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A multi-US city assessment of awareness and uptake of pre-exposure prophylaxis (PrEP) for HIV prevention among Black men and transgender women who have sex with men

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Abstract

The HIV epidemic among Black men and transgender women who have sex with men (BMTW) demands an urgent public health response. HIV point prevalence among this population ranges from 25%–43% - a rate far exceeding any other group. Pre-exposure prophylaxis (PrEP) for HIV prevention is a very promising prevention tool, however, its full potential to slow the epidemic has yet to be realized. For the current study, random time-location sampling at Black Gay Pride Events was used to collect data from $N=1,274$ BMTW, from five US cities, reporting HIV negative/unknown status. In-field HIV testing was also provided to participants. Participants were assessed on awareness and use of PrEP, health care factors, HIV testing history, psychosocial variables, and sex behaviors. About one-third of participants were aware of PrEP (39%), and a small percentage of participants were users of PrEP (4.6%). In multivariable analyses, being in a relationship, testing for HIV in the past six months, and others being aware of one's sexuality were positively associated with PrEP awareness. Higher levels of internalized homophobia and greater numbers of female sex partners were positively associated with PrEP use, while education and condom use were negatively associated. Based on study findings, messaging and uptake of PrEP needs greater expansion and requires novel approaches for scale-up. Improving linkage to HIV testing services is likely critical for engaging BMTW with PrEP. The potential for PrEP to slow the HIV epidemic is high, however, we must strengthen efforts to ensure universal availability and uptake.

Keywords

Black men and transgender women; HIV prevention; Pre-exposure prophylaxis

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Compliance with Ethical Standards

Disclosure of potential conflicts of interest: The authors declare that they have no conflict of interest.

Ethical approval: This study received IRB approval from the University of Pittsburgh, the University of Connecticut, and Columbia University. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

The US HIV epidemic among Black men who have sex with men and transgender women who have sex with men (BMTW) is an alarming public health emergency that demands an urgent response. Observational studies have found that HIV point prevalence among BMTW ranges from 25% to 43% (Herbst et al., 2008; Koblin et al., 2013; Sullivan et al., 2014). Rates of new HIV infections among Black men have sex with men (BMSM) are 6.0 times higher than among White MSM (Purcell et al., 2012). At these rates, it is estimated that 61% of BMTW could be living with HIV by the time they reach age 40 (Matthews et al., 2015). Based on the state of the current US HIV epidemic, it is imperative that BMTW receive targeted attention with regards to HIV prevention and treatment efforts (Rosenberg, Millett, Sullivan, Del Rio, & Curran, 2014).

The impact of the HIV epidemic on BMTW requires providing this group with the most effective HIV prevention strategies currently available. One such prevention option is the use of anti-retroviral medication (specifically, a once daily combination pill of tenofovir and emtricitabine) as a form of HIV prevention for BMTW, also known as pre-exposure prophylaxis (PrEP). PrEP holds tremendous promise for HIV prevention, its efficacy in reducing the likelihood of HIV transmission, when used correctly, is >99% (Grant et al., 2010). Although PrEP has demonstrated efficacy, our ability to implement a wide-spread, scale-up of it for those at-risk for exposure to HIV in the US has been slow (Kirby & Thornber-Dunwell, 2014) and in some instances it has stalled (Eaton, Driffin, Bauermeister, Smith, & Conway-Washington, 2015).

The US Food and Drug Administration approved PrEP for HIV prevention in 2012, however barriers to implementation persist including inadequate health care insurance to cover costs, biases against the use of medications used for sexual health related disease prevention, and constraints on the use of PrEP marketing to increase awareness (Al-Tayyib, Thrun, Haukoos, & Walls, 2014; Bauermeister, Meanley, Pingel, Soler, & Harper, 2013; R. Brooks & Allen, 2014; Krakower et al., 2012; Mayer & Krakower, 2015; Norton, Larson, & Dearing, 2013; PRePWatch; Rucinski et al., 2013; Saberi et al., 2012). Even with these limitations, multiple federal and state-level funded PrEP demonstration projects to improve awareness and uptake are currently underway in several US-cities (AVAC.org), however, current scale-up of PrEP is insufficient for a population-level impact on new HIV infections (Cremin et al., 2013).

Prior studies with BMSM have demonstrated that those who are unaware of PrEP report greater sexual risk taking for HIV, and are less likely to be linked with HIV prevention services (Cohen et al., 2015; Eaton et al., 2015). These findings suggest that messaging regarding PrEP may be missing those in greatest need. In regards to uptake of PrEP, very little is known about factors that influence its likelihood of occurrence among BMTW. Most of what is known about PrEP uptake comes from clinical research trials (Grant et al., 2010; McCormack & Dunn, 2015; Molina et al., 2015), which may or may not reflect patterns of uptake among individuals outside of these environments (Kirby & Thornber-Dunwell, 2014; Rucinski et al., 2013). One related precursor to PrEP that may offer valuable insight to PrEP uptake is post-exposure prophylaxis (PEP). PEP, like PrEP, is a form of antiretroviral HIV prevention for use after possible exposure to HIV, and has been available since the earlier days of the epidemic. The literature on PEP, however, has demonstrated limited awareness

and use overtime (A. Y. Liu et al., 2008; Mehta et al., 2011), and it would be detrimental to the advances made in HIV prevention if PrEP were to follow a similar pattern as PEP.

