID at risk for HIV are structural and contextual factors, such as poverty, homelessness, stigma, racial inequalities and gender inequalities, and experiences with violence we recommend multi-level PrEP interventions that can tackle some of the root issues that place PWID at risk for HIV (Pinto, Berringer, Melendez, & Mmeje, 2018; Walters et al., 2020; Walters et al., 2018) and may increase PrEP uptake. For example, providing housing options could significantly decrease HIV risk behaviors (Lee et al., 2018) and could potentially increase engagement throughout the PrEP care continuum, ultimately

leading to PrEP uptake and adherence. We are advocating for long term stable housing (more than weeks or months), not simply transitional housing or temporary supportive housing. Transitional housing sometimes requires participation in mandated programs and can uproot individuals from their communities, creating additional barriers to housing, employment, and health (Gerstel, Bogard, McConnell, & Schwartz, 1996). Rather than uprooting communities, we suggest utilizing already established social networks and community ties to inform PWID about PrEP and support PrEP for PWID throughout the PrEP care continuum (Sophus & Mitchell, 2018). Researchers have suggested that SSPs are spaces that could engage and educate PWID about PrEP (Roth et al., 2018). Future research should further explore the possibility of providing PrEP to PWID at SSPs and other harm reduction services, such as safe injection sites, where PWID are comfortable and less stigmatized, and where PWID have established communities.

In addition to the above, public health initiatives should tackle both awareness of PrEP and willingness to take PrEP, along with increasing PrEP access, linkage to PrEP care (or PrEP care in PWID specific spaces), and increasing prescribing of PrEP for PWID (Roth et al., 2018). Research has shown inequalities in prescribing PrEP, where physicians were less likely to prescribe PrEP to PWID (Edelman et al., 2016) and overall PrEP is not readily available nor is it accessible for PWID (Biello et al., 2018). It may also be worthwhile to package PrEP with other harm reduction initiatives and/or provide options for ways to protect against HIV. This is especially relevant for PWID since they are disproportionately impacted by HCV, which PrEP does not prevent. It is estimated that the prevalence of HCV among PWID in the US is 60%, with 25–50% of PWID becoming infected within two-to-six years of injection initiation (Jordan et al., 2015). Since HCV in the US is mostly attributed to injection practices, the most important means for preventing transmission is for affordable and available means of acquiring sterile injection equipment.

Our study results should be viewed in light of a number of potential limitations. People who use drugs cannot be randomly selected from a target population due to legal and stigma issues in the US, which means that the prevalence estimates may not be generalizable. This was a cross-sectional analysis, which means that the associations are not necessarily temporal or indicative of a causal effect. All variables were based on self-report and may therefore be subject to socially desirable responding or recall bias. The PrEP questions were sometimes difficult for respondents to comprehend and the barrier items were speculative and may not reflect actual behavior. We were unable to assess informal PrEP use such as taking HIV medications that were not prescribed to PWID because we did not ask questions about this. Past studies on PrEP have found that MSM exchange PrEP for informal use (i.e., take PrEP without a prescription) (Buttram & Kurtz, 2018). In this study participants may have answered yes to the PrEP question and were taking PrEP informally since we did not ask about how they acquired PrEP and if they were taking PrEP from a prescription bottle. Future research should consider ethnographic work to get a more refined understanding of PrEP awareness and willingness (Pinto, Lacombe-Duncan, Kay, & Berringer, 2019). Finally, this study sampled PWID in two major California cities and is likely not representative of other areas or states.

4. Conclusion

Many PWID experience environmental and structural conditions (such as homelessness, criminal justice involvement, and poverty), that place them at risk for HIV. PWID who are at risk for HIV through sexual and injection practices, may benefit from PrEP. Awareness of PrEP and willingness to take PrEP are key steps in the PrEP care continuum that could lead to PrEP uptake. Our findings suggest that there is a need to develop and scale up public health initiatives targeting PWID for PrEP in order to increase PrEP awareness and willingness to take PrEP, which could lead to greater PrEP uptake among PWID. Public health initiatives targeting PWID should focus on making PrEP available to PWID within the confines of their daily lives, reducing financial barriers to PrEP uptake such as copays, creating structures that enable daily adherence to medications, and combining PrEP messaging and services with ongoing communication efforts that promote condom use and safe injecting, including promoting environments that will allow PWID to do this.

