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## Characterizing Biomedical HIV Prevention Awareness and Use Among Black Transgender Women in the United States

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### Abstract

Black transgender women (BTW) in the United States experience disproportionate rates of HIV despite biomedical prevention interventions such as pre-exposure prophylaxis (PrEP) and non-occupational post-exposure prophylaxis (nPEP). Using a sample of 490 BTW collected from 2014–2017, bivariate, multivariable, and multinomial analyses were conducted to determine factors associated with awareness and use of PrEP and nPEP. BTW living with HIV were more aware of PrEP than HIV-negative BTW. Structural, demographic, and trans-specific factors (e.g., experiences of homelessness, violence, and current hormone use) related to HIV risk were

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associated with PrEP and nPEP awareness. PrEP use was associated with behavioral HIV risks (e.g., STI diagnosis, having an HIV-positive partner, and needle-sharing) and may demonstrate risk recognition among BTW. Knowing someone using PrEP was significantly positively associated with PrEP use. Development of guidelines for PrEP and nPEP use for BTW should leverage the strengths of guidelines for other populations, while also acknowledging the unique risks for this population.

## Keywords

Black; Transgender; Pre-exposure Prophylaxis; HIV prevention; biomedical interventions

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## Introduction

Available data demonstrate that transgender women, particularly those who identify as Black, bear a disproportionate burden of HIV acquisition (1–4). Transgender women are estimated to have 34.2 times greater odds of HIV infection compared to the adult US population (4). While point estimates of HIV prevalence among transgender women in the US range from 21.7% to 27.7% in meta-analyses (5, 6), recent studies of transgender women suggest increased HIV prevalence among Black transgender women (BTW) with one study reporting a 45% HIV positive prevalence among BTW (4, 7).

## Transgender women and biomedical prevention

Biomedical HIV prevention, including tools such as pre-exposure prophylaxis (PrEP) and non-occupational post-exposure prophylaxis (nPEP), has been demonstrated to prevent HIV infection among populations at increased risk for HIV (8–11); however, implications for protection and use have not been as straightforward for transgender women (12, 13). Among seven PrEP efficacy studies, transgender women comprised only 0.2% of participants (13); the iPrEx trial did not demonstrate PrEP effectiveness (12), and it has been suggested that concerns of transgender women using feminizing hormones were not addressed during the study (12). PrEP, currently approved as a once-daily pill of emtricitabine plus tenofovir disoproxil fumarate (Truvada®) or emtricitabine and tenofovir alafenamide (Descovy®), has been shown to be effective in reducing HIV acquisition among individuals with ongoing HIV risk (14, 15). The Centers for Disease Control and Prevention (CDC) released guidelines for PrEP provision that detail risks for men who have sex with men (MSM), heterosexuals at increased risk, and people who inject drugs (PWID), but no specific guidance for transgender women (16). Further, current HIV risk assessments used in populations specified for PrEP (i.e., the use of CDC guidelines or HIV Incidence Risk Index for MSM [HIRI-MSM] measures for PrEP recommendation to MSM) underperform in identifying Black populations for PrEP candidacy (17, 18). Current literature advocates for improved instrumentation appropriate for racial groups, such as Black MSM. Similarly, the demonstrated HIV disparity of BTW will require developing tools and decisional guides that are sensitive to the intersectional identity of BTW.

### **Ecological factors related to HIV risk and PrEP use among Black transgender women**

Given the absence of transgender-specific guidelines, it is important to understand the factors that are correlated with PrEP awareness and use among BTW. Extant literature highlights the importance of focusing on individual, social, and structural factors in understanding the impact of biomedical prevention awareness and uptake. Several studies have associated some of the increased HIV burden among transgender women with individual-level factors such as transactional sex (19–21), the number of recent anal sex partners (22, 23), sexually transmitted infection (STI) diagnoses (24), condomless sex (4), and partners living with HIV or of unknown status (25, 26). While substances, such as club drugs have been associated with HIV risk and infection among transgender women (27), methamphetamine use, injection drug use, and inhalants (i.e. “poppers”) (4, 21, 23, 27) have been included in HIV risk and PrEP assessment guidelines approved by the CDC (18, 28). While these factors are generally included in the CDC guidelines for PrEP recommendation, an additional HIV risk factor unique to some transgender women is the use of nonprescription hormones, which may increase HIV risk when hormone injection equipment is shared (4, 21).

Structural concerns associated with HIV risks include experiences of homelessness, unstable housing (21) and incarceration (7, 24, 29). Social factors include physical assault, intimate partner, and other interpersonal violence (6, 29). Moreover, many of the individual- and community-level factors associated with increased risk for HIV acquisition in transgender populations are sequelae of overarching structural barriers imposed by a transphobic society (30–32). Data indicate that BTW experience multiple overlapping conditions that predict HIV risk. The confluence of risk that BTW experience highlights the importance of exploring biomedical intervention among these women (33). Despite evidence of HIV risk disparities among transgender women, and evidence of PrEP effectiveness, acceptability and use of PrEP by BTW has been slower relative to other transgender women (34, 35). This difference in use patterns is thought to be related to: differences in PrEP awareness among transgender women, the unique social and structural circumstances of transgender women, and the lack of gender affirming care for BTW (36, 37).

