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ORIGINAL PAPER

Cannabis Use Frequency is Associated with PrEP Cessation and Self-reported HIV Diagnosis

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Abstract

To achieve stated targets in the United States of Ending the HIV Epidemic by 2030, it is necessary to decrease rates of pre-exposure prophylaxis use (PrEP) cessation. In particular, it is key to assess PrEP use and cannabis use frequency given the recent wave of cannabis decriminalization across the U.S., particularly among sexual minority men and gender diverse (SMMGD) individuals. We used data from the baseline visit of a national study of Black and Hispanic/Latino SMMGD. Among participants reporting any lifetime cannabis use, we further assessed the association between frequency of cannabis use in the past 3 months and: (1) self-reported PrEP use, (2) recency of last PrEP dose, and (3) HIV status using adjusted regression models. Compared to those who never used cannabis, odds of PrEP cessation were higher among those who used it once or twice (aOR 3.27; 95% CI 1.38, 7.78), those who used it monthly (aOR 3.41; 95% CI 1.06, 11.01), and those who used it weekly or more frequently (aOR 2.34; 95% CI 1.06, 5.16). Similarly, those reporting cannabis use 1–2 times in the past 3 months (aOR 0.11; 95% CI 0.02, 0.58) and those reporting weekly or more frequent use (aOR 0.14; 95% CI 0.03, 0.68) were each more likely to report more recent PrEP cessation. These results suggest that cannabis users in general may be a population at elevated risk of HIV diagnosis although more research regarding these findings is needed with nationally representative populations.

Keywords PrEP · HIV · Cannabis · Racial and ethnic minorities · Men who have sex with men

Introduction

To achieve stated targets in the United States (U.S.) of Ending the HIV Epidemic by 2030, it is necessary to increase rates of pre-exposure prophylaxis use (PrEP) and decrease rates of its cessation. A growing body of research suggests that, among users who began PrEP use, a third discontinued use within 6 months [1]. And among those who discontinue its use, strong disparities exist by race and ethnicity where two-thirds of those who discontinue are either Hispanic or non-Hispanic Black [1]. Several key barriers to sustained PrEP use have been explored in past studies, studies which have noted issues related to the monthly cost of medication, adequate insurance, potential side effects, preference for different dosing schedules (e.g., intermittent PrEP sue), and experiences of PrEP-related stigma [1–4]. Beyond these, other structural issues have been noted, led by issues related to travel to doctors' appointments [1]. Less work, however, has examined whether common substances such as cannabis may impact whether one is likely to stop use of PrEP as prescribed.

In the context of HIV prevention, the use of cannabis has more frequently been examined as a risk factor when used as a sex-drug, or a drug to enhance the sensations associated with sexual intercourse [5–7]. Less common, however, is any exploration of whether cannabis users as a population may be at elevated risk of being diagnosed with HIV, particularly in terms of its impact on continued use of PrEP medication as prescribed. Work that has been done in adjacent areas has produced mixed results. For example, two separate studies, one among young Black men who have sex with men (MSM; 16–29 years) and another among a general sample of adults (18–60 years), demonstrated that

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cannabis use does not have a significant impact on adherence to antiretroviral therapy medication among those diagnosed with HIV [6, 8]. Daily cannabis use has also been associated with greater risk of HIV seroconversion relative to those who used cannabis less than daily [9], but this study was limited in its ability to explore other frequencies of cannabis use. Still further, tangential work has demonstrated a clear association between cannabis use and poor adherence to medication use for psychiatric conditions [10, 11] as well as noting that prior experience with cannabis use was key to remaining adherent to medical cannabis itself [9, 12]. Given elevated rates of cannabis use among young Hispanic and non-Hispanic Black MSM [7, 13], as well as their continued risk of HIV acquisition [14–16], it is key to develop a better understanding of how variable cannabis use frequency impacts use of PrEP and HIV risk among this population.

To fill a critical gap in the literature, we aimed to examine whether cannabis use frequency impacts cessation of PrEP use among a sample of young Hispanic and Black sexual minority men and gender diverse (SMMGD) individuals aged 18–29. Given past research among those diagnosed with HIV, we hypothesize that frequency of cannabis use will not have a significant association with PrEP cessation during the study period nor will it be associated with recency of PrEP cessation. This hypothesis was assessed by examining frequency of cannabis use over the past 3 months among study participants reporting any lifetime use. Secondarily, we explored whether frequency of cannabis use was associated with HIV status; we expected to observe no significant association.