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Table 1:

Demographic and Behavioral Characteristics of People who Inject Drugs in Los Angeles and San Francisco (N=469)

Characteristics	N (%)
Demographics	
Study Site	
Los Angeles	214 (46%)
San Francisco	255 (54%)
Gender	
Male	346 (74%)
Female	119 (25%)
Transgender	2 (<1%)
Other	2 (<1%)
Sexual Identity	
Gay, lesbian, or bisexual	81 (17%)
Heterosexual	388 (83%)
Race/Ethnicity	
White	195 (41%)
Latinx	106 (23%)
Black	103 (22%)
Native American	33 (7%)
Asian/Pacific Islander	5 (1%)
Mixed Race/other	26 (6%)
Education	
Less than high school diploma	127 (27%)
High school diploma or more	342 (73%)
Age	
18 – 29	77 (16%)
30 – 39	107 (23%)
40 – 49	128 (27%)
50 and Older	157 (34%)
Relationship Status	
Single	322 (69%)
In a relationship, but not living as married	69 (15%)
Married or living as married	77 (16%)
Monthly Income	
Less than \$1,000	270 (58%)
\$1,000 to \$1,400	92 (20%)
\$1,401 to \$2,100	54 (11%)
\$2,101 or more	53 (11%)
Homeless (current)	363 (77%)
Mental health diagnosis (ever)	280 (60%)

Characteristics	N (%)
Sexual Behaviors	
Any sex partner in the last 6 months	295 (63%)
Any steady sex partner (last 6 months)	212 (45%)
Consistent condom use – 100%	19 (9%)
Sex partner is a person who uses drugs	162 (77%)
Any casual sex partner (last 6 months)	124 (27%)
Consistent condom use – 100%	49 (39%)
Sex partner is a person who uses drugs	105 (87%)
Any paying sex partners (last 6 months)	39 (8%)
Consistent condom use – 100%	23 (57%)
Sex partner is a person who uses drugs	31 (80%)
PrEP	
PrEP Aware	189 (40%)
PrEP Willing	276 (59%)
Willing to take Prep if	
Doctor visits required	253/276 (92%)
Blood tests required	248/276 (90%)
HIV tests required	255/276 (92%)
Copays required	165/276 (59%)
Daily use required	176/276 (64%)
Friends would find out	215/276 (78%)
Worried that risk would increase	171/276 (62%)
Required condom use	215/276 (78%)
Criminal Justice	
Currently on probation	93 (20%)
Currently on parole	15 (3%)
Contact with police (last 6 months)	265 (57%)
Arrested (last 6 months)	142 (31%)
Jail (last 6 months)	132 (28%)
Drug and Alcohol	
Drug or alcohol treatment (last 6 months)	149 (32%)
Injection frequency (last 30 days)	
Less than 30	135 (29%)
30–89	123 (26%)
90 or more	211 (45%)
Injected speedball (last 30 days)	149 (32%)
Injected goofball (last 30 days)	232 (50%)
Injected crack cocaine (last 30 days)	38 (8%)
Injected powder cocaine (last 30 days)	59 (13%)
Injected methamphetamine (last 30 days)	242 (52%)
Injected heroin (last 30 days)	384 (82%)
Injected prescription opioid (last 30 days)	33 (7%)

Table 2:

Bivariate Factors Associated with PrEP Awareness and PrEP Willingness

Characteristic	PrEP Aware (N=469) n (% reported event)	p-value	PrEP Willing (N=469) n (% reported event)	p-value
Socio-Demographics				
Study Site/Sexual Identity		<.001		.584
Los Angeles/heterosexual	40 (22%)		106 (59%)	
San Francisco/heterosexual	104 (50%)		118 (56%)	
Los Angeles/LGB [^]	17 (49%)		24 (71%)	
San Francisco/LGB [^]	28 (61%)		28 (61%)	
Race/Ethnicity		.001		.918
White	98 (50%)		117 (60%)	
Latinx	27 (26%)		58 (55%)	
Black	33 (32%)		64 (62%)	
Native American	19 (58%)		19 (58%)	
Asian/Pacific Islander	2 (40%)		3 (60%)	
Mixed Race/Other	10 (37%)		15 (56%)	
Education		<.001		.430
Less than High School Diploma	30 (24%)		71 (56%)	
High School Diploma or More	159 (47%)		205 (60%)	
Age		<.001		.083
18 – 29	39 (51%)		46 (60%)	
30 – 39	58 (54%)		72 (67%)	
40 – 49	50 (39%)		77 (60%)	
50 and Older	42 (27%)		81 (52%)	
Monthly income		.04		.930
<\$1,000	94 (35%)		158 (59%)	
\$1,000 to \$1,400	43 (47%)		53 (58%)	
\$1,401 to \$2,100	27 (50%)		34 (63%)	
\$2,101 or more	25 (47%)		31 (59%)	
Homeless		.008		.02
Yes	158 (44%)		224 (62%)	
No	31 (29%)		52 (49%)	
Mental health diagnosis (last 6 months)		.479		.021
Yes	117 (42%)		177 (63%)	
No	72 (39%)		98 (52%)	
Sexual Behaviors				
Any paying sex partners (last 6 months)		.436		<.0001
Yes	18 (46%)		34 (87%)	
No	171 (40%)		242 (56%)	
Casual sex partner (last 6 months)		.003		.055
Yes	64 (52%)		82 (66%)	

