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HIV pre-exposure prophylaxis initiation at a large community clinic: differences between eligibility, awareness, and uptake

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Abstract

Objectives: To characterize uptake of HIV pre-exposure prophylaxis (PrEP) in a community setting, and to identify disparities in PrEP use by demographic and behavioral factors associated with increased HIV risk.

Methods: A cross-sectional study of 19,587 men who have sex with men and transgender people visiting a Los Angeles clinic specializing in LGBT (lesbian, gay, bisexual, transgender) care between August 2015 and February 2018 was conducted using clinical care data.

Results: Seventy percent of patients met PrEP eligibility criteria, while 10% reported PrEP use. Using sex drugs, reporting both condomless anal intercourse and recent sexually transmitted infection, older age, and higher education level were associated with higher odds of PrEP use given eligibility. Latino or Asian race/ethnicity and bisexual orientation were associated with lower odds of PrEP use given eligibility. Higher odds of perceived need were associated with demographic risk factors but PrEP use was not similarly elevated.

Conclusions: Discrepancies between PrEP eligibility, perceived need, and use reveal opportunities to improve PrEP delivery in community settings.

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HUMAN PARTICIPANT PROTECTION

The study received approval from the Institutional Review Board at the University of California, Los Angeles (IRB#17–000717).

Policy implications: Efforts are needed to facilitate PrEP uptake in populations with highest HIV incidence.

INTRODUCTION

Taking HIV antiretroviral medication as pre-exposure prophylaxis (PrEP) is efficacious in preventing HIV infection.[1] Approved by the Food and Drug Administration (FDA) in 2012, oral daily tenofovir/emtricitibine (TDF/FTC) PrEP has been shown to reduce the risk of HIV acquisition by over 90% when taken at least four times per week.[2,3] Despite PrEP's efficacy, population studies suggest PrEP use in community settings is low, even among those at highest risk of HIV acquisition.[4–6]

In the United States, HIV disproportionately affects gay, bisexual, and other men who have sex with men (MSM) and transgender people – that is, individuals whose gender identity differs from the sex they were assigned at birth.[7,8] Two-thirds of the approximately 40,000 new HIV infections annually occur among MSM, with highest incidence among young Black and Latino MSM.[7,9,10] HIV prevalence among transgender women (TW) is estimated to be 22%.[11] Limited data on transgender men who have sex with men (TMSM) suggests that while HIV prevalence is currently low compared to cisgender (non-transgender) MSM, TMSM engaging in HIV risk behaviors are an understudied but sizeable portion of transgender men.[12,13] Data on HIV risk among genderqueer people – those whose gender identity differs from assigned sex at birth but is not strictly male or female – is even more limited.

The CDC estimates that approximately 25% of MSM in the U.S. may be appropriate candidates for PrEP, but studies estimate real-world uptake to be under 5%.[4–6] Among TW, the gap between eligibility and uptake appears to be even larger.[11] This analysis aimed to characterize eligibility for PrEP, perceived need for PrEP, and PrEP initiation at a community clinic serving a large, diverse population of MSM and transgender people.

The Centers for Disease Control and Prevention (CDC) recommends PrEP for people with HIV-positive sex partners; MSM with a six month history of STI or condomless anal intercourse (CAI); people with a six-month-history of injecting drugs who report sharing injection or preparation equipment; heterosexually active men and women at elevated risk of sexual acquisition (defined by recent STI, inconsistent condom use with partners of unknown HIV serostatus, or partners who inject drugs or are MSM).[3,14] Based on evidence that the CDC's PrEP indications for MSM may be too restrictive to identify new HIV infections, and a lack of guidelines specific to transgender and genderqueer people, we applied a broader criteria of sexual risk to determine PrEP eligibility based on STI in the past year and CAI in the past 90 days.[14–16]

As PrEP becomes available outside of research settings, evaluation of its uptake and effectiveness have documented differences in awareness of PrEP, eligibility for PrEP, willingness to use PrEP, and PrEP initiation related to social determinants of health, including age, race/ ethnicity, substance use.[4,17–21] Among those who are aware of PrEP, a

commonly cited barrier to initiation is self-perception as low risk for HIV infection despite having a history of STI or CAI with a partner of unknown HIV status.[17,19,20]

Non-injection substance use – including sex drugs (including stimulants, poppers, erectile dysfunction drugs (without prescription), and gamma-Hydroxybutyric acid), as well as heavy alcohol use – is associated with both increased risk of HIV acquisition and decreased adherence to HIV treatment regimens.[22–27] Use of sex drugs can impair decision-making and increase vulnerability to HIV infection by facilitating longer or more frequent sexual encounters.[23,25] Unlike condom use, effectively use of PrEP relies on planning but not necessarily in-the-moment actions, and may thus be a good option for individuals who use sex drugs. Evidence from some small studies suggest that stimulant use and alcohol use may affect PrEP initiation differently.[18,21]

Given the recent introduction of PrEP in the US, information about context of initiation and use are scanty. To contribute to the implementation science on PrEP, the objectives of this analysis were threefold: 1) identify correlates of reporting perceived need for PrEP among MSM and transgender people meeting the CDC's PrEP guidelines, 2) identify correlates of PrEP initiation among individuals who report perceived need for PrEP, and 3) determine relationship(s) between non-injection substance use and PrEP initiation. We hypothesized that significantly more individuals would be eligible than report perceived need, and significantly fewer individuals would initiate PrEP compared to those who report perceived need. We further hypothesized that among those who are eligible for PrEP, demographic markers of increased HIV risk – younger age, Black or Latino race/ethnicity – would be associated with lower odds of PrEP initiation, while behavioral indicators of increased HIV risk – sex drug use, history of both CAI and STI – would be associated with greater odds of PrEP initiation.

