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HIV risk perception, pre-exposure prophylaxis (PrEP) awareness, and PrEP initiation intention among women who use drugs

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Abstract

Introduction: Women who use drugs (WWUD) are prime candidates for pre-exposure prophylaxis (PrEP) due to their elevated risk of acquiring HIV through biological, behavioral, and contextual factors. However, PrEP uptake among WWUD remains low. The relationship between unhealthy drug use and correlates of PrEP uptake in this vulnerable population is not well defined. The purpose of this study is to characterize the relationships between specific types and routes of drug use and several precursors of PrEP uptake among WWUD.

Methods: The study collected data via a computer-based survey from 233 women living in New York City and Philadelphia who participated in a study designed to develop and pilot a

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women-focused intervention for PrEP uptake. The sample of cisgender, HIV-negative women were not currently taking PrEP but considered PrEP eligible. This analysis is focused on women's HIV risk perception, PrEP awareness, PrEP initiation intention, and any use of the following drugs: barbiturates, benzodiazepines, crack cocaine, powder cocaine, hallucinogens, heroin, methamphetamines, and prescription opioids.

Results: Within the three months prior to study enrollment, 63.1% of participants reported any drug use; 42% reported polydrug use; 19.8% had injected drugs; 75% reported getting high or drunk before sex; and 44% had been enrolled in drug treatment. Of our total sample, 41.2% perceived themselves at risk for HIV infection, 41.6% were aware of PrEP prior to the study, and 62.7% intended to initiate PrEP after they were informed. When compared to other PrEP-eligible women, women who reported prescription opioid use and polydrug use perceived themselves at higher risk for HIV infection and had higher intention to start PrEP. However, they and women who reported injecting drugs also reported lower awareness of PrEP.

Conclusion: These findings have implications for increasing education about PrEP and the various modes of HIV exposure to support PrEP uptake in this vulnerable population.

Keywords

Substance use; Pre-exposure prophylaxis; Women's health; HIV/AIDS; Harm reduction

1. Introduction

Women who use drugs (WWUD) have a complex susceptibility to HIV infection (Gibson et al., 2022). Though sources of infection may differ, unhealthy drug use is consistently linked to increased HIV risk among WWUD (Nydegger & Claborn, 2020; Ramsey, Bell, & Engler, 2010). For example, injection drug use, which accounts for 16% of HIV acquisitions among women, can introduce HIV infection directly into the bloodstream through contaminated drug equipment (Centers for Disease Control and Prevention [CDC], 2021a). However, the most common route of HIV transmission among women remains heterosexual contact, accounting for 83% of new diagnoses (CDC, 2021a). Not all drug use directly exposes women to HIV intravenously, but both injection and noninjection drugs that impair a woman's ability to negotiate with a male sex partner can significantly heighten HIV risk through sexual exposure (Azim, Bontell, & Strathdee, 2015; Ramsey et al., 2010). Both injection and noninjection drug use are consistently linked with increased HIV risk related to reduced condom use, using substances before or during sex, increased number of sex partners, sex with high-risk partners (i.e., men who inject drugs or are living with HIV), increased risk for sexual assault, and exchanging sex for drugs or money (Medina-Perucha, Family, Scott, Chapman, & Dack, 2019; Ramsey et al., 2010). Sex work, intimate partner violence, and problematic alcohol use are recognized syndemic factors among WWUD that further increase vulnerability to HIV (Gilbert et al., 2015; Glick et al., 2019; Stockman et al., 2021).

Many women may be situationally unable to remove HIV risk factors from their lives before exposure and infection have already occurred. Therefore, harm-reduction approaches are needed to acutely reduce HIV risk, often in the context of long-term strategies to reduce

