



# Facilitators and Barriers to Pre-Exposure Prophylaxis (PrEP) Use Among Black Individuals in the United States: Results from the National Survey on HIV in the Black Community (NSHBC)

Bisola O. Ojikutu<sup>1,4</sup> · Laura M. Bogart<sup>2</sup> · Molly Higgins-Biddle<sup>3</sup> · Sannisha K. Dale<sup>4,5</sup> · Wanda Allen<sup>6</sup> · Tiffany Dominique<sup>7</sup> · Kenneth H. Mayer<sup>8</sup>

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## Abstract

This study explores willingness to use PrEP among Black individuals in the US. From February to April 2016, an online survey was administered to a nationally representative sample of Black individuals. 855 individuals who were HIV negative by self-report participated [mean age: 33.6 (SD 9.2); 45.5% male]. Among all respondents, 14.5% were aware of, and 26.0% would be willing to use PrEP. Among high-risk individuals (N = 327), 19.8% knew about and 35.1% would be willing to use PrEP. The most common reason for lack of willingness among high-risk individuals was low self-perceived risk (65.1%). In multivariate analysis, individuals reporting single marital status [OR 1.8 (1.2, 2.5),  $p = 0.002$ ], depressive symptoms [OR 1.6 (1.2, 2.2),  $p = 0.0054$ ], arrest history [OR 1.7(1.2, 2.4),  $p = 0.0003$ ], PrEP knowledge [OR 1.5 (1.0, 2.3),  $p = 0.0247$ ] and belief in HIV conspiracies [OR 1.3 (1.1, 1.5),  $p = 0.0075$ ] were more willing to use PrEP. Participants who saw a health care provider less frequently were less willing to use PrEP [OR 0.5 (0.4, 0.8),  $p = 0.0044$ ]. Among a nationally representative sample of Black individuals, few high risk individuals were willing to use PrEP. Interventions to increase risk awareness, PrEP knowledge and access to care are necessary to improve PrEP uptake.

**Keywords** HIV · Black individuals in the US · Pre-exposure prophylaxis · HIV risk behavior

## Introduction

In 2016, 45% of estimated new HIV diagnoses in the United States were among Black individuals, who comprise only 12% of the population [1]. Pre-exposure prophylaxis (PrEP) is a highly effective means of preventing HIV infection by taking one pill once daily (tenofovir/emtricitabine). PrEP

is recommended for use by at risk individuals including men who have sex with men (MSM), high risk heterosexual individuals (e.g. history of inconsistent condom use, HIV-positive partner(s), transactional sex), and individuals who engage in injection drug use [2–4]. According to the Centers for Disease Control and Prevention, approximately 1.2 million individuals are at substantial risk for HIV acquisition and should be offered PrEP, including 492,000 MSM, 624,000 heterosexual men and women, and 115,000 individuals who inject drugs [5]. Available data from pharmacies that prescribe tenofovir/emtricitabine for PrEP (excluding Medicaid prescriptions) suggest that about 10% of those who could benefit have initiated PrEP, and that Black individuals, in particular, are not accessing this biomedical intervention [6].

The reasons for suboptimal utilization of PrEP among Black individuals are unclear. There is a growing, but incomplete, body of data exploring barriers to uptake, particularly among MSM and women [7–10]. Data exploring racial and ethnic disparities in the uptake of other primary (e.g., immunizations) and secondary prevention interventions

✉ Bisola O. Ojikutu  
bojikutu@partners.org

<sup>1</sup> Brigham and Women's Hospital, Boston, 75 Francis Street, MA 02115, USA

<sup>2</sup> RAND Corporation, Santa Monica, CA, USA

<sup>3</sup> JSI Research and Training Institute, Boston, MA, USA

<sup>4</sup> Massachusetts General Hospital, Boston, MA, USA

<sup>5</sup> University of Miami, Coral Gables, USA

<sup>6</sup> Harvard University, Boston, MA, USA

<sup>7</sup> University of Pennsylvania, Philadelphia, PA, USA

<sup>8</sup> The Fenway Institute, Boston, MA, USA

(e.g., breast, colon and cervical cancer screening) suggest that multifaceted barriers may exist [11–14]. These include financial barriers (poverty and uninsurance or underinsurance), lack of awareness, low risk perception, competing life priorities, and structural barriers (e.g. racism and discrimination and incarceration) among others [15–17]. Knowledge of and access to PrEP may differ by gender because Black women report more frequent visits with health care providers than Black men [18]. In addition, historical and ongoing oppression and racism have led to mistrust of the US government, the health care system, health care providers, and HIV conspiracy beliefs within the Black community. These factors have been identified as barriers to HIV prevention and treatment [19–21]. Furthermore, PrEP is unique among primary prevention strategies in that ongoing daily use is currently recommended. Therefore, greater challenges to initiation and ongoing adherence may apply.

PrEP is also unique because it is only indicated for use by a subgroup of individuals who are at substantial risk for HIV infection. Among Black individuals, this includes MSM who have a lifetime risk of HIV infection of one in 2, select women who have a lifetime risk of HIV that is nearly 20 times higher than White women, and individuals who use injection drugs [22]. The CDC has further risk-stratified individuals and recommends PrEP for anyone with HIV-positive sexual partner(s), recent bacterial sexually transmitted infection (STI), a high number of sex partners, a history of inconsistent or no condom use, and/or a history of transactional sex. This risk stratification does not include most Black individuals, and engagement in these activities may be highly stigmatized [23, 24]. Therefore, high risk individuals are often hidden within the larger community and not readily identified [25, 26]. Thus, determining knowledge and willingness to use PrEP within the Black community as a whole is important to target those at highest risk.

In order to reduce the number of new HIV diagnoses, the National AIDS Strategy for the United States: updated to 2020 calls for increased access to effective prevention services, including PrEP [27]. To meet this goal among Black individuals, additional data are needed to develop appropriate strategies to overcome access barriers. This study explores knowledge and barriers to willingness to use PrEP among a nationally representative sample of Black individuals.

## Methodology

The National Survey on HIV in the Black Community (NSHBC) was a cross-sectional survey of Black individuals administered in 2016 to individuals between the ages of 18 and 50 living in households throughout the US. The sample was drawn from a probability-based web panel that

is representative of adults living within households. Most panel members were recruited through address-based sampling (90.6%) relying upon mailing addresses from the US Postal Delivery Sequence File (DSF) in recognition of the decrease in landlines within homes. A small number of panel members (9.4%) were recruited through random digit dialing (when a landline was available). Census block groups with high density minority communities are oversampled. Randomly selected addresses from the DSF were invited to join the panel through a series of mailings and telephone calls. After accepting the invitation, members completed a demographic survey to allow for sampling and weighting. Other studies have used similar panel recruitment strategies [28–33]. All surveys were completed via email. Households without internet service were provided with access and a computer, if needed [34].

## Ethics Approval

This study was approved by the Boston Children's Hospital Institutional Review Board where the second author was previously employed. Informed consent was obtained from all participants prior to survey administration.

## Data Collection

Sample panel members received an e-mail request to participate in the survey on February 12, 2016. Email reminders to non-responders were sent on days 3, 6, 10, 16, 25, 35 of the field period. Data collection was completed on April 17, 2016. A \$5 online gift card was offered for survey completion.