MATERIALS AND METHODS

The data for this study come from The Los Angeles LGBT Center, a federally qualified health center that provides free and low-cost HIV/STI testing through its Sexual Health Education Program (SHEP) at two clinics in West Hollywood and Los Angeles. When a patient undergoes HIV/STI testing, they first meet with a counselor who administers a 40-question risk assessment interview. PrEP-related questions were added to the risk assessment in August 2015. The analysis included the data collected in the medical record at the first visit of each unique client who visited SHEP between August 2015 and April 2017. Versions of a PrEP cascade, analogous to the HIV care cascade, have been proposed to identify gaps in HIV prevention.[17,28,29] A conceptual model based on the initial steps in these cascades informs this analysis (Figure 1). This model expands on the PrEP cascade by incorporating demographic and behavioral factors that may influence not only HIV risk but also perceived risk and PrEP use.

Records from patients who met the following criteria were included: 1) gender identity of cisgender man, transgender man, transgender woman, or genderqueer person; 2) gay or bisexual sexual orientation, or another sexual orientation and most recent partner was male, transgender, or genderqueer; 3) at least 18 years of age; 4) presumed HIV negative prior to

testing; 5) visited the Center during the study period. Individuals who tested HIV positive for the first time at their first visit during the study period were included because they answered PrEP questions prior to receiving HIV test results. Individuals who reported an established HIV infection, or a history of testing HIV positive, were excluded.

Age, birth sex, gender identity, sexual orientation, race/ethnicity (American Indian or Alaskan Native, Asian/Pacific Islander, Black, Latino/Hispanic, White, and other race including multiracial), and highest education level attained were reported by patients during the clinic's registration process. Other patient-level variables were collected via the counselor-administered risk assessment. Whether clients were eligible for PrEP based on sexual risk was determined based on history of STI (self-report and/or laboratory testing) in the past year and condomless anal intercourse (CAI) in the past 90 days. Patients had a PrEP indication if they reported a history of STI (gonorrhea, chlamydia, syphilis, HPV, Hepatitis B, or Hepatitis C) in the past year, had a positive test result for gonorrhea, chlamydia or syphilis in the past 365 days (HPV, HBV, and HCV testing was not routinely performed in the sexual health clinic throughout the study period), or reported CAI (insertive and/or receptive) in the past 90 days. PrEP indication was coded as CAI only, STI only, or both CAI and STI. Substance use in the past 12 months was assessed by self-report in the risk assessment.

Perceived need for PrEP and PrEP use were measured with a scale used in prior research.[30] Likert scale responses to the question "Do you believe that you are currently an appropriate candidate for PrEP?" were collapsed to create binary perceived need categories of Yes and No/Unsure. Responses to the question "Have you ever taken PrEP?" were collapsed to create categories of Current Use and Former/Never Use.

Past year reports of sex drug use were categorized as follows: stimulants (including methamphetamine and MDMA/ecstasy), poppers, GHB, and erectile dysfunction drugs (without prescription), combinations of any two, and three or more. Heavy alcohol use was defined as five or more alcoholic beverages on at least five occasions in the past 30 days.

Statistical Methods

Chi-square tests were performed to assess independence of categorical variables. Bivariate logistic regression and multiple logistic regression models were created to assess relationships between independent variables and the three outcomes related to PrEP initiation. Independent variables examined included: gender, sexual orientation, race/ethnicity, age group, education level, sex drug use, PrEP indication. Missing demographic variables were imputed from an individual's chart where available. Complete case analysis was used. Covariate-dependent missingness was investigated and significant predictors were included in the multivariable models. Year of visit was included in all models, and PrEP use was included in the perceived need model. All analyses were performed with SAS 9.4 (Cary, N.C.).

Ethics

The study received approval from the [redacted] Institutional Review Board [redacted].

RESULTS

In total, 19,587 individuals met the inclusion criteria (Table 1). The majority (n = 18,954, 97%) were cisgender MSM, while 389 (2%) were TW, and less than 1% were TMSM or genderqueer people. More than half of the study population was over 30. The study population was ethnically diverse: 42% White, 32% Latino/Hispanic, 9% Asian/Pacific Islander, and 7% Black. Approximately half of participants had a college degree or higher. Twenty-five percent of all participants (n=4,918) reported using any sex drug in the past year.

PrEP Eligibility

Seventy percent (n= 13,676) of all participants met at least one of the sexual risk criteria for PrEP eligibility (Table 1). In the bivariate and multivariable models, cisgender MSM had higher odds of PrEP eligibility than TMSM or genderqueer people (categorized together as “Other” due to small samples sizes). The proportion of TW eligible for PrEP did not significantly differ from that of cisgender men (Table 2). Individuals over 40 had lower odds of eligibility compared to those under 24. Asians had lower odds of PrEP eligibility compared to Whites, but eligibility did not otherwise differ significantly by race/ethnicity. Gay-identified individuals had highest odds of eligibility compared to bisexual-identified individuals or those with other sexual orientations. Controlling for demographic variables, heavy alcohol use and sex drug use were associated with significantly higher odds of eligibility for PrEP compared to those who reported non-heavy alcohol use, or no sex drug use, respectively.

