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Structural Barriers to Pre-exposure Prophylaxis Use Among Young Sexual Minority Men: The P18 Cohort Study

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Abstract

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The protocol for this investigation received approval from the IRB of the institutions of the investigators.

HUMAN AND ANIMAL RIGHTS

No animal were used in this research. All humans research procedures followed were in accordance with the standards set forth in the Declaration of Helsinki principles of 1975, as revised in 2008 (http://www.wma.net/en/20_activities/10ethics/10helsinki/).

CONSENT FOR PUBLICATION

Written informed consent was obtained from all participants before inclusion in the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

Background: Despite decreasing rates of HIV among many populations, HIV-related health disparities among gay, bisexual and other men who have sex with men persist, with disproportional percentages of new HIV diagnoses among racial and ethnic minority men. Despite increasing awareness of HIV pre-exposure prophylaxis (PrEP), PrEP use remains low. In addition to exploring individual-level factors for this slow uptake, structural drivers of PrEP use must also be identified in order to maximize the effectiveness of biomedical HIV prevention strategies.

Method: Using cross-sectional data from an ongoing cohort study of young sexual minority men (N=492), we examine the extent to which structural-level barriers, including access to health care, medication logistics, counseling support, and stigma are related to PrEP use.

Results: While almost all participants indicated awareness of PrEP, only 14% had ever used PrEP. PrEP use was associated with lower concerns about health care access, particularly paying for PrEP. Those with greater concerns talking with their provider about their sexual behaviors were less likely to use PrEP.

Conclusion: Paying for PrEP and talking to one's provider about sexual behaviors are concerns for young sexual minority men. In particular, stigma from healthcare providers poses a significant barrier to PrEP use in this population. Providers need not only to increase their own awareness of and advocacy for PrEP as an effective risk-management strategy for HIV prevention, but also must work to create open and non-judgmental spaces in which patients can discuss sexual behaviors without the fear of stigma.

Keywords

Pre-exposure Prophylaxis; PrEP; structural barriers; healthcare providers; stigma; diverse; clinicians

1. INTRODUCTION

Despite HIV rates decreasing among several populations, HIV-related disparities among gay, bisexual men and other men who have sex with men continue to persist. As a group, sexual minority men (SMM) represent a disproportional percentage of both new diagnoses and people living with HIV. In 2015, SMM comprised 82% of new HIV diagnoses among males 13 years and older, and young SMM aged 13 to 24 accounted for 92% of all diagnoses in their age group and 27% of new diagnoses among all SMM [1]. SMM accounted for 55% of all AIDS diagnoses, of which 39% were Black, 31% were White, and 24% were Latinx [1]. From 2010 to 2014, HIV diagnoses remained stable among Black and White SMM, and increased 14% among Latinx SMM [1]. Thus, as a population, young SMM, particularly young SMM of color, experience overwhelming HIV-related health disparities, which continue to persist despite the many advances in HIV prevention and treatment [2–5].

In 2012, the Food and Drug Administration (FDA) approved pre-exposure prophylaxis (PrEP) as a daily pill for HIV prevention [6]. Despite its proven effectiveness for preventing HIV [7], PrEP uptake has largely been slow. In a recent study by Marks and colleagues, only 3.4% of the nearly 2300 young SMM sampled had ever used PrEP [8]. In New York City specifically, 41% of SMM had heard of PrEP by 2014, yet only 3% had used it [9]. Thus, despite a pattern that suggests an increase in awareness, willingness, and uptake among

young SMM, PrEP use continues to be low [10–13]. Across racial and ethnic subgroups of SMM, there are even greater disparities, with lower rates of PrEP awareness, willingness, uptake and use [14–17]. This suggests that groups that are at the highest risk for new HIV infections face the greatest challenges in PrEP implementation [18].

The literature exploring barriers and facilitators to PrEP uptake and use has documented myriad individual and structural level factors. There is much extant literature that has explored PrEP awareness, knowledge, uptake and use [19–24]. Recent work has explored individual-level cognitive barriers, including beliefs about PrEP, concerns about taking PrEP and its side effects, and PrEP perceptions [16, 25, 26]. These factors must be considered within the broader structural context of pervasive social inequality. Healthcare-related barriers [27, 28], as well as stigma associating PrEP with promiscuity and HIV [29–31], have shaped how people think about and make decisions around PrEP use. Specifically, lack of access to care, lack of health insurance/inability to pay for it, and lack of access to prescribing providers contribute to the slow uptake observed among SMM populations, particularly young SMM, and SMM of color [14, 18, 21]. Moreover, upon successful uptake, users may encounter challenges related to medication logistics, such as having to take a pill every day and seeing a provider regularly, as well as counseling support for maintaining a PrEP regimen.

Even when people are able to access healthcare, their providers may not be able to facilitate PrEP education or uptake. Previous studies have established a widespread lack of prescribing providers [32, 33], and clinicians have been shown to lack knowledge on PrEP [34, 35]. Moreover, both HIV specialists and primary care providers may avoid the responsibility of PrEP presentation and implementation, as they both believe such a task is not their responsibility [33]. This is especially problematic because patients may be hesitant to disclose their sexuality for fear of experiencing discrimination [36, 37]; yet, research has found that providers often do not inquire sufficiently about sexual behaviors [38–41].