## Survey Development

To develop the survey, cognitive interviews were conducted with a convenience sample of 30 self-identified Black individuals ages 18–50 in the Boston area to evaluate potential sources of response bias. Mean age was 39.1 (SD ± 7). Approximately 36% reported their highest level of education was high school. Same sex behavior (MSM) was reported by 4 (13.3%) of participants. Participants were recruited from local community based organizations, via flyers and word-of-mouth. Interviews were conducted at community based settings in Boston. Cognitive interviews assessed question comprehension, recallability of information, respondent motivation, cultural applicability and the potential impact of social desirability bias in regards to sensitive questions. Think aloud interviewing and verbal probing were used to identify problematic questions. Interviews were audio-taped and transcribed. The final survey comprised of questions and scales edited based on these findings was piloted via email

using a sample of panel participants. Their feedback was used to adjust survey format.

### Sociodemographic and Behavioral Risk

Sociodemographic and behavioral risk information collected included gender, age, income, education, employment, marital status, mental health (depressive symptoms) [35], access to health care (insurance status and last appointment with a health care provider), alcohol use, HIV risk-related history (sexual behavior in the 3 months prior to the survey and drug use—powder or crack cocaine, heroin, or crystal methamphetamine), and history of HIV testing. High risk individuals were identified as those who had more than one sexual partner in the last 3 months; or more than one sexual partner and no condom use in the last 3 months; or more than one sexual partner, anal sex and no condom use in the last 3 months; and/or were diagnosed with an STI (gonorrhea, Chlamydia, herpes, syphilis, Trichomonas, genital warts, human papilloma virus or HPV) in their lifetime; and/or reported male–male sexual behavior; and/or reported that they were transgender (M–F); and/or reported drug use in the last 30 days; or any history of transactional sexual behavior.

### Trust in Health Care and Government

Trust in health care provider and health care quality were assessed by asking “how much do you trust your doctor or clinic to offer you high quality medical care?” and “how would you rate the quality of medical care that you have received from your regular doctor or healthcare provider in the past 12 months?” [36] Based on a scale that has been utilized previously [18, 19, 37], we selected 4 items that explore HIV conspiracy beliefs and mistrust in the US government around HIV-related issues: (1) “There is a cure for HIV but the government is withholding it from the poor.” (2) “The medicine that doctors prescribe to treat HIV is poison.” (3) The government usually tells the truth about major health issues, like HIV/AIDS; and (4) “HIV is a man-made virus.” Responses were re-coded so that a higher score (1–5) indicated a higher level of mistrust (Cronbach alpha 0.79).

### Racism and Discrimination

To assess participants’ experiences with racism and discrimination in the last 12 months we included 5 items from a previously developed scale [38]. These items were (1) Have you been treated unfairly by people in service jobs (by store clerks, waiters, bartenders, bank tellers, and others) because you are Black?; (2) Have you been treated unfairly by strangers because you are Black?; (3) Have you been treated unfairly by police officers or security guards because

you are Black?; (4) Have you wanted to tell someone off for being racist but didn’t say anything?; and (5) Have you felt really angry about something racist that was done to you? The scale was reliable (Cronbach alpha 0.81).

### Knowledge and Willingness to Use PrEP

Knowledge about PrEP was assessed by asking participants to indicate whether the following statement which was constructed by the research team and tested during cognitive interviews was true or false: “There is a pill (drug/medication) that you can get from your doctor that can be taken daily to prevent transmission of HIV from an infected (HIV positive) sex partner to an uninfected (HIV negative) sex partner.” Willingness to use PrEP was assessed in all respondents by asking them to agree or disagree with the following statement, “If a pill (drug/medication) that could prevent transmission of HIV from an infected (HIV positive) sex partner to an uninfected (HIV negative) partner were available I would take it.” If they responded “No”, then they were asked “Why would you NOT want to take the pill?” Reasons for lack of willingness were provided: (1) I’m not at risk of HIV infection; (2) I would not want to pay for it; (3) I would be afraid that someone would find out that I was taking it; (4) I’m afraid of potential side effects; (6) I don’t like taking pills daily; (7) I don’t believe it would actually work. Respondents were allowed to indicate all reasons that applied to their response.

### Response Rate

A screening questionnaire to confirm Black race and age was emailed to 1969 individuals of whom 970 (49.3%) completed the questions. Of those, 896 (92.4%) were eligible to complete the survey. Complete responses were obtained from 868 (96.9%) of those surveyed. Data were weighted to adjust for non-response so that those who completed the survey were matched the age, sex, and other characteristics of the total population 18–50, as estimated from the most recent Current Population Survey conducted by the US Bureau of the Census.

### Statistical Analysis

Tests of differences in the distribution of respondent characteristics by HIV risk category (high risk versus lower risk) were conducted. Bivariate methods were used to examine the relationships of individual independent variables with the primary outcome of willingness to use PrEP. The multivariate logistic regression models included independent variables that were significant in the bivariate models defined as  $p < 0.05$  and/or were potential confounders of the relationship between the independent variables and dependent

variable, based on evidence from prior research. We assessed correlations between independent variables before modeling to rule out collinearity. If two independent variables were highly correlated, only one was included in the multivariate model. The multivariate regression analyses produced adjusted odds ratios and 95% CIs, controlling for all other independent variables included in the model. The discrimination ability of the logistic models was measured by c-statistics with calibration assessed using Hosmer–Lemeshow Chi square statistics and their associated p-values. We tested for interactions between gender and health care access and trust variables in these models. An alpha of 0.05 was employed in all statistical tests. All statistical analyses were performed using SAS for Windows version 9.4.

## Results

### Participant Characteristics

A total of 868 participants completed the survey. Of those, 13(1.5%) reported that they were HIV positive. These participants were removed from further analysis. Of the remaining 855, 91.1% identified solely as Black/African American. Females comprised 54.5% of the sample. On average, respondents were 33.6 years old (SD 9.2). Similar to the distribution of Black individuals across the US, most respondents (54.1%) resided in the South at the time of survey administration [39]. Non-US born individuals (immigrants) comprised 11.3% of the sample. Almost half of the participants (43.7%) reported depressive symptoms at least several days in the past 30 days prior to survey administration. More than one-quarter (26.7%) had ever been arrested. Among all participants, 72.4% reported undergoing HIV testing in their lifetime, while 27.6% reported HIV testing within the last year. The frequency of lifetime HIV testing was similar to findings reported from other nationally representative surveys [40] (Table 1).

### Health Care Access, Conspiracy Beliefs and Discrimination

Among all respondents, 84.0% of participants reported that they trusted their doctor mostly or completely to offer them high quality care. More than half (59.4%) rated the quality of health care that they had received as very good or excellent, and 17.1% were uninsured. Nearly one-quarter (23.3%) had not seen a health care provider in 12 months. No differences were noted in trust, perception of quality, insurance status or duration of time since last health care visit by gender. Overall, belief in conspiracy theories was high (56.9% scored high: mean 3.1, SD 1.0). More than half (53.2%) of

participants reported high levels of racism and discrimination (mean 1.3, SD 0.3) (Table 1).