Perceived Need

Perceived need was reported by 37% of all participants and 47% of those who met eligibility criteria. Among those who were eligible, perceived need for PrEP was significantly associated with age group, race/ethnicity, sexual orientation, education level, indication, sex drug use, and current PrEP use, but not gender or heavy alcohol use (Table 2). In the multivariable model, age group, sexual orientation, race/ethnicity, indication, and sex drug use were significantly associated with perceived need for PrEP. Individuals 40 and older had lower odds of perceived need compared to younger individuals. Black (AOR = 1.3; 95%CI 1.1, 1.5) and Latino (AOR = 1.1; 95% CI 1.0, 1.2) individuals had significantly higher odds of perceived need than White individuals. Bisexual individuals and those with another sexual orientation had significantly lower odds of reporting perceived need compared to gay individuals. More individuals with a history of both STI and CAI reported perceived need for PrEP, compared to individuals who had STI only (AOR=0.5 95% CI 0.4, 0.6) or CAI only (AOR = 0.8; 95% CI 0.7, 0.9). Eighty-two percent of those who reported perceived need also met eligibility criteria.

PrEP Use

Ten percent (n=1,906) of individuals reported current PrEP use. PrEP use was reported by 13% of individuals who met PrEP eligibility criteria, and 24% of those who reported perceived need. Of those who were eligible and reported perceived need (n=5,842), 26% reported current PrEP use. Ninety-one percent of those who reported current PrEP use met

PrEP eligibility criteria. Of PrEP users who answered the question on perceived need, 96% reported perceived need, while 2% reported they were unsure if they needed PrEP and 2% reported they were not a good candidate for PrEP. Among those who were eligible, PrEP use was associated with gender, age group, race/ethnicity and sexual orientation, education level, indication, and sex drug use but not heavy alcohol use. In the multivariable model, PrEP use was associated with gender, age group, race/ethnicity, sexual orientation, education level, indication, sex drug use, and heavy alcohol use (Table 2). Older individuals had higher odds of PrEP use compared to those under 24. Asian (AOR = 0.6; 95% CI 0.5, 0.7) or Latino (AOR = 0.6; 95% CI 0.5, 0.7) race/ethnicity was associated with lower odds of PrEP use compared to White ethnicity. Bisexual individuals and those with another sexual orientation had significantly lower odds of PrEP use compared to gay individuals. Individuals with a college degree or higher had 1.6 times the odds of PrEP use (95% CI 1.4, 1.8) compared to those with less than a college degree. Most patterns of sex drug use, except for stimulants only, were associated with higher odds of PrEP use in the adjusted model. Heavy alcohol use was associated with significantly lower odds of PrEP use (AOR = 0.7; 95% CI 0.6, 0.9).

Among those eligible but not using PrEP, race/ethnicity was a significant predictor of perceived need. Of the 11,813 individuals who met the criteria but were not currently taking PrEP, 39% reported perceived need. Both Black and Latino race/ethnicity were associated with higher odds of perceived need in bivariate associations, compared to White race/ethnicity. In the multivariable model, Black individuals not on PrEP had significantly higher odds of reporting perceived need compared to White individuals not on PrEP (AOR 1.3; 95% CI 1.1, 1.6) (Table 3). Significantly lower odds of perceived need were associated with age 40 and over, bisexual or other sexual orientation, and single PrEP indication.

DISCUSSION

Seventy percent of individuals were eligible for PrEP based on recent STI or CAI, 37% reported perceived need for PrEP, and 10% reported they were currently using PrEP. The gaps between eligibility, need, and use reveal priorities for PrEP scale-up in community settings. By identifying how key factors – namely, age, race/ethnicity, and non-injection substance use – that contribute to these gaps, we can target interventions to specific drop-offs in the PrEP cascade and ultimately ensure those who need PrEP are able to access it. The study found PrEP use among individuals at elevated HIV risk was more common in this community based clinic population than previously reported in population-based surveys.[4,5] This may reflect the population that seek care and services at this Hollywood clinic – it is not a generalizable sample of MSM or TW but reflects those who choose to seek care in a gay identified setting that offers low cost and free care. Nevertheless, 10% is still low compared to the proportion who could benefit from PrEP. Though PrEP use was higher among those who met the sexual eligibility criteria and reported perceived need, there is an opportunity for improvement, as three quarters of this group were not using PrEP. In general, reporting more behavioral HIV risk factors was associated with greater perceived need for PrEP, and greater PrEP use. Those with a recent history of both CAI and STI were more likely to report perceived need and PrEP use, compared to those who reported only one indication. This is encouraging for maximizing HIV prevention resources allocated in Los Angeles County.

The relationship between PrEP initiation and substance use differed between sex drugs and heavy alcohol use. The finding that use of sex drugs was associated with higher odds of eligibility, perceived need, and PrEP use suggests that people who use sex drugs are aware of their increased HIV risk and willing to use PrEP. Still, the substantial gap between those who report perceived need and those who use PrEP may point to opportunities to increase PrEP services. Early longitudinal data suggests that stimulant users who do start PrEP may have decreased adherence compared to non-users.[31] While concerns about non-adherence should not discourage providing PrEP to individuals who use sex drugs, this suggests that additional adherence support will be important to PrEP's success for people who use stimulants. Conversely, heavy alcohol use was associated with lower odds of PrEP use, after controlling for demographics and sex drug use. These results may suggest a need for PrEP programs to adopt various strategies to engage people who use non-injection substances and recognize that alcohol is a substance associated with HIV risk.