In order to effectively scale-up PrEP it is imperative that factors affecting its awareness and use are monitored and studied. The Health Care Access Barriers (HCAB) model posits that beneficial health outcomes, including use of disease prevention measures, are impacted by three types of modifiable barriers: cognitive, financial, and structural (Carrillo et al., 2011). HCAB provides a framework that emphasizes the importance of assessing a comprehensive set of factors related to accessing health care and disease preventative tools. In the current paper, HCAB model would suggest that PrEP awareness and use are based on multiple levels of barriers and that evaluating this information would allow for informing community-level interventions to improve PrEP awareness and use.

The focus of the current study was to better understand patterns of PrEP use and awareness among BMTW from multiple US cities. The specific study objectives were: (1) to assess the levels of awareness and use of PrEP, and (2) to examine the extent to which the following variables were related to awareness and use of PrEP: health-care factors, HIV testing history and results, psychosocial variables (internalized homophobia, resilience, others aware of sexuality, and depression), and sex behaviors. Based on prior findings and the HCAB model, awareness and use of PrEP were hypothesized to be of low frequency and increases in health care related barriers (*e.g.* lack of health care access, infrequent HIV testing) and increases in psychosocial related barriers (*e.g.* homophobia and depression, and lack of resilience and others aware of sexuality) were hypothesized to be associated with decreased PrEP awareness and use.

Methods

Sampling, Recruitment, and Enrollment

Participants were recruited from Black Gay Pride events held in five US cities (Atlanta, GA, Detroit, MI, Houston, TX, Philadelphia, PA, and Washington, DC) between April and September 2014 to complete (a) Audio Computer Assisted Interviews (ACASI) via electronic tablets and (b) in-field HIV testing. Potential participants were approached by recruitment staff as they walked through event designated areas at each of the pride's events. Recruitment staff explained to potential participants that the survey was about health related behaviors, was anonymous, would take 15–20 minutes to complete, and that they would be offered free HIV testing after survey completion. Participants were compensated \$10 for survey completion and an additional \$10 for HIV testing (see below for further details regarding HIV testing). Participants were eligible for the study if they were 18 years of age or older, identified as either male or transgender female, identified as Black or African-American, and reported ever having sex with a man. Informed consent was obtained via electronic survey assessment and was required for participation in all study procedures.

Random time-location sampling was employed in order to maximize representativeness of BMTW attending Black Gay Pride events, and data were weighted based on this sampling approach. Specifically, for each city, official pride events occurred over multiple days and time periods. Sampling frames for data collection were created to randomly select 2 hour

time and location blocks for conducting study assessments and HIV testing. At each recruitment site, intercept zones were established where individuals were counted, approached, and invited to participate in the study. The number of individuals who enrolled in the study was compared to the number of possible participants (those who entered intercept zones); this count procedure served as the basis for the data analysis weighting. In total, 14,733 individuals were counted at selected events, 3,353 were approached, and 50% (n=1,664) agreed to screening. Nearly all screened participants completed a questionnaire (n=1,655). Time location sampling weights were generated from these data for each city and included in all analyses.

All study participants were offered free and confidential HIV testing with a local community HIV/AIDS service provider. Community providers offered testing in private locations at events (*i.e.*, mobile testing vans). Participants opting out of confidential HIV testing were asked if they would provide a saliva sample for HIV testing for data collection purposes only (OraQuick ADVANCE rapid HIV-1/2 was employed for testing). All HIV test results were linked to the electronic survey via a unique study identifier. This study was approved by the [redacted for blind review] Institutional Review Board. In order to address the possibility of participants taking the survey at multiple cities and events, ACASI programming was employed to generate unique codes based on personal but non-identifying information (a specific sequence of letters and numbers from their own name, a family member's name, birthdate, and state of birth) (Hammer et al., 2003; Turner et al., 2003). Twenty-five participants completed more than one survey, and thus, for these participants, only the initial survey was retained.

Measures

Socio-demographic variables—Participants were asked their age, highest level of education (grade 8, grade 9–11, High School graduate or GED, Some College, Bachelor's degree, any post grad education), gender identity (male, transgender female), sexual orientation (gay/same gender loving, bisexual, other sexual identity, heterosexual), employment status (full time, part time, unemployed), income, and whether they were in a relationship. All measures were included in all study assessments.

Health care factors—Health care related questions regarding whether the participant had current health care coverage (*yes/no*), if they were able to afford health care (*yes/no*), if they had a place to go when sick (*yes/no*), and whether they were discriminated against when receiving medical care (*yes/no*) were included.

HIV testing results and history—Participants reported whether they had tested in the past six months (*yes/no*) and the results of their most recent test (*negative/positive/unknown*). HIV test results from in-field HIV testing were also reported.