Methods

Study Design and Participant Recruitment

Data for this analysis come from the first wave of the *PrEP and Substance Use National Survey*, an online survey assessment of sexual health history among Black and/or Hispanic/Latino SMMGD. All study protocols were approved by the University of Connecticut's Institutional Review Board.

The baseline survey was conducted in March–August of 2020 to broadly assess HIV prevention and health behaviors among Black and Hispanic/Latino SMMGD (N = 992). To participate in the baseline survey, respondents were required to identify as Black and/or Hispanic/Latino, be 18–29 years of age, be assigned male at birth, reside in the United States, and have reported anal intercourse with a man in the past 12 months. Black and Hispanic/Latino SMMGD individuals were recruited from national networks, several large mailing lists, and social media (e.g., Twitter, Facebook, and Instagram) with the assistance of the Human Rights Campaign's wide-reaching network of community partners. The research team connected with local community-based organizations, health departments, and other health centers to advertise the survey. For their participation in the baseline survey, participants were provided a $15 Amazon.com gift card.

Measures

PrEP use and cessation Participants were asked whether they had ever taken PrEP in their lifetimes and, among those answering in the affirmative, whether they were currently taking PrEP at the time of survey completion. Those who were not currently taking PrEP were coded as having discontinued PrEP use [1] while those who reported PrEP use were coded as current PrEP users (0). Next, participants were asked when they last took a dose of PrEP, coded categorically as: ≤ 1 month ago, 2–6 months ago, 7–12 months ago, and ≥ 1 year ago. Those who reported cessation of PrEP use were subsequently asked the reasons for cessation, multiple selections were allowed: concern about potential side effects, concern about cost, no longer needed PrEP, did not want to take the medication daily, concern about what others may think, and only take PrEP as needed, but not currently taking. Finally, we examined differences in main reason for missed PrEP dosages (too many negative side effects, low risk perception, forgot).

Substance use Participants self-reported whether they had ever used a variety of substances in their lifetime. These included: cannabis (marijuana, pot, grass hash, etc.), cocaine (coke, crack, etc.), stimulants (Ritalin®, Concerta®, etc.), methamphetamines (speed, crystal meth, ice, etc.), inhalants (nitrous oxide, poppers, glue, gas, paint thinner, etc.), sedatives or sleeping pills (Valium®, Serepax®, Ativan®, Librium®, Xanax®, Rohypnol, GHB, etc.), hallucinogens (LSD, acid, mushrooms, PCP, Special K, ecstasy, etc.), opiates (heroin, opium, etc.), opioids (fentanyl, oxycodone, hydrocodone, methadone, etc.), and medications to promote sexual function (Viagra). For each of the substances where participants self-reported any lifetime use, they were subsequently asked their frequency of use in the past 3 months: 0 (never), 2 (once or twice), 3 (monthly), 4 (weekly), and 6 (daily or almost daily). Participants also self-reported alcohol use, however, this was assessed only as frequency of use over the past 12 months; it was categorically coded in a similar manner as other substances. Finally, participants self-reported whether they currently held a prescription for use of medical cannabis.

HIV and STI status Participants were first asked whether they had ever been tested for HIV in their lifetime. Those who reported that they had self-reported their current HIV status with the variable operationalized as dichotomously, either HIV-negative or HIV-positive.

Race and ethnicity To assess race, participants were asked, "What is your race? (check all that apply)". Response

options included, "American Indian or Alaska Native", "Asian", "Black or African American", "Native Hawaiian or other Pacific Islander", "White", and "None of these". Ethnicity was assessed by asking participants, "Are you Hispanic/Latino?" Response options were "No" and "Yes". To combine these variables, categories were defined as non-Hispanic Black, Hispanic, or non-Hispanic and a different racial identity.

Sexual orientation Participant's sexual orientation was assessed by asking, "Which of the following best describes your sexual orientation?" with participants selecting from "Bisexual", "Gay, same gender loving", "Heterosexual or straight", "Pansexual", "Queer", "Not sure or questioning" or "Other". For purposes of this analysis, this variable was recoded as gay, bisexual, and those identifying with a different sexual identity.

Gender identity We assessed gender identity by asking participants to choose their gender between the following options, "agender", "genderfluid", "gender queer", "non-binary", "man", "transgender woman", or "something else". We dichotomized this variable to categorize cisgender participants ("cisgender") and "gender diverse" participants (those who selected a non-cisgender identity; e.g., transgender, agender, non-binary).

Age Participant age was self-reported by participants and operationalized as a continuous variable.