Demographic correlates of perceived need versus PrEP use among eligible individuals highlighted disparities that could affect PrEP's effectiveness at a community-wide level. While Latino individuals had significantly higher odds of reporting perceived need compared to Whites, PrEP use was significantly lower. Blacks had significantly higher odds of reporting perceived need but similar odds of PrEP use compared to Whites. These are especially important finding because of the higher HIV incidence rates in Black and Latino communities.[32] Asians and Pacific Islanders had similar odds of perceived need compared to Whites but significantly lower odds of PrEP use. Though Asians account for a low percentage of HIV diagnoses in the United States, HIV incidence in Asians has been increasing.[32] Finally, Blacks and Latinos who met PrEP eligibility criteria but were not taking PrEP were more likely to report perceived need compared to Whites. The substantial gap between MSM and transgender people of color who view themselves as PrEP candidates and those who initiate PrEP suggests that PrEP is an acceptable intervention, but specific efforts to increase uptake of PrEP services are key to reducing HIV incidence. Younger age was associated with increased odds of perceived need and decreased odds of PrEP use. Like racial/ethnic disparities, this age disparity highlights an opportunity to improve access to PrEP for people who may, due to overlapping social determinants of health, face additional barriers to PrEP initiation, such as lack of insurance, or inconsistent access to a primary healthcare provider.

Compared to gay-identified individuals, PrEP-eligible bisexual individuals and those with another sexual orientation had lower odds of perceived need and PrEP use. Future studies evaluating PrEP initiation should collect more detailed information on how partnerships and exposures may differ by sexual orientation. Without this additional context, it is difficult to determine whether lower PrEP need and use among non-gay identified individuals represents a need for broader intervention.

Strengths

The study had several key strengths, including a large, ethnically diverse sample from a community clinic and does not represent a research study population that were incentivized to either adopt PrEP or participate in the study. To our knowledge, this is among the first

PrEP analyses to include TMSM and genderqueer individuals. Though the analysis was underpowered to investigate demographic and behavioral correlates of PrEP initiation in transgender and genderqueer people, the differences in proportions of PrEP use in these groups compared to cisgender men point to the need for PrEP guidelines and programs for transgender and genderqueer people. Another strength was the ability to investigate substance use and PrEP initiation in a large sample and confirm findings from smaller studies that found associations between stimulant use and PrEP use.

Limitations

This analysis had several limitations. Since the sample was a convenience sample based on clinic attendance, findings may not be generalizable to individuals who do not access sexual healthcare or would not attend an LGBT-focused clinic. Differences in the time periods between the proxies and CDC criteria likely classified some individuals' PrEP eligibility differently than a strict application of the guidelines would, since the window we used was 90 days for CAI and 365 for STIs. Additionally, answers to the CAI and STI questions may be subject to under-reporting, and STI test results were available only for participants who tested at the Center in the year prior to their study period visit. Finally, clinical nuance is lost in relying on the quantitative questions to assess PrEP eligibility. Based on these factors together, it is unclear whether the proxy would over-identify or under-identify individuals eligible for PrEP. PrEP use was assessed via self-report collected via a face to face interview, which may be subject to over-reporting due to social desirability bias. Some patients may have under-reported PrEP use due to stigma, but we expect this to be minimal in an LGBT-focused clinic that provides PrEP services. Some relevant substance use data were not available – including frequency of use, measures of dependence, and use of substances not included in the risk assessment (notably, cocaine). Furthermore, the 12-month timeframe for substance use report may misclassify those who used in the past year but not recently (e.g., 10 months ago versus past month). Ever use and recent use may influence PrEP initiation differently in ways the design could not measure. Finally, because the study was cross-sectional, temporality of substance use and PrEP use could not be established. By including only an individual's first visit, we could not distinguish between individuals who initiated PrEP by a later visit and those who never initiated PrEP during the study period.

PUBLIC HEALTH IMPLICATIONS

By examining PrEP initiation in a community setting, this study identifies opportunities to improve PrEP delivery in non-research settings. Disparities in PrEP use among young MSM and transgender people of color suggest that while PrEP uptake is increasing generally, the same may not yet be true for populations with highest HIV incidence. Because PrEP is acceptable to those who use sex drugs, interventions providing PrEP services, including retention and adherence support, targeting these individuals have the potential to reduce HIV transmission.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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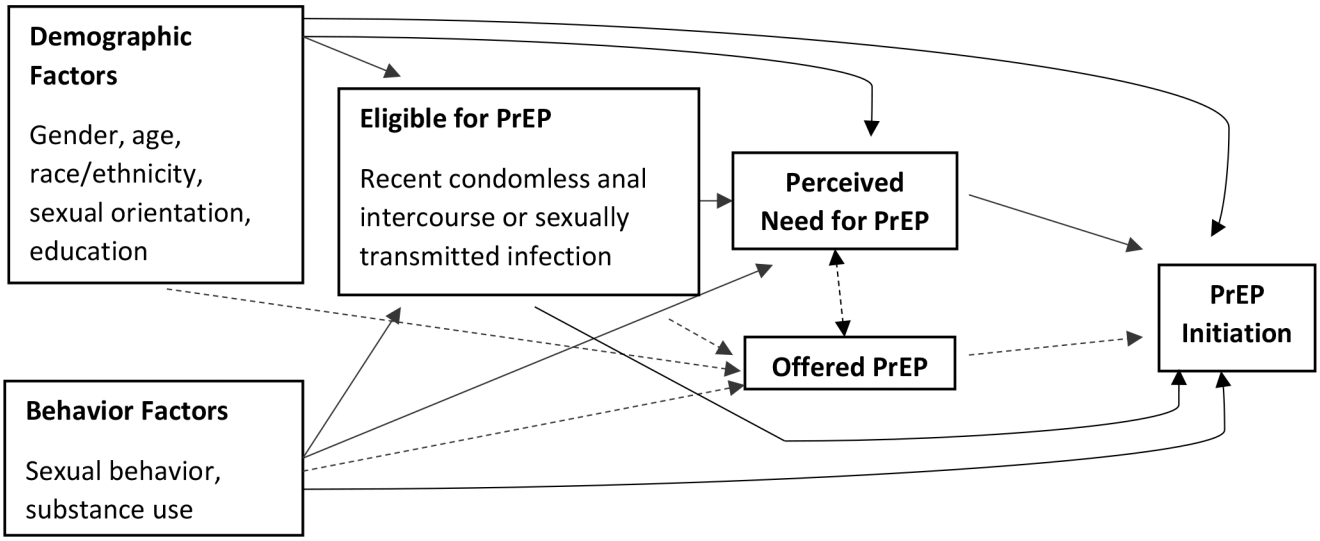