Psychosocial factors—Internalized homophobia was measured using the Internalized Homophobia Scale (IHP, 9 items) (Meyer, 1995). An example item is, "I wish I weren't attracted to men" (Cronbach's $\alpha=.93$, all α 's are based on current data set) and responses ranged from *strongly disagree*=0 to *strongly agree*=4. Resilience was measured using the

Resilience Scale (RS-14) (Wagnild, 2009). An example item is, “I feel I can handle many things at a time” (Cronbach’s $\alpha=.96$) and responses ranged from *strongly disagree*=0 to *strongly agree*=4. Others being aware of sexuality was based on five items (Cronbach’s $\alpha=.91$). Participants were asked, “How many of your family members are aware of your sexuality/sexual orientation?”. This item was repeated for “heterosexual friends”, “co-workers”, “church members”, and “neighbors”. Responses ranged from *none of them*=0 to *all of them*=3 (Cronbach’s $\alpha=.91$). Participants were asked the Center for Epidemiologic Studies Short Depression Scale (CES-D 10) containing 10 items (Andresen, Malmgren, Carter, & Patrick, 1994) (Cronbach’s $\alpha=.70$). An example item is, “I was bothered by things that usually don’t bother me.” Items were summed in accordance with scale instructions.

Pre-exposure prophylaxis and post-exposure prophylaxis—Participants were asked the following about PrEP and PEP use: “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?”, “Are you currently taking anti-HIV medications (PrEP) to prevent HIV infection?”, “Have you ever taken anti-HIV medications (PrEP) to prevent HIV infection?”, “Do you know anyone who is taking anti-HIV medications (PrEP) to prevent HIV infection?”, “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.”, “Have you ever taken anti-HIV medications (PEP) AFTER potentially being exposed to HIV?”, “Do you know anyone who has taken anti-HIV medications AFTER potentially being exposed to HIV?” (Eaton et al., 2015; Eaton et al., 2014). Responses included a dichotomous ‘*yes/no*’.

Sex behaviors—Participants reported on the number of male anal sex partners and female sex partners (oral, vaginal, and anal sex) they had in the past year. Responses were open ended. Further, they were asked how often they used condoms during both receptive anal sex and insertive anal sex with a man. Response options ranged from *never*=0 to *always*=4. Transactional sex items including receiving money, drugs, or other goods for having sex with a man and giving money, drugs, or other goods for having sex with a man in the past 12 months were also included in the assessment. Response set for these items was a dichotomous *yes/no*.

Data Analysis

Factors such as socio-demographic characteristics, health care factors, HIV testing results and history, psychosocial factors, and sex behaviors were assessed to determine their association with being aware of PrEP and currently using PrEP. We used generalized linear modeling with a dichotomous *yes* or *no* as our outcome and, therefore, specified a binary logistic model. Both bivariate and multivariable analyses of these variables were conducted. Variables were entered into the multivariable model if they were significant ($p<.05$) in bivariate analyses (Bursac, Gauss, Williams, & Hosmer, 2008). Results are reported as adjusted odds ratios (aOR). Bivariate and multivariate analyses controlled for weighting from sampling frame. IBM SPSS Statistics version 20.0 (SPSS Inc., Chicago, IL) was used for all of the analyses.

The sample included $N=1,655$ participants. Incomplete data for variables of interest ($n=55$) and surveys from repeat participants ($n=25$, see *Sampling, Recruitment, and Enrolment* above) led to removal of $n=80$ survey assessments (4.8%). Use of PrEP and PEP was not applicable to BMTW living with HIV, and, therefore, 294 (19%) BMTW who self-reported being HIV positive were excluded. Seven participants (<1%) identified as heterosexual and not having had sex with a man in the past year, these participants were also removed. The remaining sample included a total of $N=1,274$ BMTW self-reporting HIV negative or unknown HIV status. Two primary models were conducted: (1) with PrEP awareness (*yes/no*) being the dependent variable ($N=1,274$), and (2) with currently using PrEP (*yes/no*) being the dependent variable ($N=492$). Only participants reporting awareness of PrEP were included in the currently using PrEP model, thus, resulting in the reduced sample size between models.

Results

Univariate Analyses

Average age for participants was 30.34 years ($SD=10.05$) and having ‘some college’ was most frequently reported for highest level of educational attainment ($N=483$, 38.1%) (Table 1). Fifty-one percent of the sample reported incomes <\$30,000, and 65% were employed full-time. Most participants identified as male (95.7%), gay/same gender loving (76.3%), and not currently in a relationship (73.8%).

The majority of participants reported having health care (81%), being able to afford their health care (82%), and having a place to go when sick (88%). Most participants reported HIV negative (85.3%) status. Using in-field testing procedures, 21.0% of participants declined testing, 62.7% tested HIV negative, and 16.2% tested HIV positive. Further, among individuals who tested HIV positive, 66.2% had reported being HIV negative and 43.8% had reported being HIV status unknown in the survey assessment.