### HIV Risk

Three-hundred and twenty-seven participants ( $n = 327$ ) were identified as high risk based upon stratification criteria. Among all participants, 10.7% reported more than one sexual partner, and 5.6% reported more than one sexual partner and no condom use in the 3 months prior to survey administration. Few (4.0%) participants reported more than one sexual partner, engagement in anal sex and no condom use during this time frame. Lifetime STI diagnoses was reported by 28.0%; only 2.6% reported having had an STI in the prior 3 months. Same sex behavior was reported by 3.5% of male participants, and no participants identified as transgender. Drug use in the last 30 days was reported by 2.6%. Transactional sex was reported by 13.4% of participants. (Table 2).

### PrEP Knowledge and Willingness to Use PrEP

Among all survey participants, 14.5% were aware of PrEP. Knowledge of PrEP was higher among high risk than lower risk participants (19.8 vs. 11.4%,  $p < 0.0001$ ). Among all survey participants, 26.0% were willing to use PrEP. Among high risk participants, willingness to use PrEP was higher than among lower risk (35.1 vs. 20.5%,  $p = 0.0002$ ). More than half (51.6%) of MSM were aware of PrEP, and 42.0% were willing to use the medication. The most common reason for lack of willingness to use PrEP was low risk perception [lower risk (76.8%), high risk (65.1%), MSM (87.8%)]. Not believing that it works was cited by approximately one-third of all participants (28.3%), and 28.7% of high risk participants. Fear of potential side effects was cited by 18.3% of all participants, and 25.9% of high risk participants. Not liking to take pills every day selected as a reason for unwillingness by 15.4% of all participants and 10.2% of those who were high risk. Few participants reported that their reasons for lack of willingness were not wanting to pay for it or fear that someone would find out that they were taking PrEP (Figs. 1, 2).

### Total Participants: Models for Willingness to Use PrEP

Among all participants, in bivariate analysis, individuals with a household income  $< \$25,000$  per year [OR 1.5 (1.1, 2.1),  $p = 0.0152$ ], who reported single, widowed, divorced or separated marital status [OR 1.8 (1.3, 2.6),  $p = 0.0003$ ], noted any days with depressive symptoms [OR 1.8 (1.2, 2.4),  $p = 0.0004$ ], reported a history of arrest [OR 1.8 (1.3, 2.5),  $p = 0.0009$ ], were previously aware of PrEP [OR 1.5 (1.0, 2.3),  $p = 0.0503$ ] and who

**Table 1** Socio-demographic characteristics of national survey participants (total, high risk, and MSM)

|                                      | Total<br>(N = 855)<br>N <sup>a</sup> (%) | High risk total<br>(n = 327)<br>N <sup>a</sup> (%) | MSM<br>(n = 35)<br>N <sup>a</sup> (%) | p-value <sup>b</sup> |
|--------------------------------------|--|--|---------------------------------------|----------------------|
| <b>Gender</b>                        |  |  |                                       |                      |
| Female                               | 515 (54.5%)                              | 204 (58.7%)  | 0 (0%)                                | NS                   |
| Male                                 | 340 (45.5%)                              | 123 (41.3%)  | 35 (100%)                             |                      |
| Transgender                          | 0 (0%)                                   | 0 (0%)   | 0 (0%)                                |                      |
| <b>Race</b>                          |  |  |                                       |                      |
| Black/African-American               | 694 (91.1%)                              | 265 (91.5%)  | 24 (88.9%)                            | NS                   |
| Two or more races                    | 118 (4.7%)                               | 45 (4.3%)  | 7 (8.5%)                              |                      |
| <b>Ethnicity</b>                     |  |  |                                       |                      |
| Latino                               | 43 (4.2%)                                | 17 (4.2%)  | *                                     | NS                   |
| Mean age (SD)                        | 33.6 (9.2)                               | 34.9 (8.7)   | 34.1 (6.8)                            | 0.0013               |
| <b>Region of Origin</b>              |  |  |                                       |                      |
| Northeast                            | 149 (18.2%)                              | 54 (18.3%)   | 5 (3.5%)                              | NS                   |
| Midwest                              | 172 (17.1%)                              | 70 (19.2%)   | 5 (17.6%)                             |                      |
| South                                | 433 (54.1%)                              | 158 (50.5%)  | 16 (59.6%)                            |                      |
| West                                 | 101 (10.6%)                              | 45 (12.1%)   | 9 (19.4%)                             |                      |
| <b>Metropolitan Statistical Area</b> |  |  |                                       |                      |
| Metro                                | 793 (91.2%)                              | 309 (92.1%)  | 34 (92.9%)                            | NS                   |
| Non-metro                            | 62 (8.8%)                                | 18 (7.9%)  | *                                     |                      |
| <b>Marital status</b>                |  |  |                                       |                      |
| Single                               | 533 (61.6%)                              | 196 (58.7%)  | 25 (65.9%)                            | NS                   |
| Married and cohabiting w/partner     | 322 (38.4%)                              | 131 (41.3%)  | 10 (34.1%)                            |                      |
| <b>Education</b>                     |  |  |                                       |                      |
| Less than high school                | 58 (11.0%)                               | 23 (11.0%)   | *                                     | NS                   |
| High school diploma or GED           | 175 (32.7%)                              | 66 (30.5%)   | 5 (22.0%)                             |                      |
| Some college, college degree or more | 622 (56.3%)                              | 238 (58.6%)  | 29 (68.7%)                            |                      |
| Unemployed                           | 245 (28.4%)                              | 88 (25.0%)   | 10 (22.0%)                            | NS                   |
| <b>Household income</b>              |  |  |                                       |                      |
| < \$25,000                           | 314 (24.9%)                              | 115 (22.8%)  | 19 (38.6%)                            | NS                   |
| ≥ \$25,000 to < \$50,000             | 208 (26.9%)                              | 89 (28.4%)   | *                                     |                      |
| ≥ \$50,000                           | 333 (48.2%)                              | 123 (48.8%)  | 12 (54.4%)                            |                      |
| Non-US born                          | 100 (11.3%)                              | 25 (7.9%)  | *                                     | 0.0144               |
| Resided in US ≤ 10 yrs               | 20 (18.2%)                               | 9 (33.8%)  | 0 (0%)                                | 0.0176               |
| Resided in US > 10 yrs               | 80 (81.8%)                               | 16 (66.2%)   | *                                     |                      |
| Immigration status (US citizen)      | 74 (73.8%)                               | 20 (77.8%)   | *                                     | NS                   |
| <b>Language</b>                      |  |  |                                       |                      |
| Other than English                   | 160 (17.7%)                              | 67 (19.3%)   | 7 (20.7%)                             | NS                   |
| Spanish                              | 33 (18.1%)                               | 17 (23.9%)   | *                                     | NS                   |
| <b>Depressive symptoms</b>           |  |  |                                       |                      |
| Nearly every day                     | 37 (3.5%)                                | 21 (5.0%)  | *                                     | < 0.0001             |
| More than half the days              | 53 (5.8%)                                | 20 (7.4%)  | *                                     |                      |
| Several days                         | 300 (34.4%)                              | 152 (45.4%)  | 15 (40.1%)                            |                      |
| Not at all                           | 461 (56.3%)                              | 134 (42.3%)  | 15 (36.6%)                            |                      |
| Ever arrested                        | 226 (26.7%)                              | 134 (40.8%)  | 15 (32.1%)                            | < 0.0001             |
| Alcohol use                          | 85 (11.4%)                               | 57 (21.2%)   | 8 (26.5%)                             | < 0.0001             |
| Drug use                             | 27 (2.6%)                                | 27 (6.8%)  | *                                     | < 0.0001             |
| <b>HIV testing</b>                   |  |  |                                       |                      |
| HIV testing, lifetime                | 614 (72.4%)                              | 290 (91.7%)  | 28 (76.7%)                            | < 0.0001             |
| HIV testing, last 12 months          | 248 (27.6%)                              | 127 (37.0%)  | 16 (43.2%)                            | < 0.0001             |