Figure 1. Factors affecting pre-exposure prophylaxis (PrEP) initiation in community settings
PrEP Initiation:

Demographic and behavioral factors associated with HIV acquisition may influence whether someone starts pre-exposure prophylaxis (PrEP). We examined how these factors influence PrEP eligibility (defined based on recent sexual history), perceived need for PrEP, and PrEP use. We expect that many people become aware of PrEP, then perceive a need, and then seek it out. But because some people may start using PrEP not because they sought it out but because PrEP was offered to them (e.g., in the context of another healthcare visit), we include a bidirectional pathway between being offered PrEP and perceiving a need. Solid lines denote relationships directly tested in this analysis, while dotted lines indicate relationships we were not able to assess.

Table 1.

Baseline characteristics of study population, Aug 2015-February 2018 n=19,587.

	Eligible for PrEP		Perceived need		Currently taking PrEP		Perceived need (among eligible)		Currently taking PrEP (among eligible)		Total	
	n	%[a]	n	%[a]	n	%[a]	n	%[b]	n	%[b]	n	%[c]
Gender												
Cis men (who have sex with men)	13,321	70%	7,054	37%	1,868	10%	5,723	43%	1,670	13%	18,954	97%
Trans women	252	65%	124	32%	20	5%	95	38%	16	6%	389	2%
Trans men (who have sex with men)	23	34%	21	31%	6	9%	13	57%	4	17%	68	0.3%
Genderqueer people	80	45%	43	24%	12	7%	28	35%	10	13%	176	0.9%
Sexual Orientation												
Gay	11,182	72%	6,117	39%	1,732	11%	4,998	45%	1,554	14%	15,564	79%
Bisexual	1,665	63%	775	29%	112	4%	596	36%	96	6%	2,654	14%
Heterosexual	253	55%	103	23%	11	2%	80	32%	8	3%	456	2%
Other	179	64%	79	28%	15	5%	62	35%	13	7%	278	1%
Unknown	397	63%	168	26%	36	6%	123	31%	29	7%	635	3%
Age group												
18–24	2,928	70%	1,533	37%	189	5%	1,193	41%	160	5%	4,182	21%
25–29	3,986	73%	2,110	39%	440	8%	1,730	43%	397	10%	5,435	28%
30–39	4,235	71%	2,354	39%	761	13%	1,917	45%	681	16%	5,980	31%
40–49	1,576	67%	817	35%	336	14%	681	43%	307	19%	2,364	12%
50+	951	58%	428	26%	180	11%	338	36%	155	16%	1,626	8%
Race/Ethnicity												
American Indian or Alaska Native	48	76%	27	43%	10	16%	23	48%	9	19%	63	0.3%
Asian/Pacific Islander	1,143	65%	581	33%	120	7%	457	40%	110	10%	1,752	9%
Black or African American	987	72%	571	42%	119	9%	458	46%	106	11%	1,375	7%
Hispanic/Latino	4,560	72%	2,371	37%	410	6%	1,892	41%	360	8%	6,365	32%
Other	846	70%	413	34%	118	10%	335	40%	102	12%	1,209	6%
White	5,717	69%	3,098	38%	1,082	13%	2,551	45%	976	17%	8,245	42%
Unknown	375	65%	181	31%	47	8%	143	38%	37	10%	578	3%
Education Level												
Less than college degree	5,324	72%	2,679	36%	493	7%	2,195	41%	445	8%	7,370	38%
College degree and above	6,985	69%	3,830	38%	1,282	13%	3,088	44%	1,154	17%	10,179	52%
Unknown	1,367	67%	733	36%	131	6%	576	42%	101	7%	2,038	10%
Non-Injection Substance Use in the past 12 months												
Methamphetamine	754	84%	450	50%	117	13%	406	54%	111	15%	900	5%
Nitrites	2,376	82%	1,488	52%	495	17%	1,300	55%	461	19%	2,884	15%