### **Factors related to HIV risk and nPEP use among Black transgender women**

For individuals who may have exposure to HIV (e.g., sexual encounter, needle sharing with someone living with HIV), initiating a 28-day regimen of nPEP within 72 hours of exposure has been shown to be effective in preventing new infections (11, 38). There are currently no specific guidelines for nPEP use by transgender women (39). Transgender women may be at increased risk for HIV exposure through gender-affirming procedures that may not be performed in medical facilities (40). Due to economic and health insurance constraints, some transgender women may not have access to hormone therapy (21). These women may instead opt to purchase hormones and specialized hormone needles through online or other retailers rather than in clinical facilities; when these materials are in short supply, concerns exist regarding the possibility of hormone and needle sharing. Estimates of “pumping parties,” events where transgender women may be injected with hormones and fillers of various means (e.g., loose silicone) to enhance feminine characteristics, are difficult to amass; however, the reuse or sharing of unsterilized needles may confer the potential for

HIV transmission (21, 40, 41). Further, analyses of sex work note that transgender women have increased risk of acquiring HIV compared to cis-gender women and men (31), and nPEP may be an important biomedical tool for HIV exposures. Thus, nPEP awareness is important to understand for BTW, particularly women not using daily PrEP.

As PrEP and nPEP require a prescription from a healthcare provider and previous literature has sought to understand the relationship of health utilization of transgender women and discrimination encountered while seeking healthcare (42), analyses of discrimination in healthcare settings must be explored. Further, it is important to assess awareness of biomedical tools for all BTW regardless of HIV status, as HIV-positive women may engage in serodiscordant relationships or take part in social networks containing individuals of mixed-status where sharing this information may be of great value. As PrEP and nPEP are antiviral treatments, data suggest that HIV-positive women may have had greater exposure to PrEP and nPEP awareness (43). Previous research has also demonstrated that individuals living with HIV have been willing to disseminate information about PrEP use when aware of it, including transgender women (44, 45).

### The present analysis

Given the increased HIV incidence and prevalence among BTW, and the unique circumstances related to reported HIV incidence, data regarding PrEP and nPEP awareness and use among Black transgender women is critical. This exploratory analysis of a community-based sample during critical years of biomedical HIV prevention diffusion of BTW seeks to: (1) characterize PrEP and nPEP awareness among the full sample of BTW, and (2) characterize the factors associated with PrEP use among HIV-negative and HIV status unknown BTW. Because there are no PrEP or nPEP guidelines for transgender women, an important first step is understanding what factors are related to awareness and use of PrEP and nPEP from the factors that are associated with HIV risk in the literature. Such an analysis of biomedical prevention awareness and use may offer a path for interventions tailored for the unique experiences of BTW, including guidelines specifying PrEP and nPEP indications for transgender women.

## Methods

### Population and Data

Data come from Promoting Our Worth, Equality and Resilience (POWER), a serial, cross-sectional study from 2014–2017 of HIV testing, biomedical prevention access, and HIV care among BTW and Black MSM. Participants were recruited from Philadelphia, PA; Houston, TX; Washington, DC; Detroit, MI; Atlanta, GA; and Memphis, TN. Eligible participants were: (1) aged 18 or older; (2) were assigned male sex at birth; and (3) reported having sex with a man in their lifetimes. For this analysis, participants were included if they were: (1) aged 18 or older; (2) identified as “transgender”, “female” or noted that they had transitioned their gender from male to female, and (3) identified as “Black” or “African American.” A total of 548 transgender women completed the survey. After removing participants who: (1) did not identify as “Black”, “African American”; (2) were identified as duplicate surveys via a unique identifier code consisting of letters and numbers of easily

recalled personal information (46, 47); and (3) individuals who had missing data for PrEP awareness, nPEP awareness, or PrEP use, the final analytic sample was N=490. Questions related to current hormone use and gender discrimination were only asked in 2015–2017, leaving an analytic sub-sample of n=355.

Briefly, random time-location sampling was used to approach potential participants while attending Black Pride events (48). Interested participants were invited to consent and complete a psychosocial and behavioral survey. After the survey, participants were asked to consent to receive an HIV screening to be completed by a community-based organization (CBO) local to the city of data collection. For participants who chose not to test with the CBO, POWER study staff offered an anonymous HIV screening. Participants were compensated \$10 for survey completion and \$10 for HIV screening results. HIV screening tests included: INSTI (bioLytical Laboratories, Richmond, BC), Clearview STAT-PAK (Alere Inc., Waltham, MA), or OraQuick (OraSure Technologies, Inc., Bethlehem, PA). Detailed methods for data collection may be found elsewhere (7, 49). All procedures and informed consent documents were approved by the institutional review board at the University of Pittsburgh.

## Measures

**Demographics.**—City, year, Hispanic ethnicity, age, and education were collected from all participants. Age was measured in years and education had two levels: (1) high school completion or less and (2) technical training, some college or more.

**PrEP awareness.**—Participants were asked: “Have you ever heard of PrEP (pre-exposure prophylaxis)? PrEP is when HIV-negative people take anti-HIV medications (anti-retrovirals like Truvada®) BEFORE HAVING SEX to prevent HIV infection.” Participant responses were coded into aware (yes) and not aware (no or I don’t know responses).