**Table 1** (continued)

|   | Total<br>(N = 855)<br>N <sup>a</sup> (%) | High risk total<br>(n = 327)<br>N <sup>a</sup> (%) | MSM<br>(n = 35)<br>N <sup>a</sup> (%) | p-value <sup>b</sup> |
|---|--|--|---------------------------------------|----------------------|
| Health care access and trust                            |  |  |                                       |                      |
| Trust doctor, completely or mostly                      | 677 (84.0%)                              | 257 (82.3%)  | 31 (83.1%)                            | NS                   |
| Quality of health care received, excellent or very good | 413 (59.4%)                              | 159 (56.1%)  | 15 (38.1%)                            | NS                   |
| No health insurance                                     | 119 (17.1%)                              | 37 (13.4%)   | *                                     | 0.0309               |
| Not seen a doctor/health care provider within last year | 180 (23.3%)                              | 64 (21.0%)   | 8 (32.8%)                             | NS                   |
| HIV conspiracy beliefs                                  |  |  |                                       |                      |
| Mean scale (SD)   | 3.1 (1.0)                                | 3.2 (1.0)  | 3.2 (1.1)                             | NS                   |
| Racism and discrimination                               |  |  |                                       |                      |
| Mean scale (SD)   | 1.3 (0.3)                                | 1.3 (0.3)  | 1.3 (0.3)                             | NS                   |

NS not significant

<sup>a</sup>Counts are unweighted. Percentages are weighted

<sup>b</sup>Differences between higher HIV risk and lower HIV risk significant at 0.05

\*Suppressed (count < 5)

**Table 2** HIV risk stratification

| HIV risk behavior <sup>a</sup>                                       | Total<br>N <sup>b</sup> (%) |
|--|-----------------------------|
| More than one sexual partner (last 3 months)                         | 80 (10.7)                   |
| More than one sexual partner and no condom use (last 3 months)       | 41 (5.6)                    |
| More than one partner and anal sex and no condom use (last 3 months) | 28 (4.0)                    |
| History of STI (lifetime)  | 211 (28.0)                  |
| Men who have sex with men  | 35 (3.5)                    |
| Transgender (M–F or F–M)   | 0 (0)                       |
| Drug use (last 30 days)  | 27 (2.6)                    |
| Any transactional sex  | 113 (13.4)                  |

<sup>a</sup>Risk behavior categories are not mutually exclusive

<sup>b</sup>Counts are unweighted. Percentages are weighted

had high scores on the HIV conspiracy beliefs scale [OR 1.3 (1.1, 1.5),  $p = 0.0016$ ] were more likely to be willing to use PrEP. Participants who had not seen a health care provider in more than one year were significantly less likely to be willing to use PrEP [OR 0.7 95% CI (0.4, 0.9),  $p = 0.0178$ ]. In multivariate analysis, single marital status [OR 1.8 (1.2, 2.5),  $p = 0.0020$ ], depressive symptoms [OR 1.6 (1.2, 2.2),  $p = 0.0054$ ], arrest history [OR 1.7 (1.2, 2.4),  $p = 0.0033$ ], PrEP knowledge [OR 1.5 (1.0, 2.3),  $p = 0.0247$ ] and belief in HIV conspiracies [OR 1.3 (1.1, 1.5),  $p = 0.0075$ ] remained significant. Participants who last saw a health care provider more than 1 year ago remained significantly less likely to be willing to use PrEP [OR 0.5 (0.4, 0.8),  $p = 0.0044$ ] (Table 3).

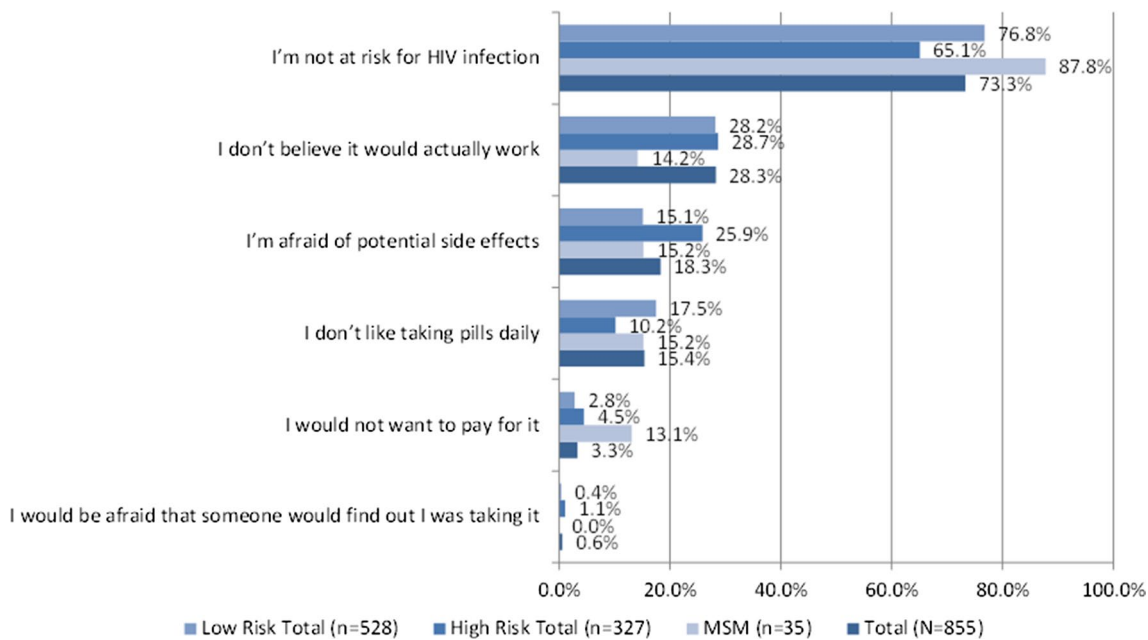
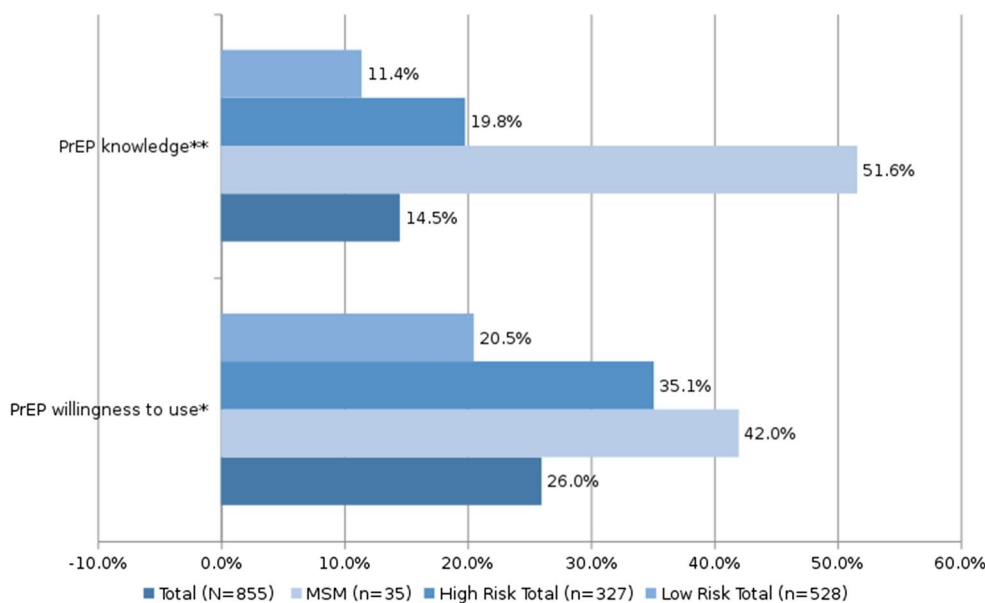
### High Risk Participants: Models for Willingness to Use PrEP