On average, scores for internalized homophobia were low ($M=1.37$, $SD=1.01$), yet 58% of the sample reported experiencing at least some internalized homophobia. Scores on resilience ($M=3.41$, $SD=0.67$) were high and others being aware of sexuality ($M=1.55$, $SD=1.02$) were moderate. Twenty-two percent of the sample screened positive on the CESD indicating the need for further evaluation.

On average, participants reported 4.59 ($SD=8.78$) male sex partners and 0.60 ($SD=2.09$) female sex partners in the past year. How often condoms were used during anal sex with men varied, but on average corresponded to *about half the time to most of the time*. In regards to transactional sex, 8.2% of the sample had engaged in this behavior in the past year.

PrEP and PEP awareness and uptake across cities—Over one-third of participants were aware of PrEP (39%), a small percentage of participants were currently taking PrEP (4.6%), and one in ten participants knew someone taking PrEP (Table 2). Less than one-third of participants were aware of PEP (28%) and a small percentage of participants had ever used PEP (4.9%). Awareness and use of PrEP and PEP varied somewhat across cities:

Washington DC reported the highest PrEP and PEP awareness (43.9%/35.1%) and use (7.4%/8.1%), Detroit reported the lowest PrEP and PEP awareness (26.0%/17.8%), and Philadelphia reported the lowest PrEP and PEP use (0.5%/1.5%).

Bivariate Analyses

Socio-demographics and PrEP awareness and uptake—BMTW who were aware of PrEP were more likely to report higher levels of education (aOR=1.10, 95% CI=1.01–1.21) and currently being in a relationship (aOR=1.36, 95% CI=1.05–1.76) compared to BMTW unaware of PrEP. BMTW currently using PrEP reported lower levels of educational attainment (aOR=.48, 95% CI .39–.59) than BMTW not using PrEP (Table 3).

Health care factors and PrEP awareness and uptake—BMTW who were aware of PrEP were more likely to have health care coverage (aOR=1.52, 95% CI=1.12–2.06) than those unaware of PrEP. BMTW who were currently using PrEP were more likely to experience discrimination when receiving medical care (aOR=13.19, 95% CI=5.70–30.52) and be unable to afford health care in past year (aOR=3.10, 95% CI=1.67–5.76) (Table 3).

HIV testing and PrEP awareness and uptake—Participants who were aware of PrEP were more likely to self-report being HIV negative than HIV status unknown (aOR=.59, 95% CI=.41–.85) and to have HIV tested in the past six months (aOR=1.66, 95% CI =1.30–2.13). Participants currently taking PrEP were more likely to report an HIV unknown status (aOR=3.50, 95% CI=1.63–7.53) and to report HIV testing in the past six months (aOR=3.57, 95% CI=1.47–8.68) than BMTW not taking PrEP (Table 3).

Psychosocial factors and PrEP awareness and uptake—BMTW aware of PrEP reported lower levels of internalized homophobia (aOR=.88, 95% CI=.79–.98) and higher levels of resilience (aOR=1.21, 95% CI=1.01–1.45) and others being aware of their sexuality (aOR=1.24, 95% CI=1.11–1.40) compared with BMTW not aware of PrEP. BMTW currently using PrEP reported higher rates of internalized homophobia (aOR=2.04, 95% CI=1.57–2.67) and depression (aOR=1.11, 95% CI=1.05–1.17), and lower rates of resilience (aOR=.53, 95% CI=.36–.78) and others being aware of their sexuality (aOR=.60, 95% CI=.44–.83) compared to BMTW not currently using PrEP (Table 3).

Sex behaviors and PrEP awareness and uptake—BMTW aware of PrEP were less likely to have received goods for sex (aOR=.48, 95% CI=.26–.87) and more likely to report a higher occurrence of condom use during receptive anal sex (aOR=1.09, 95% CI=1.00–1.19). BMTW currently using PrEP were more likely to report giving (aOR=4.59, 95% CI=1.38–15.33) and receiving (aOR=4.62, 95% CI=1.43–14.94) goods for sex, female sex partners (aOR=1.24, 95% CI=1.09–1.40), and lower occurrence of condom use during receptive anal sex (aOR=.69, 95% CI=.57–.83) (Table 3).

Multivariable Analyses

Variables significantly related to PrEP awareness and uptake in the bivariate models were entered in the multivariable models (with the exception of HIV self-reported status and ever HIV tested due to multicollinearity). Multiple variables remained significant in the

multivariable models (Table 4). Being in a relationship (aOR=1.39, 95% CI=1.07–1.82), testing for HIV in the past six months (aOR=1.54, 95% CI=1.20–1.98), and having others be aware sexuality (aOR=1.18, 95% CI=1.04–1.34) were associated with being aware of PrEP. Reporting higher levels of internalized homophobia (aOR=1.48, 95% CI=1.01–2.18) and a greater number of female sex partners (aOR=1.20, 95% CI=1.03–1.41) were positively associated with PrEP uptake, though education (aOR=.55, 95% CI=.43–.71) and condom use (aOR=.72, 95% CI=.56–.93) were negatively associated with PrEP uptake.