Annual income Income was self-reported by participants and coded as a categorical variable: < $25,000 per year, $25,001–$50,000, and ≥ $50,001.

Number of sexual partners Participants were asked how many total sex partners they had in the past 3 months with this variable operationalized as continuous.

Insurance status Insurance was assessed by asking participants whether they currently had any form of health insurance at the time of the interview, coded as a dichotomous yes/no variable.

Analyses

Statistical analyses The analytic sample includes any participants who reported any lifetime use of cannabis (N = 595). Participant characteristics were described using means, standard deviations, and proportions, as appropriate. The first multivariable logistic regression model assessed the association between frequency of substance use and odds of PrEP cessation. This was followed by the employment of a multivariable ordinal logistic regression model, only among those reporting cessation of PrEP use, assessing the relationship between recency of last PrEP dose and frequency of cannabis use. Finally, we used multivariable logistic regression to assess the association between frequency of cannabis use and odds of self-reporting as having been diagnosed with HIV. The second and third models only assessed frequency of cannabis use as it was the only substance associated with PrEP cessation. All models were adjusted for demographic characteristics (e.g., race and ethnicity, age, sexual identity, gender identity) and known confounders (e.g., insurance status, income level, number of sexual partners) based on a priori hypotheses and prior literature. Statistical significance was established at alpha < 0.05. Standard model diagnostics were assessed with no irregularities noted (e.g., no multicollinearity, etc.) All analyses were performed in Stata 17.0.

Results

In the analytic sample (Table 1), the mean age of participants (N = 595) was 25.3 years (Standard Deviation [SD] = 2.7). A plurality of participants reported as Black (239, 40.2%), followed by a different race or multiracial (195, 32.8%), and then White (161, 27.1%). The majority identified as Hispanic (387, 65.0%). Regarding sexual identity, 454 (76.3%) reported as gay, 68 (11.4%) as bisexual, and 73 (12.3%) as a different sexual identity. Five-hundred fifty-six (93.5%) participants identified as cisgender and 39 (6.6%) as gender diverse. Nearly half of participants (242, 41.0%) reported income below $25,000, followed by those reporting income between $25,001 and $50,000 (201, 34.0%), and those reporting $50,001 or greater income (148, 25.0%). A majority of participants reported having insurance (e.g., private, Medicare, Medicaid, TriCare, etc.) at the time of interview (450, 78.3%) and mean number of sexual partners was 3.0 (SD = 2.5). Regarding PrEP use, 272 (45.7%) reported any PrEP use and 90 (33.0%) of these participants discontinued use. Further, 39 (7.3%) participants self-reported as having been diagnosed with HIV. Cannabis use frequency in the past 3 months was reported across the following categories: never (121, 20.3%), one to two times (167, 28.1%), monthly but less than weekly (53, 8.9%), and weekly or more frequent (254, 42.7%). One (0.2%) participant, undiagnosed with HIV, reported having a prescription for use of medical cannabis. No difference by race or ethnicity was observed in main reason for missed PrEP dosage or reason for cessation of PrEP.

Multivariable logistic regression models to examine the association between frequency of cannabis use in the past 3 months and cessation of PrEP use by the start of the baseline survey are shown in Table 2. The first model considered only demographic and other confounding variables. Relative to non-Hispanic Black participants, Hispanic participants, had significantly greater odds of PrEP cessation (adjusted odds ratio [aOR] 1.64; 95% confidence interval [CI] 1.03, 2.60). Similarly, gender diverse participants, compared to cis-gender participants had significantly greater odds of cessation (aOR 2.53; 95% CI 1.10, 5.86). As number of sexual partners

Table 1 Demographic characteristics among sample participants reporting any lifetime cannabis use (N = 595)

Characteristic	n (%)	Mean (SD)
Age	–	25.3 (2.7)
Race		
White	161 (27.1)	–
Black	239 (40.2)	–
Different identity	195 (32.8)	–
Ethnicity		
Not Hispanic/Latino	208 (35.0)	–
Hispanic/Latino	387 (65.0)	–
Sexual orientation		
Gay	454 (76.3)	–
Bisexual	68 (11.4)	–
Different orientation	73 (12.3)	–
Gender		
Cisgender	556 (93.5)	–
Gender diverse	39 (6.6)	–
Income		
< $25,000	242 (41.0)	–
$25,001–$50,000	201 (34.0)	–
≥ $50,001	148 (25.0)	–
Any insurance	450 (78.3)	–
Number of partners	–	3.0 (2.5)
Substance use, past 3 months		–
Cannabis	595 (100.0)	–
Cocaine	91 (15.3)	–
Stimulants	78 (13.1)	–
Methamphetamines	46 (7.7)	–
Inhalants	208 (35.0)	–
Sedatives	68 (11.4)	–
Hallucinogens	105 (17.6)	–
Opiates	5 (0.8)	–
Opioids	22 (3.7)	–
Sexual function	54 (9.1)	–
Alcohol	549 (92.3)	–
HIV status, self-reported		
Negative	498 (92.7)	–
Positive	39 (7.3)	–
PrEP use, any	272 (45.7)	–
PrEP cessation[a]	90 (33.1)	–