Characteristic	PrEP Aware (N=469) n (% reported event)	p-value	PrEP Willing (N=469) n (% reported event)	p-value
No	125 (36%)		194 (56%)	
Criminal Justice				
Jail (last 6 months)		.024		.286
Yes	64 (49%)		83 (63%)	
No	124 (37%)		192 (58%)	
Drug and Alcohol				
Injected by another person (last 30 days)		.189		.001
Yes	95 (44%)		147 (67%)	
No	94 (38%)		129 (52%)	
Injected another person (last 30 days)		.007		.032
Yes	127 (45%)		176 (63%)	
No	62 (33%)		100 (53%)	
Distributive syringe sharing		.873		.045
Yes	36 (40%)		62 (68%)	
No	153 (41%)		214 (57%)	
Receptive syringe sharing		.015		.013
Yes	37 (54%)		50 (73%)	
No	152 (38%)		226 (57%)	
Shared rinse water (last 6 months)		.102		.054
Yes	59 (47%)		84 (66%)	
No	130 (38%)		192 (56%)	
Shared cooker (last 6 months)		.160		.008
Yes	91 (44%)		136 (66%)	
No	98 (38%)		140 (54%)	
Shared filter (last 6 months)		.05		<.001
Yes	69 (47%)		105 (71%)	
No	119 (37%)		170 (53%)	
Overdosed (last 6 months)		.049		.068
Yes	37 (51%)		50 (69%)	
No	152 (38%)		226 (57%)	
HIV and HCV				
HIV risk		.674		<.001
None	62 (37%)		76 (45%)	
Low	79 (42%)		121 (64%)	
Average	21 (42%)		32 (64%)	
Moderately high	21 (47%)		35 (80%)	
Very high	6 (35%)		12 (71%)	
HIV test (last 6 months)		.016		.871
Yes	145 (44%)		194 (59%)	
No	44 (32%)		82 (59%)	

[^] LGB = self-identified lesbian, gay, or bisexual

Table 3:

Multivariable Logistic Analysis of Factors Associated with PrEP Awareness among People who Inject Drugs (n=469)

	Unadjusted odds ratio	95% confidence interval (CI)	Adjusted Odds ratio	95% CI
Site by sexual identity				
LA/hetero	Referent			
SF/hetero	2.87 ***	1.72, 4.80	3.00 ***	1.90, 4.73
LA/LGB	2.31 *	1.00, 5.33	2.88 **	1.34, 6.20
SF/LGB	3.65 **	1.68, 7.91	4.35 ***	2.15, 8.79
High school education or higher	2.34 **	1.39, 3.94	2.35 **	1.45, 3.82
HIV tested in the last 6 months	1.71 *	1.07, 2.75	1.68 *	1.08, 2.63
Age				
<30	Referent			
30–39	1.39	0.72, 2.67		
40–49	0.97	0.51, 1.86		
50 or older	0.62	0.32, 1.27		
Receptive syringe sharing last 6 months	1.75	0.97, 3.17		
Currently homeless	1.56	0.91, 2.69		
Casual sex partner in the last 6 months	1.54	0.96, 2.46		
Any jail in the last 6 months	1.03	0.63, 1.68		
Injected others in the last 6 mos	1.03	0.62, 1.56		
Latinx	0.79	0.45, 1.40		
Overdosed in the last 6 months	0.99	0.56, 1.40		

* indicates $p < .05$

** indicates $p < .01$

*** indicates $p < .001$

Unadjusted model Log Likelihood=534.417; Cox & Snell R-Squared=0.183

Adjusted model Log Likelihood=573.322; Cox & Snell R-Squared=0.118

Table 4:

Multivariable Analysis of Factors Associated with PrEP Willingness among People who Inject Drugs (n=463)

	Odds ratio (OR)	95% Confidence Interval (CI)	Adjusted OR	95% CI
Paying sex partner in the last 6 months	4.81 **	1.78, 12.97	4.91 **	1.82, 13.23
HIV risk				
No risk	Referent			
Low	1.93 **	1.24, 3.02	2.07 **	1.34, 3.21
Average	1.80	0.91, 3.58	1.94	0.98, 3.82
Moderately high	3.32 **	1.44, 7.66	3.71 ***	1.63, 8.45
High	2.86	0.84, 9.75	3.11	0.93, 10.44
Injected by other PWID in last 6 m	1.86 **	1.24, 2.77	1.88 **	1.26, 2.80
Shared filter in last 6 months	1.59 *	1.01, 2.51	1.70 *	1.09, 2.65
Currently homeless	1.32	0.82, 2.12		
Mental health diagnosis	1.21	0.81, 1.83		
Injected other PWID in the last 6 months	1.04	0.69, 1.57		

* indicates $p < .05$ ** indicates $p < .01$ *** indicates $p < .001$

Unadjusted model Log Likelihood=571.454; Cox & Snell R-Squared=0.118

Adjusted model Log Likelihood=575.719; Cox & Snell R-Squared=0.115