Separate models were created for high risk participants. Of note, because only 35 male participants reported same sex behavior these participants were included among the high risk group for all regression models. Among high risk participants, in bivariate analysis, single, widowed, divorced or separated marital status [OR 1.7 (1.1, 2.8),  $p = 0.0237$ ] and PrEP knowledge [OR 1.9 (1.1, 3.2),  $p = 0.0318$ ] were the only two factors associated with willingness to use PrEP. In multivariate analysis both factors, single widowed, divorced or separated marital status [OR 1.8 (1.1, 2.9),  $p = 0.0208$ ] and PrEP knowledge [OR 1.8 (1.0, 3.2),  $p = 0.0427$ ], remained significant. We explored the HIV conspiracy belief scale items separately and noted that agreement with “there is a cure for HIV but the government is withholding it from the poor” was significantly associated with willingness to use PrEP in bivariate analysis [OR 1.6 (1.0, 2.5),  $p = 0.0444$ ]. However, when we controlled for other significant factors in multivariate analysis (marital status and PrEP knowledge), this conspiracy belief was no longer significant (Table 3).

### Conclusions

PrEP is an effective biomedical primary prevention intervention that is currently underutilized by Black individuals who are disproportionately affected by HIV [6]. This study found that even though tenofovir-emtricitabine was approved as PrEP by the US Federal Drug Administration in 2012, knowledge of its existence is low—approximately 20%—among high risk individuals in a nationally representative

**Fig. 1** PrEP knowledge and willingness to use



**Fig. 2** Reasons for lack of willingness to use PrEP

sample of Black individuals. The high risk population expressed limited willingness to use PrEP (also approximately 35%). Among the small group of male participants who engaged in same-sex sexual behavior, knowledge and willingness to use PrEP was higher than other participants, but was still suboptimal. As noted in other studies, knowledge of PrEP was found to be a key facilitator of acceptability [41, 42]. The vast majority of respondents, including high risk individuals, identified low risk perception as the reason for lack of willingness to use PrEP. These data suggest that

significant work needs to be undertaken to increase knowledge of PrEP and improve awareness of HIV risk among Black individuals in the US.

Numerous studies have noted discordance between self-perceived and objective estimates of HIV risk-taking behavior [43–48]. Incongruent HIV risk assessment has served as a barrier to acceptance of HIV testing in similar studies of Black individuals [49, 50]. In this study, amongst the high risk individuals, the most frequent reasons for not being willing to use PrEP was low self-perceived risk of HIV infection.

**Table 3** Bivariate and multivariate models for willingness to use PrEP among overall and high risk participants

| Factor   | Bivariate for overall group |                |                | MVA for overall (n = 832) |         |     | Bivariate for high risk group |                |                | MVA for high risk (n = 324) |     |                |                |
|--|-----------------------------|----------------|----------------|---------------------------|---------|-----|-------------------------------|----------------|----------------|-----------------------------|-----|----------------|----------------|
|  | N                           | OR (95% CI)    | p value        | AOR (95% CI)              | p-value | N   | OR (95% CI)                   | p-value        | AOR (95% CI)   | p-value                     | N   | OR (95% CI)    | p-value        |
|  | Male (ref: female)          | 845            | 0.9 (0.7, 1.2) | 0.5233                    | -       | -   | 326                           | 1.4 (0.9, 2.2) | 0.1929         | -                           | -   | 326            | 1.4 (0.9, 2.2) |
| Age 25 to 34 (ref: all other ages)                                       | 845                         | 1.1 (0.8, 1.5) | 0.6489         | -                         | -       | 326 | 0.9 (0.6, 1.5)                | 0.6883         | -              | -                           | 326 | 0.9 (0.6, 1.5) | 0.6883         |
| Unemployed (ref: employed)   | 845                         | 1.4 (1.0, 2.0) | 0.0405         | -                         | -       | 326 | 1.5 (0.9, 2.5)                | 0.1204         | -              | -                           | 326 | 1.5 (0.9, 2.5) | 0.1204         |
| Income < 25 K (ref: ≥ 25 K)  | 845                         | 1.5 (1.1, 2.1) | 0.0152         | 1.3 (0.9, 1.9)            | 0.1798  | 326 | 1.3 (0.7, 2.2)                | 0.3895         | -              | -                           | 326 | 1.3 (0.7, 2.2) | 0.3895         |
| Single, widowed, divorced, separated (ref: married or cohabiting)        | 845                         | 1.8 (1.3, 2.6) | 0.0003         | 1.8 (1.2, 2.5)            | 0.0020  | 326 | 1.7 (1.1, 2.8)                | 0.0237         | 1.8 (1.1, 2.9) | 0.0208                      | 326 | 1.7 (1.1, 2.8) | 0.0237         |
| Any days with depression in past 30 (ref: none)                          | 844                         | 1.8 (1.2, 2.4) | 0.0004         | 1.6 (1.1, 2.2)            | 0.0054  | 326 | 1.2 (0.7, 1.9)                | 0.4474         | -              | -                           | 326 | 1.2 (0.7, 1.9) | 0.4474         |
| Ever arrested (ref: no)  | 840                         | 1.8 (1.3, 2.5) | 0.0009         | 1.7 (1.2, 2.4)            | 0.0033  | 325 | 1.5 (0.9, 2.4)                | 0.0833         | -              | -                           | 325 | 1.5 (0.9, 2.4) | 0.0833         |
| Trust doctor completely or mostly (ref: a little, not at all)            | 793                         | 0.9 (0.6, 1.3) | 0.5536         | -                         | -       | 311 | 0.8 (0.5, 1.5)                | 0.5558         | -              | -                           | 311 | 0.8 (0.5, 1.5) | 0.5558         |
| Quality of care received excellent or very good (ref: poor or fair)      | 684                         | 1.0 (0.6, 1.7) | 0.9018         | -                         | -       | 268 | 1.1 (0.5, 2.2)                | 0.8413         | -              | -                           | 268 | 1.1 (0.5, 2.2) | 0.8413         |
| Last seen doctor more than 1 year ago or never (ref: 1 year ago or less) | 843                         | 0.7 (0.4, 0.9) | 0.0178         | 0.5 (0.4, 0.8)            | 0.0044  | 326 | 0.7 (0.4, 1.2)                | 0.2130         | -              | -                           | 326 | 0.7 (0.4, 1.2) | 0.2130         |
| Uninsured (ref: no)  | 779                         | 1.0 (0.6, 1.5) | 0.8823         | -                         | -       | 306 | 1.2 (0.6, 2.4)                | 0.5995         | -              | -                           | 306 | 1.2 (0.6, 2.4) | 0.5995         |
| PrEP knowledge (ref: no)   | 843                         | 1.5 (1.0, 2.3) | 0.0503         | 1.5 (1.0, 2.3)            | 0.0247  | 324 | 1.9 (1.1, 3.2)                | 0.0318         | 1.8 (1.0, 3.2) | 0.0427                      | 324 | 1.9 (1.1, 3.2) | 0.0318         |
| HIV conspiracy beliefs scale   | 841                         | 1.3 (1.1, 1.5) | 0.0016         | 1.3 (1.1, 1.5)            | 0.0075  | 326 | 1.2 (1.0, 1.5)                | 0.1371         | -              | -                           | 326 | 1.2 (1.0, 1.5) | 0.1371         |
| Racism scale   | 844                         | 1.5 (0.9, 2.3) | 0.0988         | -                         | -       | 326 | 1.2 (0.6, 2.4)                | 0.6550         | -              | -                           | 326 | 1.2 (0.6, 2.4) | 0.6550         |