[a]As a percent of those reporting PrEP use

increased, odds of PrEP cessation significantly decreased (aOR 0.83; 95% CI 0.75, 0.90).

The second model added the frequency of cannabis use variable alongside the demographic variables and known confounding variables. Here, only number of sexual partners remained significant relative to the first model, suggesting that a greater number of sexual partners was associated with reduced odds of PrEP cessation (aOR 0.84; 95% CI 0.75, 0.94). Compared to those who never used cannabis in the past 3 months, those who used it once or twice (aOR 3.27; 95% CI 1.38, 7.78), those who used it monthly but less than weekly (aOR 3.41; 95% CI 1.06, 11.01), and those who used it weekly or more frequently (aOR 2.34; 95% CI 1.06, 5.16) were each significantly more likely to report PrEP cessation. No other substances, including alcohol use, were associated with PrEP cessation.

Table 3 presents the results of the multivariable ordinal logistic regression model assessing the relationship between frequency of cannabis use in the past 3 months and recency of PrEP cessation, or when the last PrEP dose was taken by participants. This model was only conducted among those who reported cessation of PrEP use. Compared to those without insurance, those with insurance who stopped using PrEP, reported a longer interval of time since stopping PrEP use (aOR 7.26; 95% CI 1.75, 30.11). Relative to those reporting no cannabis use in the past 3 months, those reporting use 1–2 times (aOR 0.11; 95% CI 0.02, 0.58) and those reporting weekly or more frequent use (aOR 0.14; 95% CI 0.03, 0.68) were each more likely to report recent PrEP cessation.

Table 4 depicts the results of the multivariable logistic regression examining the association between frequency of cannabis use and self-reported HIV status. Hispanic participants, relative to non-Hispanic Black participants, had lower odds of self-reporting as diagnosed with HIV (aOR 0.41; 95% CI 0.19, 0.86). Age was associated with elevated odds of self-reported HIV positive status (aOR 1.27; 95% CI 1.08, 1.49). Compared to those making < $25,000 per year, those making $25,001–$50,000 per year (aOR 0.32; 95% CI 0.13, 0.79) and those making at least $50,001 per year (aOR 0.33; 95% CI 013, 0.85) were each associated with reduced odds of being HIV positive. Meanwhile, those who reported weekly or greater cannabis use in the past 3 months, compared to those who never used cannabis, had greater odds of self-reporting as diagnosed with HIV (aOR 5.16; 95% CI 1.16, 23.04).

Discussion

Research on PrEP cessation has demonstrated that, in some samples, nearly a third of participants stopped using PrEP after commencing its use [1]. Here, we expand these past analyses to explore whether commonly used substances have any impact on PrEP cessation and whether its frequency of use plays a compounding role. As it stands, the data were directly opposed to our hypotheses. We did, in fact, observe an association between frequency of cannabis use and likelihood of PrEP cessation, recency of PrEP cessation, and HIV diagnosis status. PrEP cessation was not associated with any other substance nor alcohol use. Across all frequency categories, cannabis users were more likely to report cessation

Table 2 Adjusted logistic regression analyses examining the association between frequency of cannabis use in the past 3 months and odds of PrEP cessation