HIV-relevant behaviors (Denis-Lalonde, Lind, & Estefan, 2019; Springer et al., 2015). Over the past several decades, harm-reduction measures, such as providing sterile drug equipment to those who inject drugs through syringe services programs, have significantly reduced HIV acquisition rates (U.S. Department of Health & Human Services, 2019). Pre-exposure prophylaxis (PrEP), an antiviral regimen, is another effective harm-reduction measure that can protect against HIV infection regardless of the route of exposure (Glick et al., 2019). While the only formulation approved for use among women for the past few years has been an oral tablet taken once daily, long-acting injectable formulations have more recently gained FDA approval (U.S. Food & Drug Administration, 2021) and intravaginal formulations are in development (Palanee-Phillips et al., 2021). Despite the evidence-based efficacy of PrEP and increased funding for PrEP services, actual PrEP uptake among WWUD remains extremely low (Cernasev, Walker, Armstrong, & Golden, 2021). Women face unique structural and social barriers to PrEP access (Flash, Dale, & Krakower, 2017); yet internal motivating factors such as a woman's perception of her risk for acquiring HIV, awareness of PrEP, and willingness to take PrEP are all essential precursors to PrEP uptake in this population (Bradley et al., 2019; Meyer et al., 2021; Mistler, Copenhaver, & Shrestha, 2020). A pilot study on a PrEP decision-aid tool for women with substance use disorders found that higher HIV risk perception was linked to increased engagement with PrEP services (Meyer et al., 2021). However, many studies among WWUD have consistently indicated an overall low HIV risk perception and low awareness of PrEP despite increased interest in using PrEP once informed of its efficacy and indications (Meyer et al., 2021; Zhang et al., 2019).

Perception of personal HIV risk, awareness of the availability of PrEP for women, and intention to start PrEP may differ across groups despite similar levels of vulnerability to HIV infection (Scott et al., 2022; Sewell et al., 2020). With high HIV infection risk and low PrEP uptake among WWUD, we know little about whether different drug use-related factors are associated with a woman's perception of her own HIV risk, awareness of PrEP, and willingness to initiate PrEP (Meyer et al., 2021; Walters, Reilly, Neaigus, & Braunstein, 2017; Zhang et al., 2019). Use of heroin (Bobashev et al., 2019), nonmedical prescription opioids (Meade, McDonald, & Weiss, 2009), crack cocaine and powder cocaine (Liu, Richards, Gebru, Spencer, & Cook, 2021), methamphetamines (Degenhardt et al., 2010), club drugs (Shacham & Cottler, 2010), and benzodiazepines (Ickowicz et al., 2015) have each been individually linked to increased susceptibility for HIV infection among women. Use of multiple drug types (or polydrug use) and injection use compound an already elevated baseline risk for HIV among WWUD (Beckham et al., 2022; Tavitian-Exley, Vickerman, Bastos, & Boily, 2015; Tavitian-Exley, 2016).

To our knowledge, few studies have explored the relationship between the important precursors to PrEP uptake and specific types or routes of drug use. Therefore, the primary research aim of this investigation is to explore the relationship between types of drug use and routes of administration among PrEP-eligible women and three essential precursors of PrEP uptake: HIV risk perception, PrEP awareness, and PrEP initiation intention. Understanding the relationship between specific types of drug use and these woman-dependent precursors of PrEP uptake will allow for more targeted interventions to support PrEP uptake within this population.

2. Material and methods

2.1. Study design

This study is a cross-sectional analysis of data collected during JUST4Us, an investigation that developed and piloted a women-focused counseling intervention for PrEP uptake and adherence (Teitelman et al., 2021). The study drew data from mutually exclusive samples of women surveyed during intervention development (n=160) and at baseline among women participating in a pilot randomized controlled trial of the intervention (n=80) (Teitelman et al., 2020; Teitelman et al., in press). Using the same instrument (described in Measures) and eligibility criteria for enrollment (described in Study Sample and Data Collection), the study assessed baseline demographics, HIV risk factors, and PrEP uptake precursors upon study entry in both cohorts of the study sample.