The outcome (willingness to use PrEP) was modeled as yes versus maybe/no



Uptake of any HIV prevention strategy hinges on the desire to engage in self-protective behavior which is directly related to one's risk perception. Therefore, individuals who do not perceive themselves to be at risk for HIV infection will never seek out or be willing to use PrEP even if offered. Many factors, including denial, lack of HIV knowledge and awareness, self-esteem, cultural beliefs and religiosity, have been associated with low self-perceived HIV risk [51–53]. In regards to PrEP willingness, similar factors that contribute to low self-perceived risk may apply. However, PrEP is unique among HIV prevention strategies because it is a biomedical intervention that must be offered and prescribed by a health care provider. Health care providers must objectively assess HIV risk by obtaining drug use and sexual histories in every patient and educate patients about their risk and the availability of PrEP in order to overcome this barrier.

Because of the need for prescription, access to health care providers is essential to increasing PrEP use. Historically, access to health care has been lower among Black versus White individuals. Compared to White individuals, Black individuals are more likely to delay or go without health care and are less likely to have a usual source of care [54]. In this study, among all participants, those who last saw a health care provider more than 1 year ago were significantly less likely to be willing to use PrEP. This finding is likely related to lower PrEP knowledge in this group. We did not note this same finding among high risk individuals. However, other studies have identified the need for improved health care access as a barrier to PrEP uptake among high risk individuals [55, 56]. Unfortunately, these issues are longstanding, and it is unlikely that disparities in health care access will be overcome in the near term. Demonstration projects evaluating alternative strategies to increase demand and accelerate uptake of PrEP that utilize novel approaches such as pharmacy access and online purchasing are underway [57, 58]. Also, California recently enacted statewide legislation to ensure that high risk individuals who test negative for HIV are informed about PrEP during post-test counseling [59]. If successful, these approaches will hopefully be rolled out to the broader community.

In this study we explored the impact of barriers to prevention interventions that have previously been noted among Black individuals, such as insurance status, mistrust of bureaucratic systems, including the US government, the health care system and health care providers, and HIV conspiracy beliefs on willingness to use PrEP. The percentage of uninsured individuals in this cohort was less than estimates from other nationally representative studies (17.1 vs. 26%), and insurance status was not related to PrEP willingness for the high risk or the total survey respondents [60]. Overall trust in the quality of care received was high, and mistrust was not found to be related to willingness to use PrEP. Interestingly, belief in HIV conspiracies increased the

likelihood of willingness to use PrEP for the overall survey population and was not associated with willingness for the high risk population. This is contrary to our hypothesis that these beliefs would serve as barriers to PrEP use. Additional research should be undertaken to explore these relationships with willingness to use PrEP, particularly among high risk individuals.

Several other factors were associated with increased willingness to use PrEP. Among all participants and those identified as high risk, single marital status (including widowed, divorced and separated individuals) was independently associated with willingness to use PrEP. It is likely that these participants have a higher likelihood of engagement in risk behavior. Among all participants, arrest history and depressive symptoms were found to be associated with willingness to use PrEP. In regards to arrest history, studies have noted a higher prevalence of recent HIV testing among women who reported a history of incarceration [61]. Rates of incarceration in the US are highest among Black individuals in the US as a byproduct of racism, discrimination and the failed “War on Drugs” [62, 63]. Though mass incarceration of Black individuals has had a catastrophic impact on the Black community and must be addressed, correctional institutions may serve as an optimal time to offer PrEP to high risk individuals. In regards to depression, previous studies have noted increased rates of HIV testing among individuals with mental illness, including depression [64, 65]. This is believed to be due to increased engagement in high risk behaviors prompting individuals to seek out testing. However, we did not note this finding among higher risk participants.

This study has several limitations that warrant mention. This survey was administered to a nationally representative sample of Black/African-American individuals. However, our sample size was modest. Responses from all respondents which included 338 (40%) who were high risk and likely eligible for PrEP were reported. We believe that responses from all members of this nationally representative sample are important in understanding willingness to use PrEP among the highest risk individuals. However, based on reported risk behavior, most of the sample would not be eligible for PrEP. Because of our survey methodology we were not able to include homeless, transiently housed or institutionalized individuals. To reduce response fatigue and cover many domains we utilized very brief instruments to measure key concepts. In order to gain additional understanding of these complex issues we would need to obtain a larger sample size and use more detailed instruments. This survey was self-administered and may include social desirability and recall bias. This issue was minimized by anonymous administration via email. However, our findings regarding HIV risk-taking behavior are likely conservative estimates. We attempted to minimize recall bias by asking participants to recall sexual intercourse within the past 3 months prior to

survey administration. In addition, our sample only includes a small number of men who reported same sex behavior who are at highest risk of HIV infection within the Black community. However, other studies have collected data regarding PrEP knowledge and barriers to use among Black MSM [66, 67].

In sum, numerous facilitators and barriers to PrEP awareness and uptake exist among Black individuals in the US. This paper adds to the current body of knowledge by exploring the role of known barriers to the uptake of prevention strategies to the case of PrEP among a nationally representative sample of Black individuals. Understanding these barriers and capitalizing on the facilitators noted are necessary to increase access to this biomedical intervention. Future research should explore methods to overcome low self-perceived risk, to better understand the role of HIV conspiracy theories and mistrust of government in the uptake of PrEP, and increase awareness of PrEP as a highly effective HIV prevention intervention.

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## Compliance with Ethical Standards

**Conflict of interest** None of the authors report conflict of interest.

**Ethical Approval** All procedures performed in this study were in accordance with the ethical standards of the institution and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants in this study.