**Know someone taking PrEP.**—Knowing another person using PrEP was assessed with the following yes/no question: “Do you know anyone who is taking anti-HIV medications (PrEP) to prevent HIV infection?” This question was only asked among participants aware of PrEP.

**PrEP use.**—Participants were asked: “Are you currently taking anti-HIV medications (PrEP) to prevent HIV infection?” Participant responses were coded into PrEP use (yes) and no PrEP use (no or I don’t know responses).

**nPEP awareness.**—Participants were asked: “Have you ever heard of PEP (post-exposure prophylaxis)? PEP is when HIV-negative people take anti-HIV medications (anti-retrovirals) AFTER potentially being exposed to HIV in order to prevent infection. Participant responses were coded into aware (yes) and not aware (no or I don’t know responses).

**nPEP use.**—Participants were asked: “Have you ever taken anti-HIV medications (PEP) AFTER potentially being exposed to HIV?” Participant responses were coded into nPEP use (yes) and no nPEP use (no or I don’t know responses).

**HIV status.**—HIV status was determined using self-report and HIV screening data. HIV-positive status was determined in two ways: if participants responded “HIV positive” to “What was the result of your most recent HIV test?” or if participants received a preliminary HIV-positive result from the screening of the study. HIV testing result was selected when self-report and CBO/study test were in conflict. HIV-negative status was confirmed in consenting participants via HIV screening. Individuals who completed the survey but did not consent to the HIV screening were coded as status unknown.

**Current insurance.**—Current insurance was assessed using the following yes/no question: “Do you currently have health insurance or health care coverage?”

**Inability to access healthcare due to cost.**—Past-year inability to access healthcare was assessed using the following yes/no question: “During the past 12 months, was there any time when you needed medical care but didn’t get it because you couldn’t afford it?”

**Incarceration.**—Past two-year incarceration was assessed using the following yes/no question: “In the past 2 years, have you been incarcerated (spent a night or more in jail or prison)?”

**Homelessness.**—Experiences of homelessness were assessed using the following yes/no question: “In the past 12 months, have you been homeless at any time? By homeless, I mean you were living on the street, in a shelter, in a Single Room Occupancy hotel (SRO), or in a car.”

**Physical assault.**—Past-year physical assault was assessed using the following yes/no question: Measurement of physical assault used the following yes/no item: “In the past year, have you been physically assaulted (hit, kicked, beat up or in any other way physically harmed)?”

**Intimate partner violence.**—Past-year intimate partner violence was measuring using the following yes/no question: “In the past year, have you been in a relationship with a partner who has ever hit, kicked, slapped, beaten or in any other way physically assaulted you?”

**Healthcare Discrimination.**—A composite variable of discrimination encountered in healthcare settings was created using the following two step approach. Participants answered a series of yes/no questions that assessed if they had experienced discrimination for one of six causes (e.g., “In the past year, have you experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior while because of your gender-identity/expression?). Other factors included: “race”; “... you have sex with men”; “HIV status”; “income or class”; or “some other reason.” Participants who answered yes to any of the discrimination questions were asked to specify where the discrimination took place (e.g., “getting medical care”). Although there were eight possible locations, only responses of “getting medical care” were included in this analysis.

**Current hormone use.**—Current hormone use was assessed with the following yes/no question from 2015–2017: “Are you currently taking hormones (estrogen) for transgender-related purposes?”

**Number of sexual partners.**—Participants were asked to enumerate their past-year sexual partners with the following question, “In the past 12 months, with approximately how many different men have you had anal sex?”

**Past-year exchange sex engagement.**—Past-year exchange sex was identified by asking participants: “In the past 12 months, did you ever give or take money, drugs or other goods for sex with a female partner?” with responses including “Yes”, “No”, “I don’t know” and “Refuse to answer.” Similarly, participants were asked: “In the past 12 months, did you ever give or take money, drugs or other goods for sex with a male partner?” with follow-up questions asking if they had “received money, drugs or other goods for sex” or “gave money, drugs or other goods for sex” with partners. Responses were recoded dichotomously to reflect exchange sex engagement if participants reported that they had received or given money, drugs or other goods in exchange for sex within the previous year, regardless of the gender of the client.

**Past-year STI diagnosis.**—Past-year STI diagnosis was assessed using a series of yes/no questions (e.g., “In the past 12 months, has a doctor or other health care provider told you that you had gonorrhea?”). Other STIs included were: Chlamydia, syphilis and “some other STD (other than HIV).”

**HIV-positive sex partners.**—To align with the CDC recommendation, two yes/no questions were assessed. Individuals were asked: “Of the times you had receptive anal intercourse sex (bottomed) in the past 12-months, did you have condomless sex with anyone who told you they were HIV positive?” Participants were also asked: “Of the times you had insertive anal sex (topped) in the past 12-months, did you have condomless sex with anyone who told you they were HIV positive?” Further, participants were asked about their last male partner via “What was his HIV status?” with responses including: “He told me he was HIV-negative”; “He told me he was HIV-positive”; “He did not know”; “We did not discuss it”; “Don’t know” and “refuse to answer.” Participants were coded as having had an HIV-positive partner if they had condomless sex with a male partner that told them he was HIV-positive or if the participant’s last partner was HIV-positive.