	Eligible for PrEP		Perceived need		Currently taking PrEP		Perceived need (among eligible)		Currently taking PrEP (among eligible)		Total	
	n	%[a]	n	%[a]	n	%[a]	n	%[b]	n	%[b]	n	%[c]
GHB	622	87%	393	55%	167	23%	365	59%	160	26%	718	4%
Ecstasy/MDMA	1,690	82%	978	47%	335	16%	849	50%	312	18%	2,063	11%
Erectile dysfunction drugs without prescription	529	86%	332	54%	157	26%	315	60%	152	29%	612	3%
Other prescription drug use without prescription	244	78%	164	52%	36	12%	142	58%	32	13%	313	2%
Alcohol	10,354	71%	5,271	36%	1,452	10%	4,330	42%	1,309	13%	14,498	74%
Heavy alcohol use (5 drinks or more, 5 times in the last month)	1,473	77%	795	41%	195	10%	676	46%	174	12%	1,918	10%
Injection drug use ever	252	76%	166	50%	32	10%	136	54%	28	11%	330	2%
Condomless anal intercourse, past 90 days	11,820	100%	5,273	45%	1,557	13%	5,273	45%	1,557	13%	11,820	60%
STI, past year	5,846	100%	2,626	45%	889	15%	2,626	45%	889	15%	5,846	30%
Reports Perceived Need for PrEP												
Yes	5,859	81%	7,242	100%	1,705	24%	5,859	100%	1,540	26%	7,242	37%
Unsure	3,218	68%	--	--	32	1%	--	--	26	1%	4,723	24%
No	3,449	59%	--	--	41	1%	--	--	25	1%	5,862	30%
Unknown/Unreported	1,150	65%	--	--	128	7%	--	--	109	9%	1,760	9%
PrEP Use												
Current	1,700	89%	1,705	89%	1906	100%	1,540	91%	1,700	100%	1,906	10%
Former	569	80%	413	58%	--	--	354	62%	--	--	707	4%
Never	11,244	67%	5,105	31%	--	--	3,948	35%	--	--	16,689	85%
Unknown/Unreported	163	57%	19	7%	--	--	17	10%	--	--	285	1%
Tested HIV positive at baseline visit	201	82%	98	40%	1	0.4%	84	42%	1	0.5%	246	1%
Total	13,676	70%	7,242	37%	1,906	10%	5,859	43%	1,700	100%	19,587	100%

[a] Row percentages (denominator is total)

[b] Row percentages (denominator is total eligible)

[c] Column percentages

Table 2.

Crude and adjusted odds ratios for correlates of PrEP eligibility (n=19,587), perceived need, and use, among those eligible for PrEP (n=13,676), Aug 2015-February 2018

		Eligibility[a]				Perceived Need among Eligible[b]				PrEP Use among Eligible[c]			
	n	Crude OR	95% CI	Adjusted OR	95% CI	Crude OR	95% CI	Adjusted OR	95% CI	Crude OR	95% CI	Adjusted OR	95% CI
Gender		*p<0.0001*		*p<0.0001*		p=0.3		p=0.9		*p=.02*		p=0.05	
Cisgender male (ref)	18,954	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
Transgender female	389	0.8	(0.6, 1.0)	1.0	(0.8, 1.4)	0.8	(0.6, 1.1)	1.1	(0.7, 1.6)	0.5	(0.3, 0.8)	1.4	(0.7, 2.8)
Other	244	0.3	(0.2, 0.4)	0.3	(0.2, 0.5)	0.8	(0.6, 1.3)	1.0	(0.6, 1.7)	1.1	(0.6, 1.9)	2.2	(1.1, 4.3)
Age		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*	
18–24 (ref)	2,928	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
25–29	3,986	1.1	(1.0, 1.3)	1.1	(1.0, 1.2)	1.1	(1.0, 1.3)	1.0	(0.9, 1.1)	1.9	(1.6, 2.3)	1.6	(1.3, 1.9)
30–39	4,235	1.0	(0.9, 1.1)	1.0	(0.9, 1.1)	1.2	(1.1, 1.4)	0.9	(0.8, 1.0)	3.3	(2.8, 4.0)	2.6	(2.2, 3.2)
40–49	1,576	0.8	(0.7, 0.9)	0.8	(0.7, 0.9)	1.1	(1.0, 1.3)	0.8	(0.7, 0.9)	4.2	(3.4, 5.2)	3.3	(2.7, 4.2)
50+	951	0.6	(0.5, 0.7)	0.6	(0.7, 0.9)	0.8	(0.7, 1.0)	0.6	(0.5, 0.7)	3.4	(2.7, 4.3)	2.5	(1.9, 3.3)
Ethnicity		*p<0.0001*		*p=0.0005*		*p=0.002*		*p=0.006*		*p<0.0001*		*p<0.0001*	
White (ref)	8,245	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
Asian/PI	1,752	0.8	(0.7, 0.9)	0.8	(0.7, 0.9)	0.8	(0.7, 1.0)	1.0	(0.9, 1.2)	0.5	(0.4, 0.6)	0.6	(0.5, 0.7)
Black	1,375	1.1	(1.0, 1.3)	1.2	(1.0, 1.4)	1.1	(0.9, 1.2)	1.3	(1.1, 1.5)	0.6	(0.5, 0.7)	0.8	(0.6, 1.0)
Hispanic	6,365	1.1	(1.0, 1.2)	1.1	(1.0, 1.2)	0.9	(0.8, 1.0)	1.1	(1.0, 1.2)	0.4	(0.4, 0.5)	0.6	(0.5, 0.7)
Other	1,272	1.0	(0.9, 1.2)	1.0	(0.9, 1.2)	0.8	(0.7, 1.0)	0.9	(0.8, 1.1)	0.7	(0.6, 0.9)	0.8	(0.7, 1.1)
Sexual orientation		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p=0.002*		*p<0.0001*		*p<0.0001*	
Gay (ref)	15,564	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
Bisexual	2,654	0.7	(0.6, 0.7)	0.7	(0.6, 0.8)	0.7	(0.6, 0.8)	0.8	(0.7, 1.0)	0.4	(0.3, 0.5)	0.4	(0.3, 0.5)
Other	734	0.5	(0.5, 0.6)	0.6	(0.5, 0.7)	0..6	(0.5, 0.8)	0.7	(0.5, 0.9)	0.3	(0.2, 0.5)	0.3	(0.2, 0.6)
Education Level		*p<0.0001*		*p<0.0001*		*p=0.005*		p=0.2		*p<0.0001*		*p<0.0001*	
Less than college degree (ref)	7,370	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
College degree or more	10,179	0.8	(0.8, 0.9)	0.8	(0.8, 0.9)	1.1	(1.0, 1.2)	0.9	(0.9, 1.0)	2.2	(1.9, 2.4)	1.6	(1.4, 1.8)
PrEP Indication (among eligible)						*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*	