## References

- Centers for Disease Control and Prevention. HIV among African Americans. 2016. <https://www.cdc.gov/hiv/group/raciaethnic/africanamericans/>. Accessed 3 May 2017.
- Grant RM, Lama JR, Anderson PL, et al. iPrEx study team. Pre-exposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*. 2010;363(27):2587–99.
- Thigpen MC, Kebaabetswe PM, Paxton LA. TDF2 Study Group. Antiretroviral preexposure prophylaxis for heterosexual HIV transmission in Botswana. *N Engl J Med*. 2012;367(5):423–34.
- United States Public Health Service. Preexposure prophylaxis for the prevention of HIV infection in the United States—2014 clinical practice guideline. <https://www.cdc.gov/hiv/pdf/prepguidelines2014.pdf>. Accessed 3 May 2017.
- Smith DK, Van Handel M, Wolitski RJ, et al. Vital Signs: estimated percentages and numbers of adults with indications for pre-exposure prophylaxis to prevent HIV acquisition—United States, 2015. *MMWR Morb Mortal Wkly Rep*. 2015;64(46):1291–5.
- Rawlings K et al. (McCallister S presenting). FTC/TDF (Truvada) for HIV pre-exposure prophylaxis (PrEP) utilization in the United States: 2013–2015. 21st International AIDS Conference, Durban, Abstract TUAX0105LB, 2016.
- Wingood GM, Dunkle K, Camp C, et al. Racial differences and correlates of potential adoption of preexposure prophylaxis: results of a national survey. *J Acquir Immune Defic Syndr*. 2013;1(63 Suppl 1):S95–101.
- Cahill S, Taylor SW, Elsesser SA, Mena L, Hickson D, Mayer KH. Stigma, medical mistrust, and perceived racism may affect PrEP awareness and uptake in black compared to white gay and bisexual men in Jackson, Mississippi and Boston, Massachusetts. *AIDS Care*. 2017;29(11):1351–8.
- Lelutiu-Weinberger C, Golub SA. Enhancing PrEP access for Black and Latino men who have sex with men. *J Acquir Immune Defic Syndr*. 2016;73(5):547–55.
- Rolle CP, Rosenberg ES, Luisi N, et al. Willingness to use pre-exposure prophylaxis among Black and White men who have sex with men in Atlanta, Georgia. *Int J STD AIDS*. 2017;28(9):849–57.
- Lu PJ, O'Halloran A, Williams WW, Lindley MC, Farrall S, Bridges CB. Racial and ethnic disparities in vaccination coverage among adult populations in the U.S. *Am J Prev Med*. 2015;49(6 Suppl 4):S412–25.
- Swan J, Breen N, Coates RJ, Rimer BK, Lee NC. Progress in cancer screening practices in the United States: results from the 2000 National Health Interview Survey. *Cancer*. 2003;97:1528–40.
- Pigone M, Rich M, Teutsch SM, et al. Screening for colorectal cancer in adults at average risk: a summary of the evidence for U.S. Preventive Services Task Force. *Ann Intern Med*. 2002;137:132–41.
- Brown DR, Wilson RM, Boothe MA, Harris CE. Cervical cancer screening among ethnically diverse black women: knowledge, attitudes, beliefs, and practices. *J Natl Med Assoc*. 2011;103(8):719–28.
- Klassen AC, Smith KC, Shariff-Marco S, et al. A healthy mistrust: how worldview relates to attitudes about breast cancer screening in a cross-sectional survey of low income women. *Int J Equity Health*. 2008;31(7):5.
- Peters RM, Aroian KJ, Flack JM. African American culture and hypertension prevention. *West J Nurs Res*. 2006;28(7):831–54 **discussion 855–63**.
- Mohan ARM, Thomson P, Leslie SJ, Dimova E, Haw S, McKay JA. A systematic review of interventions to improve health factors or behaviors of the cardiovascular health of prisoners during incarceration. *J Cardiovasc Nurs*. 2017;33:72–81.
- Manuel JI. Racial/ethnic and gender disparities in health care use and access. *Health Serv Res*. 2017. <https://doi.org/10.1111/1475-6773.12705>.
- Bogart LM, Galvan FH, Wagner GJ, Klein DJ. Longitudinal association of HIV conspiracy beliefs with sexual risk among black males living with HIV. *AIDS Behav*. 2011;15(6):1180–6.
- Bogart LM, Wagner G, Galvan FH, Banks D. Conspiracy beliefs about HIV are related to antiretroviral treatment nonadherence among African American men with HIV. *J Acquir Immune Defic Syndr*. 2010;53(5):648–55.
- Freeman R, Gwadz MV, Silverman E, et al. Critical race theory as a tool for understanding poor engagement along the HIV care