2.2. Study sample and data collection

Recruitment and enrollment took place from October 2017 to May 2018 for the intervention development phase and November 2018 to June 2019 for the pilot randomized controlled trial in Philadelphia and New York City, two northeastern urban cities with high HIV prevalence rates (CDC, 2021a). Women were primarily recruited through face-to-face outreach at community locations, including methadone programs, shelters, and independent residential recovery facilities, as well as online advertisements and participant referral. Eligible participants were HIV negative, cisgender women, ages 18 to 55 years old, who self-reported condomless vaginal or anal sex with a male partner and/or injected drugs in the past 6 months. Consistent with CDC and New York State guidelines for PrEP eligibility for women at the time of recruitment initiation in 2017, eligible women also had to report at least one additional personal HIV risk behavior in the past 6 months or have a current male sex partner who engaged in HIV risk behaviors in the past 6 months. Based on CDC guidelines and relevant literature on HIV risk factors among women, personal HIV risk criteria were: sharing injection equipment (CDC, 2023); using cocaine/crack cocaine or another stimulant (Liu et al., 2021); being enrolled in drug treatment, including but not limited to those offering medication for opioid use disorder (MOUD) (El-Bassel, Wechsberg, & Shaw, 2012); exchanging sex for money, drugs, or other services (CDC, 2022); meeting criteria for problematic alcohol use [CAGE score ≥ 2 (Ewing, 1984)] (Fisher et al., 2008); or receiving a diagnosis of chlamydia, gonorrhea, syphilis, or a new diagnosis of genital herpes in the past 6 months (CDC, 2023). Male partner HIV risk criteria were: injecting drugs; HIV seropositive; has sex with men; or incarcerated in the past 6 months (Adams et al., 2018; CDC, 2023). The study excluded women if they were currently pregnant, currently taking PrEP, or did not understand and read English at a 5th grade level.

Women interested in participating were provided details about the study in a private area. After consent for screening, women completed an eligibility questionnaire on a mobile tablet or paper copy. Initial visits across both intervention development and piloting phases included an informed consent process, followed by viewing a short publicly available video about women and PrEP (Project Inform, 2016) and completing the survey, described in Measures.** Each woman was reimbursed \$50 for participating and received an additional

\$10 for each woman they referred (limited to three) who was eligible and enrolled. This study received approval through the Institutional Review Boards.

2.3. Measures

During data collection, women completed a computer-assisted self-interview (CASI) survey, which included the following variables of relevance to the aims of this analysis.

2.31. Demographics and health.—The demographic variables collected included age; race/ethnicity; education level; employment status; yearly household income; health insurance status; history of incarceration; current primary male partner; and exchanging sex with a man for money, drugs, goods, or other services.

2.32. Substance use.—The variables relevant to drug and alcohol use included use of drugs or alcohol to get high or drunk before sex; injection drug use in the past 3 months; and admission to a drug treatment program (including but not limited to MOUD) in the past 3 months. To capture alcohol use, we used the Alcohol Use Disorders Identification Test Consumption screening tool (AUDIT-C) (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998); the study classified women with three or more positive answers as at-risk for problematic alcohol use, or alcohol use disorder (O'Connor et al., 2018).

The study measured drug use by questions adapted from the drug use questionnaire in the HIV Risk Assessment Battery, which captures drug type and frequency of use (Metzger, Nalvalin, & Woody, 2001). We modified the questionnaire based on common drugs associated with HIV-relevant behaviors and reported among the urban populations in Philadelphia and New York City at the initiation of this study. The questionnaire differentiated between the following 8 categories of drugs: angel dust (phencyclidine [PCP]), Ecstasy or other hallucinogens; barbiturates, quaaludes, or other sedatives; benzodiazepines or other tranquilizers; crack cocaine; powder cocaine; methamphetamine or other amphetamines; heroin; and prescription opioids (such as Oxycontin® and Percocet®). The study dichotomized drug use into binary variables for each drug type, differentiating between no use of the drug type (“not at all”) and any use of the drug (“a few times each month”; “a few times each week”; or “everyday”) in the past 3 months. To measure concurrent use of two or more drugs, we created a polydrug variable by summing up the answers to the individual drug type questions for each participant, with possible scores ranging from 0 to 8. Although marijuana use was measured and reported in 53% of our sample, we excluded marijuana from the drug types and the polydrug variable analyzed due to the lower risk profile of isolated cannabis use on condomless sex and other HIV-relevant behaviors when compared to other drugs (Fredericksen et al., 2021).