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		Eligibility[a]				Perceived Need among Eligible[b]				PrEP Use among Eligible[c]			
	n	Crude OR	95% CI	Adjusted OR	95% CI	Crude OR	95% CI	Adjusted OR	95% CI	Crude OR	95% CI	Adjusted OR	95% CI
STI and CAI (ref)	3,990	--	--	--	--	1.0	--	1.0	--	1.0	--	1.0	--
STI only	1,856	--	--	--	--	0.4	(0.4, 0.5)	0.5	(0.4, 0.6)	0.4	(0.3, 0.4)	0.4	(0.3, 0.5)
CAI only	7,830	--	--	--	--	0.7	(0.6, 0.7)	0.8	(0.7, 0.9)	0.5	(0.5, 0.6)	0.5	(0.5, 0.6)
Sex Drug Use		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*	
None (ref)	14,699	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
Stimulants only	1,335	1.7	(1.5, 2.0)	1.7	(1.5, 2.0)	1.2	(1.0, 1.4)	1.2	(1.0, 1.4)	1.2	(1.0, 1.4)	1.2	(0.9, 1.5)
Nitrites only	1,628	1.9	(1.7, 2.2)	1.8	(1.5, 2.0)	1.6	(1.4, 1.8)	1.4	(1.2, 1.6)	1.8	(1.5, 2.1)	1.7	(1.4, 2.0)
ED Drugs only	203	1.8	(1.3, 2.5)	2.2	(1.5, 3.2)	1.5	(1.1, 2.0)	1.0	(0.7, 1.6)	3.3	(2.3, 4.7)	2.3	(1.6, 3.4)
GHB only	80	1.9	(1.1, 3.3)	2.2	(1.2, 4.2)	2.0	(1.1, 3.4)	1.7	(0.9, 3.3)	3.0	(1.7, 5.4)	2.8	(1.5, 5.2)
Stimulants and Nitrite	650	2.9	(2.3, 3.7)	2.9	(2.2, 3.7)	1.8	(1.5, 2.2)	1.6	(1.3, 2.0)	2.0	(1.6, 2.5)	1.9	(1.4, 2.4)
Stimulants and ED	59	3.4	(1.5, 7.5)	3.1	(1.4, 6.9)	2.2	(1.2, 3.9)	1.5	(0.8, 3.0)	3.2	(1.7, 6.0)	2.5	(1.3, 4.9)
Stimulants and GHB	170	2.4	(1.6, 3.7)	2.2	(1.4, 3.4)	1.3	(0.9, 1.8)	1.0	(0.7, 1.5)	2.2	(1.4, 3.3)	2.0	(1.3, 3.2)
2 drugs, Non stimulant	165	2.5	(1.6, 3.8)	2.6	(1.6, 4.0)	2.6	(1.8, 3.8)	1.7	(1.1, 2.7)	4.2	(2.9, 6.0)	3.1	(2.1, 4.6)
Poly (3 or more)	482	5.8	(4.1, 8.1)	5.3	(3.6, 7.7)	2.7	(2.2, 3.3)	1.9	(1.5, 2.4)	3.2	(2.6, 4.0)	2.8	(2.2, 3.7)
Heavy Alcohol Use		*p<0.0001*		*p=0.0005*		p=0.2		p=0.5		p=0.5		*p=0.002*	
5 drinks or more, 5 times in the last 30 days	1,918	1.6	(1.4, 1.8)	1.3	(1.1, 1.5)	1.1	(1.0, 1.2)	1.0	(0.8, 1.1)	1.0	(0.8, 1.1)	0.7	(0.6, 0.9)
Year of Visit		*p=0.03*		*p=0.02*		*p<0.0001*		*p<0.0001*		*p<0.0001*		*p<0.0001*	
2015	5,652	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
2016	7,822	0.9	(0.8, 1.0)	0.9	(0.8, 1.0)	0.8	(0.8, 0.9)	0.8	(0.7, 0.9)	1.0	(0.9, 1.1)	1.0	(0.9, 1.2)
2017	5,921	0.9	(0.9, 1.0)	0.9	(0.8, 1.0)	0.8	(0.8, 0.9)	0.8	(0.7, 0.9)	1.4	(1.3, 1.6)	1.5	(1.3, 1.8)
2018	822	1.0	(0.9, 1.2)	1.1	(0.9, 1.3)	0.7	(0.6, 0.8)	0.6	(0.5, 0.8)	1.2	(1.0, 1.6)	1.4	(1.0, 1.8)
PrEP Use						*p<0.0001*		*p<0.0001*					
Current	1,906	--	--	--	--	46.3	(35.0, 61.4)	49.2	(36.2, 66.7)	--	--	--	--

[a] 3,265 observations were omitted due to missing values (effective sample size = 16,322)

[b] 2,862 observations were omitted due to missing values (effective sample size = 10,814)

[c] 1,978 observations were omitted due to missing values (effective sample size = 11,698)

Table 3.