Discussion

Findings from the current study offer insight into multiple factors related to PrEP awareness and use. The observed low levels of PrEP awareness (38.6%) and use (4.6%) are consistent with other more region-specific studies and suggest that considerable work remains if the full benefits of PrEP are to be realized (Mayer & Krakower, 2015). Study findings provide important information on the scale-up of PrEP and factors associated with awareness and use among a community-based sample of BMTW – a critically important target group for PrEP implementation efforts.

In terms of improving awareness of PrEP among BMTW it appears that individuals who are connected to HIV testing services are receiving messages about PrEP even if overall use is low. The finding that recent HIV testing remained a strong predictor of PrEP awareness in the current study underscores the importance of linking individuals to HIV testing sites. These sites serve a critical role as the frontline in the HIV treatment cascade, and can also serve as the first step in accessing effective prevention options such as PrEP. Efforts to improve PrEP outreach should be coupled with improving HIV testing outreach and pre/post HIV-test counseling should include information for accessing PrEP. Although many participants were aware of PrEP, the majority of participants were unaware of it, and PrEP unawareness was associated with a reduced likelihood of being out about one's sexual orientation. Given that others being aware of one's sexuality is related to PrEP awareness it is possible that messaging that largely targets the LGBT community may fail to reach a critical sub-group who do not have strong social ties with this network. Broader, community-wide messaging, possibly targeting geographic locations with elevated HIV incidence, is needed. Further, the messaging in media campaigns for PrEP should include diversity with regards implied sexual preferences in the content of these campaigns.

Multiple noteworthy factors related to currently using PrEP were observed. To begin, lower educational attainment was associated with PrEP use. It is unknown why less education is associated with PrEP use. It's possible that educational level is associated with information seeking about PrEP, which may be related to having concerns about physiological, emotional, and economic costs of taking a prophylactic medication (R. A. Brooks et al., 2011; Gamarel & Golub, 2015; Mutchler et al., 2015). Further, and contrary to expectations, experiencing higher levels of internalized homophobia was associated with PrEP use, as was higher number of female partners. Additional data are needed to better understand why these factors are related to PrEP use. There is evidence -in popular press reports (Burruss, 2014; Duran, 2012; Glazek, 2014)- that stigma exists around gay men taking PrEP *i.e.* that its use is associated in a negative manner with frequently engaging in sexual activities with multiple

partners. It is possible that BMTW who experience greater internalized homophobia relate less to the LGBT community and, therefore, may be less susceptible to negative messaging around PrEP use. It is also possible that BMTW who report more internalized homophobia and female partners are more concerned about HIV transmission because testing HIV positive might lead to having to discuss or disclose one's sexual identity to others. Finally, although both BMTW who were and were not currently taking PrEP reported sexual risk taking behaviors, BMTW who were taking PrEP reported a lower rate of condom use during receptive anal sex with a man. This finding suggests that PrEP is reaching those who are in need, yet further research is warranted to evaluate whether risk compensation is factor of concern in PrEP uptake.

Regarding current PrEP implementation efforts, Cáceres, (Caceres, O'Reilly, Mayer, & Baggaley, 2015) and (Auerbach & Hoppe, 2015) underscore the greater need for social sciences research to inform implementation strategies. More specifically, these works have cautioned against a singular focus on the *demonstrated efficacy* of PrEP as the driving force of scale-up, and instead, have highlighted the need for implementation efforts to include and be informed by the psychological and social realities that affect the role of PrEP (including messaging, access, and sustained care engagement) in HIV prevention. Data from the current study provides context for this approach by identifying the health care, psycho-social, and sexual risk factors associated with PrEP awareness and use.

One-in-four BMTW who reported currently taking PrEP tested HIV positive. This finding is of considerable concern (Hurt, Eron, & Cohen, 2011), however, it must be interpreted within the constraints of the current study design and it largely highlights the need to better understand how PrEP is being used outside of randomized controlled trials. Study design constraints include a reliance on self-report and, therefore, clinical data such as medical charts or lab reports were not available to confirm responses to PrEP items. Further, adherence to PrEP was not assessed, and therefore, can't be used to explain findings. Also, underground sales of antiretrovirals have been documented in the US which suggests the possibility of participants taking PrEP without medical monitoring (Kurtz, Buttram, & Surratt, 2014). Even with these limitations in mind, assessing how PrEP use unfolds outside of clinical trials is a critical component for understanding how BMTW use PrEP in naturalistic settings.

It is important to note that our findings regarding PEP demonstrated an overall lack of awareness and use. Although there are substantial limitations to comparing PrEP and PEP (*e.g.*, PEP is not a reasonable candidate for front-line prevention), there are lessons to be learned from the path and current status of PEP (Cohen, Liu, Bernstein, & Philip, 2013). Concerns about awareness, behavioral change, adherence, costs, and prescribing recommendations regarding PEP for non-occupational exposure have existed in the literature for decades (Kalichman, 1998; Katz & Gerberding, 1997; Lurie, Miller, Hecht, Chesney, & Lo, 1998; Smith et al., 2005) and, in many respects, mirror the current landscape around PrEP. Lessons learned from PEP implementation -including challenges to informing health care providers and patients of its availability and biases in prescribing medications for disease prevention related to sexual risk taking - can inform and advance our approaches to providing access to PrEP for populations in need of this prevention option.