2.33. PrEP precursor variables.—We measured perceived HIV risk, PrEP awareness, and PrEP initiation intention. Awareness was a binary response (yes/no) to the question: “Before this study, had you ever heard of PrEP?” Perceived HIV Risk and PrEP initiation intention were originally 4-point Likert responses (“strongly disagree” to “strongly agree”) to the items (“I believe I am at risk of getting HIV” and “I plan to start PrEP in the next 3 months”). For analyses, we converted these outcome variables into dichotomous variables

(“strongly agree/agree” and “strongly disagree/disagree”) due to the small sample sizes for several drug types and for consistency in analysis across all three PrEP precursor outcome variables.

3. Data analysis

Using SPSS (V.28), the study team conducted descriptive statistics to describe demographic variables. We generated frequencies to describe categorical variables; and minimum, maximum, mean, and standard deviations were generated to describe continuous variables. Binary logistic regressions evaluated the relationship between the independent drug variables of interest and the PrEP variables. We excluded seven (7) participants from this analysis due to insufficient or nonresponses to the drug use questions, resulting in a total analyzable sample of 233 participants. We assessed for association between three potentially confounding demographic covariates (age, ethnicity, and income) and the PrEP precursor outcome variables. Ethnicity was associated with PrEP awareness ($p<.05$) and PrEP initiation intention ($p<.05$); and age was associated with PrEP initiation intention ($p<.01$). Therefore, we adjusted for age and ethnicity, but not income, across all logistic regression models for drug use and the PrEP precursor outcomes. A p -value <0.05 was considered statistically significant.

4. Results

4.1. Demographics

Nearly three quarters (70.9%) of women were Black, and roughly one quarter identified as Hispanic/Latina. Approximately one-third had received education beyond a high school diploma or GED. More than half (54.2%) were either not working or temporarily laid off, and the majority (67.9%) made less than \$12,000 per year. Most (88.2%) had health insurance (see Table 1).

4.1.1. HIV related behaviors & substance use.—Half of the women had a primary male partner; over half had exchanged sex with a man for money, drugs, goods, or other services in the past 3 months. Three quarters of women reported using drugs or alcohol to get high or drunk before sex, with 43.8% indicating that this was a frequent practice (“often”, “nearly every time,” or “every time”). Approximately half of the women had a history of incarceration. In the past three months prior to study enrollment, the majority of women (63%) had used at least one drug type, 42% had used at least two or more drugs, and 19.8% had injected drugs. Nearly 45% had been enrolled in drug treatment in the past 3 months. According to reported alcohol consumption, about half screened high-risk for developing problematic alcohol use (see Table 1). The frequency of each drug type in the sample is described in Table 2. The drug types that participants most frequently endorsed were crack cocaine, benzodiazepines, powder cocaine, and opioids.

4.2. PrEP uptake precursors and drug use

In our overall sample, HIV risk perception (41.2%) and PrEP awareness (41.6%) were moderately low while intention to initiate PrEP once informed was moderately high (62.7%)

(see Table 3). Compared to women who did not use drugs, HIV risk perception was higher among WWUD (46.3% vs 32.6%), PrEP awareness was lower (35.4% vs 52.3%), and PrEP initiation intention was higher (64.6% vs 59.3%). However, none of these differences between women who did and did not use drugs on these PrEP variables were statistically significant. Engagement in drug treatment within the three months prior to study enrollment was significantly associated with lower odds of PrEP awareness (OR: 0.42; $p < 0.01$; 95% CI [0.24, 0.72]), although no significant associations with either HIV risk perception or PrEP initiation intention were noted.

4.21. Drug type and route.—In the adjusted analysis (see Table 4), women who used prescription opioids were two times more likely to perceive themselves at risk for HIV, 48% less likely to be aware of PrEP, and more than three times more likely to intend to initiate PrEP in the next 3 month. Use of PCP or other hallucinogens was significantly associated with higher PrEP initiation intention ($p < 0.05$), and benzodiazepine use was associated with lower PrEP awareness ($p < 0.01$). The remaining drugs showed similar yet nonsignificant trends with each of these variables. The logistic regression model of polydrug use indicated that the more types of drugs women used significantly increased their odds of perceiving themselves at risk for HIV, having lower awareness of PrEP, and having higher intention to start PrEP. Women who injected drugs were 55% less likely to report awareness of PrEP than those who did not inject drugs, although the study found no significant associations between injection drug use and HIV risk perception or PrEP initiation intention.