Crude and adjusted odds ratios for correlates of meeting reporting perceived need among MSM and transgender people eligible for PrEPa but not taking PrEP (n= 11,813), Aug 2015-February 2018

			Perceived Need[a]			
	n	%[b]	Crude OR	95% CI	Adjusted OR[c]	95% CI
Gender			p=0.7		p=0.9	
Cisgender male (ref)	11,492	86%	1.0	--	1.0	--
Transgender female	232	92%	1.0	(0.8, 1.3)	1.1	(0.7, 1.6)
Other	89	86%	0.8	(0.5, 1.3)	1.0	(0.6, 1.7)
Age			*p<0.0001*		*p<0.0001*	
18–24 (ref)	2,735	93%	1.0	--	1.0	--
25–29	3,542	89%	1.0	(0.9, 1.1)	1.0	(0.9, 1.1)
30–39	3,508	83%	0.9	(0.8, 1.0)	0.9	(0.8, 1.0)
40–49	1,243	79%	0.8	(0.6, 0.9)	0.7	(0.6, 0.9)
50+	785	83%	0.6	(0.5, 0.7)	0.6	(0.5, 0.7)
Ethnicity			*p<0.0001*		*p=0.003*	
White (ref)	4,668	82%	1.0	--	1.0	--
Asian/PI	1,020	89%	1.0	(0.9, 1.2)	1.0	(0.8, 1.2)
Black	868	88%	1.3	(1.2, 1.6)	1.3	(1.1, 1.6)
Hispanic	4,154	91%	1.2	(1.1, 1.3)	1.1	(1.0, 1.2)
Other	771	86%	0.9	(0.8, 1.1)	0.9	(0.8, 1.1)
Sexual orientation			*p=0.0004*		*p=0.004*	
Gay (ref)	9,496	85%	1.0	--	1.00	--
Bisexual	1,552	93%	0.8	(0.7, 0.9)	0.8	(0.7, 1.0)
Other	408	94%	0.8	(0.6, 0.9)	0.7	(0.5, 1.0)
Education Level			*p=0.006*		p=0.2	
Less than college degree (ref)	4,808	90%	1.0	--	1.0	--
College degree or more	5,756	82%	0.90	(0.8, 1.0)	0.9	(0.9, 1.0)
PrEP Indication			*p<0.0001*		*p<0.0001*	
STI and CAI (ref)	3,198	80%	1.0	--	1.0	--
STI only	1,686	91%	0.50	(0.4, 0.6)	0.5	(0.4, 0.6)
CAI only	6,929	88%	0.80	(0.7, 0.8)	0.8	(0.7, 0.9)
Sex Drug Use			*p<0.0001*		*p<0.0001*	
None (ref)	8,668	89%	1.0	--	1.0	--
Stimulants only	906	87%	1.2	(1.0, 1.4)	1.2	(1.0, 1.4)
Nitrites only	1,056	82%	1.5	(1.3, 1.7)	1.4	(1.2, 1.6)
ED Drugs only	115	72%	1.0	(0.6, 1.4)	1.1	(0.7, 1.7)
GHB only	44	73%	1.6	(0.9, 3.0)	1.9	(1.0, 3.6)
Stimulants and Nitrite	440	81%	1.6	(1,4, 2.0)	1.6	(1.3, 2.0)
Stimulants and ED	36	71%	1.7	(0.9, 3.3)	1.5	(0.7, 3.0)
Stimulants and GHB	113	80%	1.0	(0.7, 1.6)	1.0	(0.6, 1.5)
2 drugs, Non stimulant	93	67%	1.8	(1.2, 2.7)	1.7	(1.1, 2.8)

			Perceived Need[a]			
	n	**%[b]**	**Crude OR**	**95% CI**	**Adjusted OR[c]**	**95% CI**
Poly (3 or more)	320	72%	2.2	(1.7, 2.7)	1.9	(1.5, 2.5)
Heavy Alcohol Use			p=0.06		p=0.5	
5 drinks or more, 5 times in the last 30 days	1,263	86%	1.10	(1.0, 1.3)	1.0	(0.8, 1.1)
Year of Visit			*p<0.0001*		*p<0.0001*	
2015	3,613	88%	1.0	--	1.0	--
2016	4,801	87%	0.8	(0.7, 0.9)	0.8	(0.7, 0.9)
2017	2,880	83%	0.7	(0.6, 0.8)	0.7	(0.7, 0.8)
2018	519	86%	0.6	(0.4, 0.7)	0.6	(0.5, 0.7)

a. Eligibility defined as sexually transmitted infection in the past year or condomless anal intercourse in the past 90 days.

b. Percent not currently taking PrEP, of total in each catergory who meet eligibility criteria (see Table 1 for row totals).

c. 2,447 observations were excluded due to missing values.