Characteristic	Model 1 (n = 416)		Model 2 (n = 263)	
	aOR	95% CI	aOR	95% CI
Race/Ethnicity				
Non-Hispanic Black	Ref	–	Ref	–
Hispanic	1.64*	1.03, 2.60	1.50	0.82, 2.75
Different race or ethnicity	Empty	–	Empty	–
Age				
Sexual identity				
Gay	Ref	–	Ref	–
Bisexual	1.25	0.59, 2.65	0.81	0.26, 2.54
Other	1.08	0.53, 2.21	1.54	0.65, 3.66
Gender identity				
Cisgender	Ref	–	Ref	–
Gender diverse	2.53*	1.10, 5.86	2.11	0.75, 5.98
Insurance				
None	Ref	–	Ref	–
Insured	1.34	0.74, 2.44	1.19	0.54, 2.60
Income				
< $25,000	Ref	–	Ref	–
$25,001–$50,000	0.90	0.52, 1.55	0.90	0.44, 1.82
≥ $50,001	0.89	0.50, 1.58	0.76	0.35, 1.63
Number of sexual partners	0.83***	0.75, 0.90	0.84**	0.75, 0.94
Frequency of cannabis use, past 3 months				
Never	–	–	Ref	–
1–2 times	–	–	3.27**	1.38, 7.78
Monthly, but less than weekly	–	–	3.41*	1.06, 11.01
Weekly or greater	–	–	2.34*	1.06, 5.16

Model 1 adjusts only for demographic variables, Model 2 adds frequency of cannabis use

*p ≤ 0.05; **p ≤ 0.01; ***p ≤ 0.001

relative to non-users. Interestingly, those who used cannabis more infrequently (1–2 times in the past 3 months or a few times per month) exhibited greater odds of cessation than weekly or more frequent users. Both infrequent and frequent cannabis users were each more likely to report more recent PrEP cessation than those who didn't report cannabis use in the past 3 months. Meanwhile, frequent users (weekly or greater) were more likely to self-report as diagnosed with HIV. The findings highlight importance for targeting tailored PrEP interventions broadly to cannabis users in order to continue moving towards achieving U.S. goals of Ending the HIV Epidemic by 2030.

In models considering only demographic variables, we demonstrated the persistence of racial disparities among MSM who discontinued PrEP use. This finding is consistent with previous work among this age group that noted that both Black and Hispanic MSM, relative to White MSM were more likely to discontinue PrEP use [1]. Our research builds on this past finding by noting further disparities among Black and Hispanic MSM themselves with Hispanic MSM exhibiting greater likelihood of PrEP cessation than their counterparts. No difference by race or ethnicity existed, however, when assessing specific reasons for cessation. These results suggest that novel methods such as PrEP on-demand [17] are not being used as substitutes for consistent, daily PrEP use. These findings highlight the need for further research specifically among Hispanic MSM in regard to either structural factors related to healthcare utilization or affordability. For example, there may be substantial barriers to making or keeping primary care appointments [1], such as issues related to transportation or one's ability to take the require time off work. Or Hispanic MSM may feel less comfortable discussing sexual health-related issues with their provider than other MSM. Continued work in this area has the potential to increase uptake of PrEP among Hispanic MSM and potentially stem the tide of new diagnoses among this population.

Table 3 Adjusted ordinal logistic regression analyses examining the association between frequency of cannabis use in the past 3 months and recency of PrEP cessation (n = 84)

Characteristic	aOR	95% CI
Race/Ethnicity		
Non-Hispanic Black	Ref	–
Hispanic	0.70	0.25, 2.02
Different race or ethnicity	1.26	1.00, 1.59
Age		
Sexual identity		
Gay	Ref	–
Bisexual	0.98	0.18, 5.30
Other	2.26	0.52, 9.88
Gender identity		
Cisgender	Ref	–
Gender diverse	0.32	0.07, 1.46
Insurance		
None	Ref	–
Insured	7.26**	1.75, 30.11
Income		
< $25,000	Ref	–
$25,001–$50,000	0.38	0.11, 1.25
≥ $50,001	0.11***	0.03, 0.42
Number of sexual partners		
Frequency of cannabis use, past 3 months		
Never	Ref	–
1–2 times	0.11*	0.02, 0.58
Monthly, but less than weekly	0.20	0.03, 1.57
Weekly or greater	0.14*	0.03, 0.68

Sample reduced by those who reported both last use of PrEP and cannabis use frequency

*p ≤ 0.05; **p ≤ 0.01; ***p ≤ 0.001

Table 4 Adjusted logistic regression analyses examining the association between frequency of cannabis use in the past 3 months and HIV status (n = 508)