Limitations

BMTW were surveyed at Black Gay Pride events which may or may not be representative of the larger population of BMTW. This study also used a cross-sectional survey method, precluding any inferences of causation regarding study dependent and independent variables. Sample sizes across cities varied, and therefore, may have affected results related to PrEP awareness and uptake. It's possible that with larger samples, and therefore, casting a wider sampling net, results could vary. The survey method relied on self-report of sensitive experiences and behaviors which may be prone to bias. The potential for social desirability influences were minimized by anonymous survey procedures.

Conclusions

Data from the current study underscore to need to prioritize and focus on how communities that are in urgent need of effective HIV prevention options, in fact, gain access to these options. Importantly, prior studies have demonstrated that although use of PrEP is low, interest is high (Cohen et al., 2015; A. Liu et al., 2014), and there is considerable focus on implementation science around PrEP (Dutta, 2013; Norton et al., 2013). The potential for PrEP to slow the HIV epidemic is great, however, we must strengthen efforts to ensure wide-spread availability and access.

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Table 1

Demographic, structural, HIV testing, psychosocial, and sex behavior variables among Black men and transgender women (N=1274) attending community pride events (April 2014–August 2014)

Variable	M (SD)
Demographics	
Age	30.34 (10.05)
Education Level ^a	4.02 (1.27)
	N (%)
Gender, N (%)	
Male	1219 (95.7)
Transgender Female	55 (4.3)
Sexual Identity, N (%)	
Gay/Same Gender Loving	972 (76.3)
Bisexual	250 (19.6)
Other Sexual Identity	39 (3.1)
Heterosexual	13 (1.0)
Employment Status N (%)	
Full-Time	826 (65.1)
Part-Time	158 (12.4)
Unemployed	285 (22.4)
Missing	5 (<.01)
Income, N (%)	
<\$30,000	641 (50.5)
\$30,000	628 (49.5)
Missing	5 (<.01)
In a relationship	332 (26.2)
Health Care Factors (Yes)	
Current health care coverage?	1029 (80.8)
Unable to afford medical care in past 12 months?	224 (17.6)
Have place to go when sick or need medical advice.	1116 (87.6)
Discriminated against when trying to receive medical care.	91 (7.1)
HIV Testing Results and History	
HIV Self-Report	
HIV negative	1083 (85.0)
HIV unknown	191 (15.0)
Field HIV Test Result	
Declined	268 (21.0)

Variable	M (SD)
Tested HIV Negative	799 (62.7)
Tested HIV Positive	207 (16.2)
Ever tested for HIV (Yes)	1151 (90.3)
Tested for HIV in past six months (Yes)	813 (63.9)
M (SD)	
Psychosocial Factors (range)	
Internalized Homophobia (0–4)	1.37 (1.01)
Resilience (0–4)	3.41 (.67)
Others aware of sexuality (0–3)	1.55 (1.02)
CESD (0–30)	6.55 (4.82)
N (%)	
CESD 10 or higher	283 (22)
Sex Behaviors	
N (%)	
Received items for having sex with male partner	72 (5.7)
Gave items in order to have sex with a male partner	37 (2.9)
M (SD)	
Number of female sex partners in past year	.60 (2.09)
Number of male anal sex partners in past year	4.59 (8.78)
How often condoms used during receptive anal sex in past year ^b	2.66 (1.46)
How often condoms used during insertive anal sex in past year	2.80 (1.42)

Note:

^aResponse set included: 1=grade 8, 2=grade 9–11, 3=High School graduate or GED, 4=Some College, 5=Bachelor's degree, 6=any post grad education.

^bResponse set included: *never*=0 to *always*=4.

Pre-exposure prophylaxis (PrEP) and post exposure prophylaxis (PEP) awareness and uptake in five US cities among Black men and transgender women