**Inconsistent condom use.**—Participants were asked to estimate their frequency of condom use with two questions (e.g., “Of the times you had receptive anal sex (bottomed), what proportion of the time did your partner wear a condom?”) with responses ranging from “never” to “always” inclusive of “don’t know” and “refuse to answer.” A second question asked about condom frequency while having insertive anal sex. Participants were included in inconsistent condom use if they identified that they used condoms “about half of the time” while being the receptive or insertive partner.

**Needle sharing.**—Needle sharing was asked using the following yes/no question: “In the past 6 months, have you shared an injection needle with someone else?”

**Methamphetamine use.**—Past three-month methamphetamine use was determined by a two-step question. First, “Have you ever used methamphetamines (crystal, tina, speed)?” Participants were then asked: “In the past 3 months, how often have you used methamphetamines (crystal, tina, speed)?” with time-based responses ranging from “never” to “daily or almost daily.” Responses were recoded so that individuals answering “no” if they had ever used methamphetamine and those who answered “never” in the previous three months were considered to not have used methamphetamine. Any use in the past three months, regardless of frequency was recoded as “yes.”

**Inhalant “popper” use.**—Similar to methamphetamine use, a two-step process was used to determine past three-month inhalant “popper” use. Participants who noted that they had never used poppers, or “never” used them in the previous three months were considered not to have used poppers. Participants who had used poppers with any frequency were considered to have used poppers.

### Analytic Approach

All analyses were conducted using Stata Version 16 (StataCorp, College Station, TX). To characterize the sample of N=490 BTW, univariate frequencies were used. Given these frequencies, bivariate analyses were conducted in order understand any disparities in biomedical HIV prevention awareness and use among the sample. While there were no a priori hypotheses, this analysis used potentially predictive behaviors to explore correlates of awareness and use. Analyses were conducted using chi-square and t-tests among categorical and continuous variables respectively based on differences in PrEP awareness and nPEP awareness. Exploration in differences of awareness were tested based upon: age, education level, HIV status, insurance coverage, ability to access healthcare, experiences of incarceration and homelessness, physical assault, intimate partner violence and hormone use.

Unlike PrEP and nPEP awareness, PrEP use was analyzed using multinomial logistic regressions using possible behavioral indications found in previous publications among HIV-negative and HIV status unknown participants. Behavioral risks for acquiring HIV were compared using analysis of variance (ANOVA) and chi-square comparisons focused on: age, education, and HIV risk behaviors (e.g., number of sexual partners, past-year STI diagnosis). One additional query sought to understand if knowing someone using PrEP was associated with PrEP use among participants who reported PrEP awareness. Previous studies found that there was network component to PrEP use (45, 50). Multivariable regression analyses of PrEP awareness, nPEP awareness, and multinomial logistic regression analyses for associations of PrEP use were adjusted for year, city, Hispanic ethnicity, age and education. Models included variables with chi-square or t-test significance  $p < .10$  in bivariate analysis. Significance was set to  $\alpha = 0.05$  for multinomial and multivariable models.

### Results

Table 1 describes the characteristics of the BTW (N=490) in the sample. The women had a mean age of nearly 31 years, and 57.6% had a high school or less education. Among the BTW in the study, 39.2% were HIV-positive and nearly 14% of the sample was considered



HIV status unknown. While 78.6% of the sample had health insurance, 42.5% noted that in the last year, they had not accessed care due to cost. In the past two years, 34.7% had been incarcerated, and in the past year, 41.8% had experienced homelessness, 43.7% reported physical assault, 45.5% reported intimate partner violence and 44.2% of participants asked between 2015–2017 reported current hormone use. Almost 10% of the sample reported a form of discrimination while seeking healthcare. More than half of the participants were aware of PrEP and among HIV-negative and status unaware participants, (n=298) 21.8% were currently using PrEP. Forty percent of participants in the sample were aware of nPEP.

### PrEP Awareness among BTW

Table 2 shows the correlates of PrEP awareness in the full sample (N=490). While the percent of participants who were aware of PrEP ranged from 46.3% to 62.8% across the years, the change was not significant, ( $\chi^2=7.386$ ,  $p=0.061$ ). In the total sample, PrEP awareness differed significantly based on education ( $\chi^2=5.14$ ,  $p=0.023$ ), HIV status ( $\chi^2=6.21$ ,  $p=0.045$ ), current insurance ( $\chi^2=7.40$ ,  $p=0.006$ ), inability to access healthcare ( $\chi^2=4.95$ ,  $p=0.026$ ), experiences of homelessness ( $\chi^2=18.28$ ,  $p<0.001$ ), physical assault ( $\chi^2=12.39$ ,  $p<0.001$ ), intimate partner violence ( $\chi^2=9.87$ ,  $p=0.002$ ) and current hormone use ( $\chi^2=8.38$ ,  $p=0.004$ ) and marginally differed based on incarceration ( $\chi^2=2.72$ ,  $p=0.099$ ). PrEP awareness did not significantly differ by age, Hispanic ethnicity, or experiences of healthcare discrimination. In multivariable models (Table 3), participants living with HIV and those with unknown status were more likely to report PrEP awareness (adjusted odds ratio [aOR]=1.56, CI: 1.02–2.37). Those with health insurance were more likely to be PrEP aware (aOR= 1.67, CI:1.05–2.62), but so were participants who were unable to access healthcare in the previous year due to cost (aOR = 1.64, CI: 1.11–2.42). Past-year experiences of homelessness (aOR=2.34, CI: 1.57–3.48), physical assault (aOR=1.92, CI: 1.30–2.84), and intimate partner violence (aOR=1.74, CI:1.17–2.56) were all associated with PrEP awareness. Current hormone use was also associated with PrEP awareness (aOR=1.85, CI: 1.17–2.93). Incarceration in the past two years and discrimination experienced in healthcare settings were not associated with PrEP awareness.