Characteristic	aOR	95% CI
Race/Ethnicity		
Non-Hispanic Black	Ref	–
Hispanic	0.41*	0.19, 0.86
Different race or ethnicity	1.58	0.16, 15.45
Age	1.27**	1.08, 1.49
Sexual identity		
Gay	Ref	–
Bisexual	1.11	0.30, 4.06
Other	0.80	0.25, 2.57
Gender identity		
Cisgender	Ref	–
Gender diverse	0.92	0.18, 4.69
Insurance		
None	Ref	–
Insured	1.97	0.72, 5.40
Income		
< $25,000	Ref	–
$25,001–$50,000	0.32*	0.13, 0.79
≥ $50,001	0.33*	0.13, 0.85
Number of sexual partners	0.99	0.85, 1.15
Frequency of cannabis use, past 3 months		
Never	Ref	–
1–2 times	2.36	0.47, 11.88
Monthly, but less than weekly	5.15	0.86, 30.71
Weekly or greater	5.16*	1.16, 23.04

*p ≤ 0.05; **p ≤ 0.01

In the context of cannabis use, we observed that those who used cannabis at any level in the past 3 months were much more likely to report PrEP cessation than those who reported no cannabis use, although some attenuation was observed based on frequency of use. And while past work examining cessation among cannabis users is limited, there is a body of work assessing PrEP adherence and substance use more generally. Two such studies have demonstrated no association between any cannabis use (but not frequency of use) and PrEP adherence among neither a general sample of gay and bisexual men [18] nor among a sample of Black MSM [19]. Another set of studies which combined illicit substances into a single variable, without disaggregating cannabis use, noted that use of illicit substances was associated with an increased likelihood of PrEP cessation [20, 21]. More recent work by our study team [22] and others [23] have observed positive trend-level associations between cannabis use and PrEP discontinuation [22], but the work presented here builds on each of these. Namely, we report here that frequency of cannabis use may be the key driver in sustained PrEP use over the long-term with particular concern among intermittent users. This is demonstrated in our sample among those who used cannabis intermittently and their greater odds of cessation than those who used cannabis frequently. In fact, this potential risk can be seen in past studies that have observed that frequent cannabis users are less likely to be aware of their HIV-status [6]. Thus, a feedback loop of new HIV diagnoses may exist among this population if they are also less likely to be remain on PrEP. In fact, our subsequent analyses here suggest that it is only those who are frequent cannabis users who are more likely to test positive for HIV. Future research should continue to examine risk more thoroughly among cannabis users as it appears that this may be a particularly high-risk group that has gone under the radar in the past.

In addition to observing key findings regarding cessation of PrEP we also noted that both light and frequent

cannabis use, relative to no cannabis use, were each associated with more temporally recent PrEP cessation. These findings may be attributable to recent cannabis legalization in several states across the U.S. [24, 25]. For example, in an environment where cannabis use is now legal, non-users may initiate use while previous users may increase their frequency of use. In turn, this may impact the likelihood of PrEP cessation through documented alterations in one's sex drive, either positive or negative [26, 27]. This hypothesis could be tested in future studies by examining cannabis and PrEP use pre- and post-legalization to determine whether cannabis use increases post-legalization and if this results in an increased likelihood of PrEP cessation. This set of findings may also be masking a different narrative, one that has been noted by Scott et al. who reported that illicit substance use was associated with a fewer median days of PrEP use prior to cessation [21]. Given this, it possible that while frequent cannabis users appear to have more recently stopped using PrEP, they may have also started PrEP use much later than non-cannabis users, resulting in an overall shorter period of PrEP use. Unfortunately, these data are unavailable in this sample and future research should aim to assess whether this hypothesis is feasible alongside potential reasons for fewer median days of PrEP use among substance users.

Although we have identified key contributions to the literature regarding PrEP use and HIV status among cannabis users, these findings should be considered in light of several limitations. First, data were collected online from a non-probability sample of Black and Hispanic/Latino SMMGD in the United States. Thus, the sample reflects individuals with Internet access and connections to the social media platforms on which recruitment occurred. Cannabis use and HIV status were each self-reported and were not verified via laboratory testing (urine or serum, respectively). Next, social desirability biases may play have played a role in participant's responses. In particular, having a prescription for medical cannabis use was not an explicit category and only could have been reported as a write-in option. Other issues related to social desirability should be largely mitigated by the anonymity of the survey, methods which have been shown to substantially reduce this bias [28].

Even with these limitations, we observed several key factors regarding cannabis use in the past 3 months among this population. First, frequency of cannabis use was differentially associated with odds of PrEP cessation and recency of PrEP cessation where more infrequent use exhibited a larger effect size than frequent users. Second, frequent users were more likely to self-report as diagnosed with HIV relative to non-users. Taken together, these results suggest that cannabis users in general, and frequent users in particular, may be a population at high risk of HIV diagnosis although more research regarding these findings is needed with nationally representative populations.

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Declarations

Competing Interests The authors have no competing interests to declare.

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