5. Discussion

Our findings provide a deeper understanding of the association between drug use and known women-dependent precursors of PrEP uptake among WWUD. The moderately low rates of HIV risk perception and PrEP awareness paired with moderately high PrEP initiation intention are consistent with previous studies among WWUD (Glick et al., 2019; Walters et al., 2017; Zhang et al., 2019). Our findings, distinguishing among various drug types and routes, suggest that women using prescription opioids and reporting polydrug use perceive themselves at higher HIV risk and are more likely to desire to start PrEP than other PrEP-eligible women. Given the strong epidemiologic link between HIV transmission and both opioid use and polydrug use, these women may have received more education about their HIV risk in health care or syringe exchange settings or be more socially aware of HIV risk factors within communities where HIV infection is more prevalent (Larney, Mathers, Poteat, Kamarulzaman, & Degenhardt, 2015; Lorvick, Browne, Lambdin, & Comfort, 2018). However, the significantly lower PrEP awareness among women who reported prescription opioid use, polydrug use, and injection drug use indicates that effective interventions to increase PrEP education are still needed in this particularly vulnerable subgroup of WWUD. Previous studies have linked PrEP awareness with PrEP prevention education at syringe exchange centers (Walters et al., 2017) and indicate that WWUD prefer PrEP education and services to be incorporated into substance use treatment (Qin et al., 2020). While we did not assess access to syringe exchange centers or differentiate among types of drug treatment programs (i.e., counseling-only, MOUD programs, etc.), the association found in our study

between enrollment in drug treatment and lower PrEP awareness reflects the critical need and opportunity to incorporate PrEP education within drug treatment programs.

The significant association between hallucinogen use and higher PrEP initiation intention as well as between benzodiazepine use and lower PrEP awareness requires cautious interpretation. Hallucinogens have been previously associated with greater sexual risk-taking among women (May & Parrott, 2015); and, while known to be an independent risk factor for HIV, benzodiazepine use is most frequently seen to increase HIV risk when used in dangerous combination with other impairing substances, such as opioids and alcohol (Votaw, Geyer, Rieselbach, & McHugh, 2019; Votaw, McHugh, Vowles, & Witkiewitz, 2020). Therefore, these associations likely have a more complex explanation beyond those directly assessed in this study and should be more closely examined.

Conversely, the lack of associations found for other drug types should also be carefully approached. When paired with our significant findings for prescription opioid use and injection drug use, it seems theoretically plausible that PrEP-eligible women who use nonopioid or noninjection drugs (i.e., PCP, crack cocaine, benzodiazepines, etc.) may be less prioritized for HIV prevention education in intensive drug treatment programs and underestimate their risk for HIV. Previous studies have found that PrEP-eligible women who choose not to initiate PrEP, or discontinue PrEP after initiation, may do so because the woman's self-perceived HIV risk is incongruent with her actual HIV risk (Namey et al., 2016; Sewell et al., 2020). For example, women who discontinue injection drug use may reduce their HIV risk from intravenous exposure but remain vulnerable to HIV via other perceivably "less risky" routes of drug use and/or high HIV-relevant sexual behavior. All participants in our study were considered high risk for HIV and, therefore, PrEP eligible. If not eligible for PrEP due to injection drug use, women were characterized by HIV-relevant sexual behaviors, apart from their reported drug use. Regardless of the reason for lack in statistical significance when comparing women who reported drug use to those who did not, low overall HIV risk perception and low overall PrEP awareness across our PrEP-eligible sample emphasize the importance of educating women who use nonopioid or noninjection drugs about sexual behaviors associated with HIV infection and the availability of PrEP. HIV prevention education and linkage to PrEP services, when indicated and desired, should actively be incorporated into drug treatment for WWUD and in treatment plans for all PrEP-eligible women irrespective of the type of HIV-relevant behavior (CDC, 2021b; Springer et al., 2015).