Table 2

Variable	Total (N=1274)		Philadelphia (N=204)		Houston (N=316)		Washington, DC (N=275)		Detroit (N=147)		Atlanta (N=332)	
	N	%	N	%	N	%	N	%	N	%	N	%
Pre-Exposure Prophylaxis (PrEP) Items												
1. Have you ever heard of PrEP (pre-exposure prophylaxis)? PrEP is when HIV-negative people take anti-HIV medications (antiretrovirals like Truvada) <u>BEFORE HAVING SEX</u> to prevent HIV infection. (Yes)	492	38.6	78	38.6	125	39.9	119	43.9	38	26.0	132	39.9
2. Are you currently taking anti-HIV medications (PrEP) to prevent HIV infection? (Yes)	59	4.6	1	0.5	19	6.1	20	7.4	3	2.1	16	4.8
3. Have you ever taken anti-HIV medications (PrEP) to prevent HIV infection? (Yes)	58	4.6	3	1.5	19	6.1	22	8.1	3	2.1	11	3.3
4. Do you know anyone who is taking anti-HIV medications (PrEP) to prevent HIV infection? (Yes)	139	10.9	18	8.9	39	12.5	43	15.9	11	7.5	28	8.5
Post-Exposure Prophylaxis (PEP) Items												
5. Have you ever heard of PEP (post-exposure prophylaxis)? PEP is when HIV-negative people take anti-HIV medications (anti-retrovirals) <u>AFTER</u> potentially being exposed to HIV in order to prevent HIV infection. (Yes)	351	27.6	49	24.4	75	24.0	95	35.1	26	17.8	106	32.1
6. Have you ever taken anti-HIV medications (PEP) <u>AFTER</u> potentially being exposed to HIV? (Yes)	62	4.9	3	1.5	20	6.4	22	8.1	3	2.1	14	4.2
7. Do you know anyone who has taken anti-HIV medications <u>AFTER</u> potentially being exposed to HIV? (Yes)	113	8.9	12	6.0	26	8.3	33	12.2	11	7.6	31	9.4

Table 3

Bivariate associations between demographic, health care factors, HIV testing, psychosocial factors, sex behavior, and PrEP awareness and uptake among Black men and transgender women

Variable	Aware of PrEP (N=1274)		AOR	Currently Using PrEP (N=492)		AOR
	No	Yes		No	Yes	
	771	492		433	59	
Demographics						
Age, M (SD)	30.6 (10.3)	29.9 (9.7)	.99 (.98–1.01)	29.7 (8.9)	31.6 (14.5)	1.03(1.00–1.06)
Education Level ^a , M (SD)	3.9 (1.2)	4.2 (1.4)	1.10 (1.01–1.21) *	4.3 (1.1)	2.8 (2.1)	.48 (.39–.59) ***
Gender, N (%)			1.39 (.78–2.48)			.81 (.18–3.67)
Male	740 (96.0)	469 (95.3)		413 (95.4)	56 (94.9)	
Transgender Female	31 (4.0)	23 (4.7)		20 (4.6)	3 (5.1)	
Sexual Identity, N (%)						
Gay/Same Gender Loving	571 (74.1)	392 (79.7)	1.10(.57–2.12)	351 (81.1)	41 (69.5)	.53(.16–1.80)
Bisexual	166 (21.5)	82 (16.7)	1.39(1.04–1.87)	68 (15.7)	14 (23.7)	.74(.40–1.38)
Other Sexual Identity	24 (3.1)	15 (3.0)	2.29(.63–8.37)	12 (2.8)	3 (5.1)	.53(.07–4.12)
Heterosexual (ref)	10 (1.3)	3 (0.6)		2 (0.5)	1 (1.7)	
Employment Status N (%)						
Full-Time	491 (63.7)	331 (67.3)	1.22(.92–1.61)	292 (67.4)	39 (66.1)	1.03(.54–1.97)
Part-Time	98 (12.7)	60 (12.2)	1.10(.78–1.56)	53 (12.2)	7 (11.9)	1.07(.47–2.45)
Unemployed (ref)	182 (23.6)	101 (20.5)		88 (20.3)	13 (22.0)	
Income, N (%)						
<\$30,000	408 (52.9)	229 (46.5)	1.16 (.92–1.48)	196 (45.3)	33 (55.9)	.57 (.32–1.02)
\$30,000	363 (47.1)	263 (53.5)		237 (54.7)	26 (44.1)	
In a relationship (Yes)	183 (23.7)	146 (29.7)	1.36 (1.05–1.76) *	123 (28.4)	23 (39.0)	1.53 (.85–2.75)
Health Care Factors						
	N (%)	N (%)		N (%)	N (%)	