### nPEP Awareness among BTW

Correlates of nPEP awareness of the full sample (N=490) are found in Table 2. While the percent of participants who were aware of nPEP ranged from 34.6% to 48.2% from 2014 to 2017, the change was not significant over years sampled ( $\chi^2=4.505$ ,  $p=0.212$ ). Participants differed in nPEP awareness based on Hispanic ethnicity ( $\chi^2=4.81$ ,  $p=0.028$ ), education ( $\chi^2=5.56$ ,  $p=0.018$ ), current insurance coverage ( $\chi^2=5.08$ ,  $p=0.024$ ), inability to access care due to cost ( $\chi^2=5.92$ ,  $p=0.015$ ), past two-year incarceration ( $\chi^2=6.55$ ,  $p=0.010$ ), and past-year experiences of homelessness ( $\chi^2=25.10$ ,  $p<0.001$ ), physical assault ( $\chi^2=16.92$ ,  $p<0.001$ ) and intimate partner violence ( $\chi^2=12.97$ ,  $p<0.001$ ). Age nor HIV status differed significantly. Participants currently using feminizing hormones also differed in nPEP awareness ( $\chi^2=24.00$ ,  $p<0.001$ ). In multivariable models (Table 3), past-year inability to access healthcare due to cost (aOR=1.65, CI:1.12, 2.44), experiences of homelessness (aOR=2.62, CI: 1.76–3.89), physical assault (aOR=2.30, CI: 1.56–3.41), intimate partner violence (aOR=2.05, CI: 1.38–3.05), and past two-year incarceration (aOR=1.58, CI: 1.05–2.37) were all associated with nPEP awareness. Current hormone use was also

associated with nPEP awareness (aOR=3.11, CI:1.96–4.96). Current health insurance was not significant in the multivariable model. Healthcare discrimination was too low to assess any differences. Among nPEP aware, HIV-negative and HIV status unknown participants (n=298), 20.5% (n=61) reported that they had used nPEP in their lifetime (data not shown).

### PrEP use among BTW

Behavioral correlates of PrEP use among HIV-negative or HIV status unknown participants (n=298) are found in Table 4. While the percent of participants who used PrEP among participants aware of PrEP ranged from 35.0% to 48.2% across the years, the change was not significant, ( $\chi^2=1.974$ ,  $p=0.616$ ). Three groups of participants were compared: participants not aware of PrEP and therefore not using PrEP (n=143); participants aware of PrEP but not using PrEP (n=90); and participants currently using PrEP (n=65). HIV-negative and HIV status unknown participants differed in PrEP use based on Hispanic ethnicity ( $\chi^2=15.94$ ,  $p<0.001$ ), education level ( $\chi^2=14.65$ ,  $p=0.001$ ). Among past-year behavioral factors, participants differed in PrEP use based on number of sexual partners ( $F_{2,295}=3.60$ ,  $p=0.029$ ), experience of last-year exchange sex ( $\chi^2=10.55$ ,  $p=0.005$ ), past-year STI diagnosis ( $\chi^2=69.04$ ,  $p<0.001$ ), HIV-positive partner ( $\chi^2=15.31$ ,  $p<0.001$ ), inconsistent condom use ( $\chi^2=11.16$ ,  $p=0.004$ ), needle sharing ( $\chi^2=50.88$ ,  $p<0.001$ ), past three-month amphetamine use ( $\chi^2=12.72$ ,  $p=0.002$ ), and past three-month “popper” use ( $\chi^2=18.50$ ,  $p<0.001$ ). Participants also differed based on knowing someone taking PrEP ( $\chi^2=57.58$ ,  $p<0.001$ ).

Table 5 displays the results of the multinomial logistic regression models of PrEP use and past year behavioral factors. Compared to participants who were unaware of PrEP, participants who were aware of PrEP, but did not use PrEP were significantly less likely to report exchange sex in the previous year (relative odds ratio [rOR]=0.39, CI: 0.18–0.87). Additionally, compared to participants who were unaware of PrEP, participants who reported PrEP were significantly more likely to report past-year STI diagnosis (rOR=17.80, CI: 7.52–42.14), HIV-positive partner (rOR=3.23, CI: 1.53–6.78), inconsistent condom use (rOR=2.20, CI: 1.12–4.30), needle sharing (rOR=11.50, CI: 1.12–4.30) and past three-month “popper” use (rOR=3.52, CI: 1.53–8.10). Use of amphetamines did not predict PrEP use. Lastly, among participants who were aware of PrEP, those who knew someone using PrEP were significantly more likely to report PrEP use (aOR=14.38, CI:5.67–36.54).