5.1. Study strengths and implications

The greatest strength of this study is the differentiation between types of drugs and their associations with three critical precursors of PrEP uptake. Most prior studies among PrEP for WWUD have focused on substance use broadly, sometimes exclusively sampling injection drug users (Walters et al., 2017; Zhang et al., 2019) or women with diagnosed substance use disorders (Meyer et al., 2021) to isolate higher HIV-relevant drug use behaviors indicating eligibility for PrEP; none to our knowledge have differentiated among this range of drug types and routes that are associated with increased HIV risk. Recruiting our sample, in part, at residential independent substance use facilities provided access to

women recently enrolled in care and in recent recovery—a population not often accessible or included in studies about PrEP for women. Furthermore, we enrolled a high percentage of minority women, specifically Black and Hispanic/Latina women. Most prior studies on PrEP and WWUD have been conducted predominantly among non-Hispanic White women; limited studies exist that explore this phenomenon among ethnic minority women who are disproportionately affected by HIV in the United States (Zhang et al., 2019).

5.2. Limitations and need for future research

Although all the study participants were PrEP eligible, which was a strength, it also posed challenges to the interpretability and generalizability of our results. We did not control for HIV-relevant sexual behaviors because the capacity of certain drugs (particularly noninjection drug use) to increase HIV risk is directly connected to HIV-relevant sexual behaviors. Because our entire sample were PrEP-eligible women, these HIV-relevant sexual behaviors could confound differences when comparing PrEP uptake precursor variables between women who used drugs versus those who did not, which may explain the lack of significant differences on the PrEP variables between these groups in our sample. Future studies with larger sample sizes should utilize moderated regression methods to further explore frequency of drug use and the moderating influence of drug use types on the relationship between sexual risk behaviors and these PrEP uptake precursors.

Second, we were unable to fully explore the amount or frequency of substance use. Because of this, we did not distinguish between occasional drug use and unhealthy drug use, including clinical diagnoses of substance use disorders (Saitz, Miller, Fiellin, & Rosenthal, 2021). However, the much shorter time from first drug use to diagnosis of a substance use disorder among women compared to men (i.e., the “telescoping” phenomenon) makes this lack of differentiation more reasonable for our study among PrEP-eligible women (McHugh, Votaw, Sugarman, & Greenfield, 2018). We did not explicitly differentiate fentanyl use from heroin or other opioids, although the influx of fentanyl in Philadelphia and NYC has dramatically increased since this study was conducted (Substance Use Philadelphia, 2022). Furthermore, including cocaine use and enrollment in a drug treatment program within the eligibility criteria for this study likely led to disproportionate enrollment of women who reported opioid or cocaine use in our study. While analysis of alcohol use on the precursors of PrEP uptake was beyond the scope of this paper, the demographics of our sample indicated high rates of problematic alcohol use, which is also linked to increased HIV risk through HIV-relevant sexual behavior (Carey et al., 2019). Other studies have linked higher alcohol use severity among WWUD with increased engagement in PrEP services (Meyer et al., 2021). Therefore, future studies should examine this distinct yet often overlapping substance of use on the precursors of PrEP uptake among WWUD.

Third, the cross-sectional nature of our study limited our ability to determine changes in the three PrEP uptake precursors over time or translation into actual PrEP uptake. Despite the moderately high intention to initiate PrEP after women were informed about PrEP, our study was unable to assess whether this intention was sustained or was associated with actual PrEP uptake. Current research about PrEP uptake among WWUD, including our study, focus on the once-daily oral formulation of PrEP. With recent approval of the

long-acting injectable PrEP formulation, future research should explore the impact of this injectable PrEP formulation on these PrEP uptake precursors and even on structural barriers to PrEP among WWUD (Footer et al., 2019; Shrestha et al., 2020; U.S. Food & Drug Administration, 2021).

Finally, this study focuses on the internal, woman-dependent precursors of PrEP uptake rather than structural barriers to PrEP uptake itself. While essential to PrEP uptake, the three precursors of PrEP uptake in this study do not always directly translate into actual PrEP uptake (Blackstock et al., 2021; Tran et al., 2021). Both structural and perceived barriers to PrEP may overwhelm and prevent uptake, especially among the most vulnerable populations of WWUD (Felsher et al., 2020). These barriers include mistreatment or stigma from health care providers, fear of side effects, and low functional prioritization of daily medication adherence in socioeconomically unstable environments (Felsher et al., 2020; Jackson et al., 2021; Tran et al., 2021). Providers may also underestimate the ability of WWUD to adhere to PrEP and, therefore, be less likely to prescribe despite this population's heightened risk (Calabrese et al., 2021; Qin et al., 2020). Although understanding the woman-dependent precursors of PrEP uptake is foundational, exploring and addressing structural barriers to PrEP uptake should also be prioritized when operationalizing support for PrEP uptake among WWUD.