- continuum among African American/Black and Hispanic persons living with HIV in the United States: a qualitative exploration. *Int J Equity Health*. 2017;16(1):54.
22. Hess K, Hu X, Lansky A, Mermin J, Hall IH. Estimating the Lifetime Risk of a Diagnosis of HIV Infection in the United States. Conference on Retroviruses and Opportunistic Infections (CROI), February 22–25, Boston, MA. Abstract 52.
  23. Arnold EA, Rebhook GM, Kegeles SM. ‘Triply cursed’: racism, homophobia and HIV-related stigma are barriers to regular HIV testing, treatment adherence and disclosure among young Black gay men. *Cult Health Sex*. 2014;16(6):710–22.
  24. Bourgois P, Martinez A, Kral A, Edlin BR, Schonberg J, Ciccarone D. Reinterpreting ethnic patterns among white and African American men who inject heroin: a social science of medicine approach. *PLoS Med*. 2006;3(10):e452.
  25. Icard LD. Reaching African-American men on the down low: sampling hidden populations: implications for HIV prevention. *J Homosex*. 2008;55(3):437–49.
  26. Hodder SL, Justman J, Haley DF, et al. HIV prevention trials network domestic prevention in Women Working Group. Challenges of a hidden epidemic: HIV prevention among women in the United States. *J Acquir Immune Defic Syndr*. 2010;55(Suppl 2):S69–73.
  27. The White House. The National AIDS Strategy for the United States: Updated to 2020. <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update.pdf>. Accessed 10 May 2017.
  28. Allen JD, Othus MK, Shelton RC, et al. Parental decision making about the HPV vaccine. *Cancer Epidemiol Biomark Prev*. 2010;19(9):2187–98.
  29. Baker L, Wagner TH, Singer S, Bundorf MK. Use of the internet and email for health care information: results from a national survey. *JAMA*. 2003;289(18):2400–6.
  30. Borkin JR, Rothwell E, Anderson R, et al. Public attitudes regarding the use of residual newborn specimens for research. *Pediatrics*. 2012;129(2):231–8.
  31. Davis MM, Fant K. Coverage of vaccines in private health plans: what does the public prefer? *Health Aff*. 2005;24(3):770–9.
  32. Bobo LD, Dawson MC, Johnson D. Enduring two-ness: through the eyes of Black America. *Public Perspect*. 2001;12(3):12–6.
  33. Bobo LD, Johnson D. A taste for punishment: Black and White Americans’ views on the death penalty and the war on drugs. *Du Bois Review*. 2005;52:151–80.
  34. Knowledge Networks. <http://www.knowledgenetworks.com/ganp/index.htm>. Accessed 30 May 2017.
  35. Whooley MA, Avins AL, Miranda J, Browner WS. Case-finding instruments for depression. Two questions are as good as many. *J Gen Intern Med*. 1997;12(7):439–45.
  36. RAND Corporation. HIV Cost and Services Utilization Survey (HCSUS). <https://www.rand.org/content/dam/rand/www/external/health/projects/hcsus/Follow2/g09c.pdf>. Accessed 31 May 2017.
  37. Bogart LM, Thorburn S. Are HIV/AIDS conspiracy beliefs a barrier to HIV prevention among African Americans? *J Acquir Immune Defic Syndr*. 2005;38(2):213–8.
  38. Landrine H, Klonoff EA. The schedule of racist events: a measure of racial discrimination and a study of its negative physical and mental health consequences. *J Black Psychol*. 1996;22:144–68.
  39. United States Census. [https://www.census.gov/newsroom/releases/archives/2010\\_census/cb11-cn185.html](https://www.census.gov/newsroom/releases/archives/2010_census/cb11-cn185.html). Accessed 11 November 2017.
  40. Kaiser Family Foundation. HIV Testing in the United States. <https://www.kff.org/hiv/aids/fact-sheet/hiv-testing-in-the-united-states/#footnote-156232-45>. Accessed 15 November 2017.
  41. Miming MJ, Case P, Johnson CV, Safren SA, Mayer KH. Pre-exposure antiretroviral prophylaxis (PrEP) attitudes in high risk Boston area MSM: limited knowledge and experience, but potential for increased utilization after education. *J Acquir Immune Defic Syndr*. 2009;50(1):77.
  42. Auerbach JD, Kinsky S, Brown G, Charles V. Knowledge, attitudes, and likelihood of pre-exposure prophylaxis (PrEP) use among US women at risk of acquiring HIV. *AIDS Patient Care STDs*. 2015;29(2):102–10.
  43. Mayer KH, Ducharme R, Zaller ND, et al. Unprotected sex, underestimated risk, undiagnosed HIV and sexually transmitted diseases among men who have sex with men accessing testing services in a New England bathhouse. *J Acquir Immune Defic Syndr*. 2012;59(2):194–8.
  44. Stephenson R, White D, Darbes L, Hoff C, Sullivan P. HIV testing behaviors and perceptions of risk of HIV infection among MSM with main partners. *AIDS Behav*. 2015;19(3):553–60.
  45. Pringle K, Merchant RC, Clark MA. Is self-perceived HIV risk congruent with reported HIV risk among traditionally lower HIV risk and prevalence adult emergency department patients? Implications for HIV testing. *AIDS Patient Care STDs*. 2013;27(10):573–84.
  46. MacKellar DA, Valleroy LA, Secura GM, et al. Perceptions of lifetime risk and actual risk for acquiring HIV among young men who have sex with men. *AIDS Behav*. 2007;11:263–70.
  47. Prata N, Morris L, Mazive E, Vahidnia F, Stehr M. Relationship between HIV risk perception and condom use: Evidence from a population-based survey in Mozambique. *Int Fam Plan Perspect*. 2006;32:192–200.
  48. Nunn A, Zaller N, Cornwall A, et al. Low perceived risk and high HIV prevalence among a predominantly African American population participating in Philadelphia’s Rapid HIV testing program. *AIDS Patient Care STDs*. 2011;25:229–35.
  49. Magnus M, Kuo I, Phillips G 2nd, et al. Elevated HIV prevalence despite lower rates of sexual risk behaviors among black men in the District of Columbia who have sex with men. *AIDS Patient Care STDs*. 2010;24:615–22.
  50. Gerrard M, Gibbons FX, Bushman BJ. Relation between perceived vulnerability to HIV and precautionary sexual behavior. *Psychol Bull*. 1996;119:390–409.
  51. Theall K. Perceived susceptibility to HIV among women: Differences according to age. *Res Aging*. 2003;25:405–32.
  52. Brown E. Theoretical antecedents to HIV risk perception. *J Am Psychiatr Nurses Assoc*. 2000;6:177–82.
  53. Weisman CS, Nathanson CA, Ensminger M, Teitelbaum MA, Robinson JC, Plichta S. AIDS knowledge, perceived risk and prevention among adolescent clients of a family planning clinic. *Fam Plann Perspect*. 1989;21:213–7.
  54. Kaiser Family Foundation. Key Facts on Health and Health Care by Race and Ethnicity. (Washington, DC: Kaiser Family Foundation. June 2016). <http://files.kff.org/attachment/Chart-pack-Key-Facts-on-Health-and-Health-Care-by-Race-and-Ethnicity>. Accessed 6 June 2017.
  55. Underhill K, Morrow KM, Collieran CM, et al. Access to healthcare, HIV/STI testing, and preferred pre-exposure prophylaxis providers among men who have sex with men and men who engage in street-based sex work in the US. *PLoS ONE*. 2014;9(11):e112425.
  56. Hubach RD, Currin JM, Sanders CA, et al. Barriers to access and adoption of pre-exposure prophylaxis for the prevention of HIV among men who have sex with men (MSM) in a relatively rural state. *AIDS Educ Prev*. 2017;29(4):315–29.
  57. Pre-Exposure Prophylaxis Access at Kelly Cross Pharmacy. <https://www.kelley-ross.com/hiv-pre-exposure-prophylaxis-prep-at-kelley-ross-pharmacy/>. Accessed 16 June 2017.
  58. Buy PrEP Now. <http://prepster.info/buying-prep-online/>. Accessed 16 June 2017.
  59. Anderson- Minshall J. California Governor Signs Landmark PrEP Education Bill. <https://www.hivplusmag.com/prevention>

- [/2016/9/28/california-governor-signs-landmark-prep-education-bill](#). Accessed 28 June 2017.
60. The Kaiser Commission on Medicaid and the Uninsured. “The uninsured: a primer. Key facts about Americans without health insurance.” October 2012. <http://www.kff.org/uninsured/issue-brief/the-uninsured-a-primer/>. Accessed 16 June 2017.
  61. Wise A, Finlayson T, Nerlander L, Sionean C, Paz-Bailey P, NHBS Study Group. Incarceration, sexual risk-related behaviors, and HIV infection among women at increased risk of HIV Infection, 20 United States cities. *J Acquir Immune Defic Syndr*. 2017;75:S261–7.
  62. Bureau of Justice Statistics. Prisons in 2015. <https://www.bjs.gov/content/pub/pdf/p15.pdf>. Accessed 7 June 2017.
  63. Politifact. How the War on Drugs affected incarceration rates. <http://www.politifact.com/truth-o-meter/statements/2016/jul/10/cory-booker/how-war-drugs-affected-incarceration-rates/>. Accessed 16 June 2017.
  64. Yehia BR, Cui W, Thompson WW, et al. HIV testing among adults with mental illness in the United States. *AIDS Pt Care STDs*. 2014;28(12):628–34.
  65. Kagee A, Saal W, Bantjes J. Distress, depression and anxiety among persons seeking HIV testing. *AIDS Care*. 2017;29(3):280–4.
  66. Eaton LA, Driffin DD, Bauermeister J, Smith H, Conway-Washington C. Minimal awareness and stalled uptake of Pre-Exposure Prophylaxis (PrEP) among at risk, HIV-Negative, Black men who have sex with men. *AIDS Patient Care STDS*. 2015;29(8):423–9.
  67. Eaton LA, Driffin DD, Smith H, Conway-Washington C, White D, Cherry C. Psychosocial factors related to willingness to use pre-exposure prophylaxis for HIV prevention among Black men who have sex with men attending a community event. *Sex Health*. 2014;11:244–51.