### Discussion

In this analysis, more than half (55.5%) of the sample was aware of PrEP, fewer were aware of nPEP (40%). Just over a fifth of the sample reported PrEP use (21.8%) among participants who were HIV-negative/unknown. Nearly 40% of the sample were living with HIV, which is consistent with other estimates among BTW (6, 7, 21). PrEP awareness was higher among BTW living with HIV and those who had a missing or unknown status compared to BTW who were HIV-negative. This result was similar to another study where women living with HIV had greater PrEP awareness (43). Further, this result is important as a 2016 study found that individuals living with HIV who were aware of PrEP were willing to recommend PrEP to friends and partners, and suggests that this is an underutilized group

for PrEP dissemination (44); such network recommendations by transgender women have already been shown effective among PrEP-using transgender women (45).

Similar to other analyses, this sample reported high rates of incarceration, experiences of homelessness, physical assault, and intimate partner violence (4, 6, 7, 21, 24). These findings further articulate the negative impact of transphobia in the everyday social experiences of BTW. With nearly 35% of BTW reporting incarceration in the previous two years, this study confirms that experiences of incarceration are high among BTW, compared to the estimated 1 in 40 (2.5%) in adults over 18 incarcerated in the general population (29, 51, 52). Interestingly, a majority of the sample had health insurance, unlike another recent study (23), but nearly half of the participants also noted that they had not accessed care in the last year due to cost, suggesting that having insurance does not equate to accessing medical care. Improving healthcare outcomes for BTW will require ensuring affordability of healthcare, including gender-affirming healthcare (53, 54). Discrimination in healthcare settings was low in this sample and may be indicative that many in the sample are accessing trans-specific care. The fact that PrEP awareness was associated with several demographic and structural factors associated with HIV risk and acquisition (e.g., homelessness, environmental violence) may suggest that campaigns to share the promise of PrEP among BTW were effective during the early period of PrEP deployment. However, given the gender-specific concerns of BTW such as gender-based violence and lowered power to negotiate safer sexual encounters, ongoing PrEP awareness efforts are required (54). Future HIV prevention interventions should address structural determinants of health to increase accessibility to BTW. The finding that current hormone use was associated with PrEP awareness is an important one, as studies confirm concerns of BTW that PrEP might interfere with hormone therapy (54, 55). If BTW using feminizing hormones are aware of PrEP, perhaps from being in gender-affirming care, future PrEP studies should specifically address these concerns and develop trans-specific messaging to encourage confidence in PrEP use.

Although less well-known in the sample, possibly due to the situational nature of nPEP, we found that several structural factors related to HIV acquisition (e.g., experiences of incarceration, homelessness, environmental violence) and current hormone use were associated with nPEP awareness. Interestingly, current insurance coverage was not associated with nPEP awareness, which may present an opportunity for a more robust education campaign, particularly among BTW who are not using daily PrEP to prevent HIV. Given elevated HIV incidence and prevalence among BTW, a concerted effort must be made to ensure this population is aware of all biomedical prevention tools possible for episodic and ongoing HIV risk.

In analyses of PrEP use focused on behavioral factors, among HIV-negative or HIV status unknown BTW, compared to participants unaware of PrEP, many past-year HIV risk behaviors explored (exchange sex, STI diagnosis, HIV-positive partner, inconsistent condom use, needle sharing, and past three-month popper use) were positively associated with PrEP use; however, amphetamine use among this sample was not significantly associated with PrEP users. These associations suggest that participants are evaluating their risk for HIV and seeking preventative measures; similarly, providers are identifying BTW with

the greatest risk, but given the increased HIV prevalence among BTW, this list may not be exhaustive. The effect sizes of past-year STI and needle sharing may mean BTW are being properly advised about PrEP in healthcare and other settings. Perhaps an additional opportunity for public health practitioners is the strength of the association of PrEP use and knowing someone using PrEP. For groups such as BTW, leveraging the existing network for social and demonstrative support about using biomedical prevention may be essential in developing a trans-specific strategy to increase PrEP use. In fact, several novel social network interventions for Black MSM and BTW demonstrated improved retention to HIV care and adoption of risk reduction behaviors (20, 56).

While this study is an important addition to the literature regarding BTW, it must be viewed considering some limitations. Biomedical HIV prevention has been a quickly evolving field since FDA approval of PrEP in 2012. Data were collected between 2014 and 2017, prior to the release of Descovy® for PrEP which has addressed at least two concerns raised by transgender women regarding their hesitancy to use: the size of the pill and the inclusion of transgender women in the marketing for PrEP (54). This study relied on self-report of PrEP and nPEP use with no collection of biological PrEP or nPEP adherence. These data were collected at large Black Pride events throughout the United States, limiting the generalizability of these findings; however, the sample size of this analysis and similarity to smaller studies increases confidence in the findings. By collecting a sizeable sample, these data are not being conflated with MSM, aligning this analysis with best practices suggested by Poteat and colleagues (57). Lastly, these data are cross-sectional in nature and therefore cannot indicate causal inference; rather, this provides a near-baseline analysis for additional study of this very important group. Future studies of BTW would be improved with a biological measure of PrEP adherence, supporting the study of biobehavioral HIV prevention outcomes.