6. Conclusion

Effectively supporting PrEP uptake among WWUD begins with understanding the known woman-dependent variables that precede PrEP uptake itself. In this study, women who reported prescription opioid use as well as those who reported polydrug use had higher HIV risk perception, lower awareness of PrEP, and higher intention to initiate PrEP than other PrEP-eligible women. These findings indicate that perception of HIV risk and the internal motivation to start PrEP, once aware, is heightened among populations of WWUD who are most vulnerable to HIV. However, the overall finding of low HIV risk perception, low awareness of PrEP, and moderately high intention to start PrEP in our total sample of PrEP-eligible women ultimately underscores the need for education about the modes of exposure and HIV vulnerability for all WWUD, regardless of route. Future studies should focus on feasible and acceptable interventions that increase awareness of PrEP and provide PrEP services to support PrEP uptake when indicated and desired among WWUD.

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Highlights

- Both injection and non-injection use of various drugs increase susceptibility to HIV infection among who use drugs (WWUD).
- Uptake of pre-exposure prophylaxis (PrEP) for HIV prevention remains low among WWUD.
- We used logistic regression modeling to examine the relationship between types/routes of drug use among women and their HIV risk perception, PrEP awareness, and PrEP initiation intention.
- Findings from our study suggest the need for education about modes of HIV exposure and the availability of PrEP for all WWUD.

TABLE 1.

Demographic characteristics of women (N = 233)

<i>Characteristic</i>	Mean	SD
<i>Age (years) (18+)</i>	39.2	12.2
	<i>n</i>	<i>%</i>
<i>Race (n=230)</i>		
Black	163	70.9
White	28	12.2
Other	39	17.0
<i>Hispanic/Latina (n=226)</i>	56	24.8
<i>Education (n=223)</i>		
<12th grade	62	27.8
High school - diploma or GED	83	37.2
Some college, technical training, college or post-grad degree	78	35.0
<i>Employment status (n=225)</i>		
Full-time/Part-time/Working off-book	60	26.7
Not working/Temporarily laid off	122	54.2
Student or Other	43	19.1
<i>Yearly household income (n = 212)</i>		
Less than \$12,000	144	67.9
\$12,000 – 16,999	28	13.2
\$17,000 or more	40	18.9
<i>Has health insurance (n=228)</i>	201	88.2
<i>Ever incarcerated (n = 231)</i>	119	51.5
<i>Primary male partner (n = 221)</i>	119	53.8
<i>Had sex with a man for money, drugs, goods or services (n = 208)</i>	110	52.9
<i>Used drugs or alcohol to get high or drunk before sex in past 3 months (n = 208)</i>		
Never	52	25.0
Sometimes	65	31.3
Often	34	16.3
Almost Every Time	24	11.5
Every Time	33	15.9
<i>Injected drugs in the past 3 months (n = 232)</i>	46	19.8
<i>Been in a drug treatment program in the past 3 months</i>	103	44.2
<i>Any drug use in the past 3 months (n=233)</i>	147	63.1
<i>Risk for problematic alcohol use (AUDIT-C >2) (n=230)</i>	122	53.0
<i>No. of drugs used in the past 3 months (n = 233)</i>		
0	86	36.9
1	49	21.0
2	32	13.7
3	25	10.7
4	41	17.6

AUDIT-C Alcohol Use Disorders Identification Test – Consumption

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TABLE 2.

Drug use by type

Drug type	Total <i>n</i> reporting use	Percentage of sample using drugs (n=147)	Percentage of total sample (N=233)
Angel dust/PCP	34	23.1	14.6
Barbiturates	21	14.3	9.0
Benzodiazepines	57	38.8	24.4
Crack cocaine	71	48.3	30.5
Powder cocaine	56	38.1	24.0
Heroin	52	35.4	22.3
Methamphetamines	24	16.3	10.3
Prescription opioids	55	37.4	23.6

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TABLE 3.