Variable	Aware of PrEP (N=1274)		AOR	Currently Using PrEP (N=492)		AOR
	No	Yes		No	Yes	
Current health care coverage? (Yes)	604 (78.3)	415 (84.5)	1.52 (1.12–2.06)**	365 (84.5)	50 (84.7)	1.15 (.51–2.58)
Unable to afford medical care in past 12 months? (Yes)	130 (17.6)	92 (19.2)	1.16 (.86–1.57)	70 (16.7)	22 (37.9)	3.10 (1.67–5.76)***
Have place to go when sick or need medical advice (Yes)	668 (86.6)	437 (88.8)	1.12 (.74–1.69)	380 (87.6)	57 (96.6)	5.77 (.77–43.44)
Discriminated against when trying to receive medical care (Yes)	52 (6.7)	39 (7.9)	.84 (.53–1.33)	21 (4.9)	18 (30.5)	13.19 (5.70–30.52)***
HIV Testing Results and History						
HIV Self-Report	N (%)	N (%)		N (%)	N (%)	
HIV negative	634 (82.4)	441 (89.6)		395 (91.2)	46 (78.0)	
HIV unknown	135 (17.6)	51 (10.4)	.59 (.41–.85)**	38 (8.8)	13 (22.0)	3.50 (1.63–7.53)**
Field HIV Test Result						
Declined	146 (18.9)	114 (23.2)	1.10 (.83–1.48)	103 (23.8)	11 (18.6)	.79 (.37–1.69)
Tested HIV Negative	491 (63.7)	305 (62.0)	.91 (.66–1.27)	269 (62.1)	36 (75.0)	1.59 (.75–3.36)
Tested HIV Positive (ref)	134 (17.4)	73 (14.8)		61 (14.1)	12 (25.0)	
Tested for HIV in past six months (Yes)	457 (59.3)	351 (71.5)	1.66 (1.30–2.13)***	298 (69.0)	53 (89.8)	3.57 (1.47–8.68)**
Psychosocial Factors						
	M (SD)	M (SD)		M (SD)	M (SD)	
Internalized Homophobia	1.43 (1.09)	1.26 (1.09)	.88 (.79–.98)*	1.15 (1.01)	2.09 (1.27)	2.04 (1.57–2.67)***
Resilience	3.37 (.68)	3.46 (.65)	1.21 (1.01–1.45)*	3.49 (.61)	3.22 (.86)	.53 (.36–.78)**
Depression	6.76 (4.83)	6.21 (4.77)	.98 (.96–1.01)	5.98 (4.65)	7.90 (5.36)	1.11 (1.05–1.17)***
Others Aware Sexuality	1.47 (1.03)	1.67 (.97)	1.24 (1.11–1.40)***	1.73 (.96)	1.25 (1.03)	.60 (.44–.83)**
Sex Behaviors						
Received goods for having sex with male partner (Yes)	57 (7.4)	15 (3.0)	.48 (.26–.87)*	10 (2.3)	5 (8.5)	4.62 (1.43–14.94)*
Gave goods in order to have sex with a male partner (Yes)	21 (2.7)	16 (3.3)	1.08 (.54–2.14)	11 (2.5)	5 (8.5)	4.59 (1.38–15.33)*
Number of female sex partners in past year	.65 (2.22)	.53 (1.86)	.99 (.93–1.05)	0.39 (1.32)	1.57 (3.91)	1.24 (1.09–1.40)**
Number of male anal sex partners in past year	4.53 (9.18)	4.73 (8.23)	1.00 (.99–1.02)	4.62 (8.53)	5.51 (5.55)	1.02 (.99–1.05)
How often condoms used during receptive anal sex in past year ^b	2.58 (1.48)	2.81 (1.40)	1.09 (1.00–1.19)*	3.32 (1.18)	2.56 (1.58)	.69 (.57–.83)***

Variable	Aware of PrEP (N=1274)		Currently Using PrEP (N=492)		AOR
	No	Yes	No	Yes	
How often condoms used during insertive anal sex in past year	2.71 (1.48)	2.92 (1.35)	3.27 (1.22)	3.02 (1.31)	.85 (.69–1.06)

Note:

*** $p < .001$,

** $p < .01$,

* $p < .05$.

Odds ratios include adjustment for sampling weights and city.

^a Response set included: 1=grade 8, 2=grade 9–11, 3=High School graduate or GED, 4=Some College, 5=Bachelor's degree, 6=any post grad education.

^b Response set included: *never*=0 to *always*=4.

Table 4

Multivariable model estimates of variables associated with PrEP awareness and uptake among Black men and transgender women attending community pride events (April 2014–August 2014)

Variable	Aware of PrEP	Currently Using PrEP
	AOR (95%)	AOR (95%)
Demographics		
Education	1.06 (0.96–1.17)	.55 (.43–.71) ***
In a relationship	1.39 (1.07–1.82) *	n/a
Current health insurance	1.37 (.99–1.89)	n/a
Health Care Factors		
Unable to afford medical care	n/a	.81 (.32–2.06)
Have place to go when sick or need medical advice	n/a	4.50 (.55–36.75)
Discriminated against when trying to receive medical care	n/a	1.51 (.43–5.35)
HIV Testing Results and History		
Tested for HIV in past six months	1.54 (1.20–1.98)**	3.04 (1.04–8.87) *
Psychosocial Factors		
Internalized homophobia	0.97 (0.86–1.10)	1.48 (1.01–2.18) *
Resilience	1.07 (0.89–1.28)	.77 (.46–1.27)
Depression	n/a	1.06 (.98–1.14)
Others aware of sexuality	1.18 (1.04–1.34) *	.89 (.59–1.34)
Sex Behaviors		
Number of female sex partners in past year	n/a	1.20 (1.03–1.41) *
How often condoms used during receptive anal sex in past year	1.09 (.99–1.19)	.72 (.56–.93) *
Receive goods for sex with male partner	0.57 (0.31–1.06)	1.09 (.22–5.43)
Gave goods in order to have sex with a male partner	n/a	3.92 (.73–21.09)

Note:

 $p < .001$,

*
 $p < .05$.

Odds ratios include adjustment for sampling weights and city. In order to include all participants in the multivariable model, participants reporting no anal sex were coded as 4 for the how often condoms were used variable. Variables listed as “N/A” were removed from model due to non-significance in bivariate analyses.