While this analysis provides vital information about the historical awareness and uptake of biomedical HIV prevention strategies, these data indicate the need to tailor campaigns and guidelines to the transgender experience. While several of the structural and behavioral risk factors identified in the literature were associated with PrEP and nPEP awareness and PrEP use, the remaining disparity will require further exploration of unique factors. If BTW are at increased risk compared to the general population, Black MSM, and other transgender women, interventions must begin to center the lives and experiences of BTW in order to reduce and eliminate such disparities. Parity in PrEP and nPEP use with other groups at increased risk for HIV may not be enough to address the HIV disparity among transgender women. This analysis is a requisite step in advocating for a trans-specific screening tool for providers to increase biomedical awareness, use, and confidence in the promise of biomedical HIV prevention interventions.

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**Table 1.**

Participant characteristics, Black transgender women in POWER 2014–2017

Characteristic	N=490
	n (%)
City	
Philadelphia, PA	46 (9.4)
Houston, TX	118 (24.1)
Washington, D.C.	73 (14.9)
Detroit, MI	141 (28.8)
Atlanta, GA	106 (21.6)
Memphis, TN	6 (1.2)
Year	
2014	136 (27.8)
2015	144 (29.4)
2016	132 (26.9)
2017	78 (15.9)
Age mean (standard deviation)	30.8 (10.8)
Ethnicity	
Hispanic	36 (7.4)
Education Level	
High school or less	282 (57.6)
Technical, college or more	204 (41.6)
Missing	4 (0.8)
HIV status	
HIV-negative	230 (46.9)
HIV-positive	192 (39.2)
Unknown/missing	68 (13.9)
Healthcare	
Insurance coverage	385 (78.6)
Unable to access healthcare	207 (42.2)
Incarceration	170 (34.7)
Homelessness	205 (41.8)
Physical assault	214 (43.7)
Intimate partner violence	223 (45.5)
Healthcare discrimination	48 (9.8)
Current hormone use †	157 (44.2)
PrEP awareness	273 (55.5)
nPEP awareness	201 (40.0)
Current PrEP use *	65 (21.8)

Notes:

‡ only asked 2015–2017, n=355

\* PrEP use among HIV- and HIV status unknown participants only n=298

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**Table 2.**

Correlates of PrEP and nPEP awareness among Black transgender women in POWER 2014–2017, N=490

Characteristic	Not PrEP aware	PrEP Aware	p value	Not nPEP aware	nPEP aware	p value
	n = 218	n = 272		n = 289	n = 201	
	n (%)	n (%)		n (%)	n (%)	
age (mean (SD))	31.3 (11.5)	30.5 (10.3)	0.42	31.2 (11.7)	30.4 (9.4)	0.41
Hispanic ethnicity	11 (5.1)	25 (9.2)	0.08	15 (5.2)	21 (10.5)	<b>0.028</b>
Education Level			<b>0.023</b>			<b>0.018</b>
High school or less	137 (63.7)	145 (53.5)		178 (62.5)	104 (51.7)	
Technical/college or more	78 (36.3)	126 (46.5)		107 (37.5)	97 (48.3)	
HIV status			<b>0.045</b>			0.11
HIV-negative	116 (53.2)	114 (41.9)		145 (50.2)	85 (42.3)	
HIV-positive	75 (34.4)	117 (43.0)		102 (35.3)	90 (44.8)	
Unknown/missing	27 (12.4)	41 (15.1)		42 (14.5)	26 (12.9)	
Current insurance coverage	159 (72.9)	226 (83.1)	<b>0.006</b>	217 (75.1)	168 (83.6)	<b>0.024</b>
Unable to access healthcare	80 (36.7)	127 (46.7)	<b>0.026</b>	109 (37.7)	98 (48.8)	<b>0.015</b>
Incarceration	67 (30.7)	103 (37.9)	0.099	87 (30.1)	83 (41.3)	<b>0.010</b>
Homelessness	68 (31.2)	137 (50.4)	<b>&lt;0.001</b>	94 (32.5)	111 (55.2)	<b>&lt;0.001</b>
Assault	76 (34.9)	138 (50.7)	<b>&lt;0.001</b>	104 (36.0)	110 (54.7)	<b>&lt;0.001</b>
Intimate partner violence	82 (37.6)	141 (51.8)	<b>0.002</b>	112 (38.8)	111 (55.2)	<b>&lt;0.001</b>
Healthcare Discrimination	18 (8.3)	30 (11.0)	0.31	25 (8.7)	23 (11.4)	0.31
Current hormone use *	51 (35.2)	106 (50.5)	<b>0.004</b>	66 (33.0)	91 (58.7)	<b>&lt;0.001</b>

Notes:

\* included in 2015–2017 cycles only, n=355; **bold type** indicates p .05

**Table 3.**

Multivariable logistic regression associations of PrEP and nPEP awareness among Black transgender women in POWER 2014–2017, N=490

Characteristic	PrEP awareness		nPEP awareness	
	aOR	95% CI	aOR	95% CI
HIV status				
HIV-negative	REF		REF	
HIV-positive	<b>1.56</b>	<b>(1.02–2.37)</b>	1.42	(0.94–2.16)
Unknown/missing	<b>1.82</b>	<b>(1.01–3.29)</b>	1.22	(0.68–2.21)
Current insurance coverage	<b>1.67</b>	<b>(1.05–2.62)</b>	1.58	(0.97–2.58)
Unable to access healthcare	<b>1.64</b>	<b>(1.11–2.42)</b>	<b>1.65</b>	<b>(1.12–2.44)</b>
Incarceration	1.20	(0.80–1.81)	<b>1.58</b>	<b>(1.05–2.37)</b>
Homelessness	<b>2.34</b>	<b>(1.57–3.48)</b>	<b>2.62</b>	<b>(1.76–3.89)</b>
Assault	<b>1.92</b>	<b>(1.30–2.84)</b>	<b>2.30</b>	<b>(1.56–3.41)</b>
Intimate partner violence	<b>1.74</b>	<b>(1.17–2.56)</b>	<b>2.05</b>	<b>(1.38–3.05)</b>
Healthcare discrimination	-	-	-	-
Current hormone use *	<b>1.85</b>	<b>(1.17–2.93)</b>	<b>3.11</b>	<b>(1.96–4.96)</b>

Notes: aOR = adjusted odds ratio; CI = confidence interval; all aOR models adjusted for city, year, age, ethnicity and education.

\* included in 2015–2017 cycles only, n=355; **bold type** indicates  $p < .05$

**Table 4.**

Correlates of PrEP use among HIV-negative or HIV status unknown Black transgender women in POWER 2014–2017, N=298

Characteristic	Not PrEP aware, no PrEP use	PrEP aware but no use	Current PrEP use	p value
	n = 143	n = 90	n = 65	
	n (%)	n (%)	n (%)	
age (mean (SD))	31.6 (12.0)	28.2 (8.3)	30.4 (9.7)	0.06
Hispanic ethnicity	9 (6.3)	4 (4.4)	14 (21.5)	< <b>0.001</b>
Education Level				<b>0.001</b>
High school or less	93 (66.0)	38 (42.7)	44 (67.7)	
Technical/college or more	48 (34.0)	51 (57.3)	21 (32.3)	
Number of sexual partners (mean (SD))	9.7(29.0)	6.4 (12.9)	7.2 (11.9)	<b>0.029</b>
Exchange sex	40 (28.0)	10 (11.1)	19 (29.2)	<b>0.005</b>
Past-year STI diagnosis	33 (23.1)	23 (25.6)	52 (80.0)	< <b>0.001</b>
HIV-positive partner	26 (18.2)	20 (22.2)	28 (43.1)	< <b>0.001</b>
Inconsistent condom use	53 (37.3)	28 (31.1)	37 (56.9)	<b>0.004</b>
Needle sharing	13 (9.1)	9 (10.0)	31 (47.7)	< <b>0.001</b>
Amphetamine use	16 (11.2)	4 (4.4)	15 (23.1)	<b>0.002</b>
Popper use	16 (11.2)	7 (7.8)	20 (30.8)	< <b>0.001</b>
Know someone taking PrEP*	-	18 (20.0)	53 (81.4)	< <b>0.001</b>

Note:

\* only asked among HIV-negative, HIV status unknown and PrEP aware participants, n=155, **bold type** indicates p < 0.05

**Table 5.**

Multinomial logistic regression comparisons of PrEP use among HIV-negative or HIV status unknown Black transgender women in POWER 2014–2017, N=298

Characteristic	PrEP aware, no use		Current PrEP use	
	rOR	95% CI	rOR	95% CI
Exchange sex	<b>0.39</b>	<b>(0.18–0.87)</b>	1.13	(0.63–2.75)
Past-year STI diagnosis	1.74	(0.88–3.45)	<b>17.80</b>	<b>(7.52–42.14)</b>
HIV-positive partner	1.20	(0.57–2.51)	<b>3.23</b>	<b>(1.53–6.78)</b>
Inconsistent condom use	0.82	(0.45–1.50)	<b>2.20</b>	<b>(1.12–4.30)</b>
Needle sharing	1.82	(0.69–4.83)	<b>11.50</b>	<b>(4.71–28.07)</b>
Amphetamine use	0.48	(0.15–1.60)	2.11	(0.88–5.07)
Popper use	0.76	(0.28–2.08)	<b>3.52</b>	<b>(1.53–8.10)</b>
Know someone taking PrEP *	Referent	Referent	<b>15.51</b>	<b>(6.10–39.45)</b>

Note: PrEP unaware participants are the referent group;

\* only asked among subsample aware of PrEP n=155;

rOR = relative odds ratio; CI = confidence interval; all rOR models adjusted for city, year, ethnicity, education and number of sexual partners; **bold type** indicates p < 0.05