Frequency of PrEP Outcome Variables

	Total Sample (n=233)	Sample Using Drugs (n=147)	Sample Not Using Drugs (n=86)
Outcomes	Agree/Strongly Agree, n (%)		
HIV Risk Perception <i>"I believe I am currently at risk of getting HIV."</i>	96 (41.2)	68 (46.3)	28 (32.6)
PrEP Awareness <i>"Before this study, had you ever heard of PrEP?"</i>	97 (41.6)	52 (35.4)	45 (52.3)
PrEP Initiation Intention <i>"I plan to start PrEP in the next 3 months."</i>	146 (62.7)	95 (64.6)	51 (59.3)

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TABLE 4.

Logistic Regression Between Use of Drug Types and PrEP Variables

Drug Types	HIV Risk Perception		PrEP Awareness		PrEP Initiation Intention	
	Unadjusted OR (95% CI)	Adjusted [†] OR (95% CI)	Unadjusted OR (95% CI)	Adjusted [†] OR (95% CI)	Unadjusted OR (95% CI)	Adjusted [†] OR (95% CI)
Angel/PCP	1.88 (0.88, 4.00)	1.97 (.91, 4.28)	0.78 (0.37, 1.64)	0.68 (0.31, 1.49)	2.33 (0.92, 5.95)	2.72 (1.04, 7.14) *
Barbiturates	1.41 (0.58, 3.39)	1.42 (.58, 3.50)	0.49 (0.19, 1.31)	0.45 (0.17, 1.25)	1.15 (0.43, 3.12)	1.33 (0.48, 3.68)
Benzo-diazepines	1.13 (0.62, 2.03)	1.10 (.61, 1.98)	0.36 (0.19, 0.69) **	0.37 (0.19, 0.72) **	1.74 (0.86, 3.52)	1.83 (0.90, 3.75)
Crack cocaine	1.82 (1.04, 3.17) *	1.73 (0.96, 3.11)	0.73 (0.42, 1.28)	1.05 (0.57, 1.92)	1.13 (0.61, 2.10)	1.19 (0.61, 2.30)
Powder cocaine	1.89 (1.02, 3.50) *	1.84 (.99, 3.42)	0.63 (0.34, 1.19)	0.70 (0.37, 1.34)	1.32 (0.65, 2.71)	1.42 (0.69, 2.94)
Heroin	1.56 (0.85, 2.88)	1.51 (.81, 2.80)	0.53 (0.28, 1.00)	0.58 (0.30, 1.13)	1.51 (0.75, 3.08)	1.63 (0.79, 3.36)
Meth-amphetamines	0.75 (0.32, 1.77)	.72 (.30, 1.71)	0.57 (0.24, 1.37)	0.62 (0.25, 1.52)	1.81 (0.65, 5.08)	1.79 (0.63, 5.08)
Prescription opioids	2.06 (1.13, 3.75) *	2.00 (1.09, 3.66) *	0.49 (0.26, 0.93) *	0.52 (0.27, 0.99) *	2.86 (1.31, 6.28) **	3.03 (1.37, 6.73) **
Any drug use	1.86 (1.06, 3.27) *	1.73 (0.96, 3.12)	0.51 (0.30, 0.88) *	0.70 (0.39, 1.24)	1.46 (0.81, 2.64)	1.64 (0.87, 3.09)
Injection use	1.90 (0.98, 3.68)	1.97 (1.00, 3.90)	0.49 (0.24, 0.99) *	0.45 (0.21, 0.94) *	1.06 (0.51, 2.20)	1.18 (0.55, 2.52)
Polydrug use	1.17 (1.02, 1.33) *	1.15 (1.01, 1.32) *	0.81 (0.70, 0.94) **	0.85 (0.73, 0.98) *	1.17 (1.00, 1.38)	1.20 (1.02, 1.42) *

OR odds ratio; CI confidence interval.

* p value <0.05

** p value <0.01

[†] Adjusted for age and ethnicity