Once individuals successfully start PrEP, they may face challenges related to obtaining counseling support, or contending with the potential burden of taking a pill every day [42]. A previous study has shown that men who have sex with men (MSM) are more willing to use PrEP with the addition of one-on-one counseling and support [43]. Similarly, sexual health counseling as a part of PrEP support was also shown to be a potential facilitator to increased PrEP use [44]. Moreover, several studies have cited the burden of taking a pill daily as a potential barrier to PrEP use [45–48]. One study found that a month after PrEP initiation, only approximately half of participants had indications in their blood that they had taken PrEP four or more times that week. That number dropped to 34% after 48 weeks [49]. Thus, challenges exist to not only PrEP uptake, but also sustained use.

Exacerbating all of these concerns is the pervasive effect of stigma, potentially experienced from health-care providers and society more broadly [22, 50, 51]. For example, in a recent qualitative study of social, structural and behavioral barriers influencing PrEP retention in Mississippi, Arnold and colleagues differentiated between experienced stigma and anticipated stigma, finding that participants' concern about anticipated stigma from family, romantic and sexual partners, and religious communities negatively influenced

PrEP retention [52]. These findings are also supported by a recent study of PrEP access and adoption in which the researchers found that participants perceived stigma from both health care providers as well as from within the LGBTQ community. Both types of stigma negatively affected participants' willingness to seek out PrEP from healthcare providers [44].

Taken together, these structural factors work in tandem with individual-level factors to shape how young SMM make decisions regarding PrEP use. Thus, the purpose of this work was to further understand the relationship between these structural factors and PrEP use among a sample of young adult SMM of diverse racial, ethnic and socioeconomic backgrounds. In particular, we (1) describe the awareness and use of PrEP in this sample; (2) examine the association between demographic states (race and ethnicity, income, health insurance status, and sexual orientation) and concerns about health care access, medication logistics, counseling support and stigma; and (3) assess the relationship between PrEP use and concerns about health care access, medication logistics, counseling support and stigma.

2. METHODS

2.1. Sample

Data was obtained from one wave of a longitudinal cohort study in the New York City metropolitan area involving young SMM individuals. From the 2009 version of the study, a total of 600 participants were recruited, out of which, 274 gave consent to participate in its continuation. An additional 391 participants were recruited, deemed eligible, and enrolled, to create a total baseline sample of 665. To determine HIV serostatus, a rapid HIV antibody test via finger prick was administered to HIV-negative participants. Of the baseline sample of 665, 629 were seronegative. Potential participants were recruited and assessed for eligibility between March 2014 and March 2016. Information on socio-demographic traits, health-related beliefs and behaviors, and psychosocial factors was collected at each visit via Audio Computer-Assisted Self-Interviews (ACASI). Further information in this study has been previously detailed [26, 53, 54].

Data utilized in these analyses were collected during the participants' first visit after baseline, which occurred six months later. At this point, there was an 80% retention rate since 503 participants out of the 629 HIV-negative baseline samples completed the six-month follow-up visit. A final sample of 492 was determined after 11 participants tested seropositive and were thus excluded from the analysis. A sub-analysis showed that these 11 individuals did not differ from the analytic sample along any of the key demographic characteristics. The measures administered at the six-month visit included the largest number of measures evaluating beliefs, perceptions, and concerns about PrEP. Participant demographic information, such as sexual orientation, race/ethnicity, foreign-born status, and annual personal income, was only ascertained at baseline. The federal approval of PrEP in the United States occurred two years prior to the collection of the data for the six-month assessment, which took place between 2014 and 2016. This investigation holds a Federal Certificate of Confidentiality. The protocol for this investigation received approval from the IRB of the institutions of the investigators.

2.2. Measures

2.2.1. Sociodemographic Characteristics—A single survey item was used to ascertain participants' race and ethnicity, categorized in these analyses as Hispanic/Latino, Black non-Hispanic, Asian non-Hispanic, Multiracial/Other non-Hispanic and White non-Hispanic. The Kinsey 7-item continuum ranging from (0) Exclusively Heterosexual to (6) Exclusively Homosexual [55] was used to determine sexual orientation. Consistent with previous studies, responses were dichotomized as either Exclusively Homosexual (6) or Not Exclusively Homosexual (0–5). Insurance status was ascertained through the use of a single survey item on the Affordable Care Act and categorized in these analyses as either Has Insurance or Does Not Have Insurance. Participants self-reported personal annual income; an original 12-category response set was recoded into two groups: less than \$14,999 per year; more than \$15,000. Dichotomizing income into these two categories enabled us to consider participants' potential healthcare access based on the maximum Medicaid-eligible annual income for New York state [56].

2.2.2. PrEP Use and Awareness—Two dichotomously coded questions were used to determine PrEP use and awareness, including “Have you heard of PrEP?” and “Have you ever taken PrEP?” When answering these questions, participants were provided with the following definition of PrEP: “an HIV-negative person taking a daily pill to prevent HIV”.

2.2.3. Healthcare Access—These analyses employed two items that address potential concerns about the logistics surrounding PrEP use. These items addressed level of concern about paying for PrEP and level of concern about having to see one's doctor regularly to refill prescriptions for PrEP. Participants were asked to rate each item in terms of their level of concern. Responses were self-reported on a 5-item Likert scale ranging from 1 = Very Concerned to 5 = Very Unconcerned.

2.2.4. Support and Counseling—Two items were used to address participants concerns about not receiving support and counseling while using PrEP. One item specifically assessed concern about taking PrEP without receiving support and counseling for taking PrEP, and the second more generally assessed concern about taking PrEP without receiving support and counseling for one's sex life. Participants were asked to rate each item in terms of their level of concern. Responses were self-reported on a 5-item Likert scale ranging from 1 = Very Concerned to 5 = Very Unconcerned.

2.2.5. Medication Logistics—These analyses employed two items that addressed potential concerns about adherence to PrEP. The first assessed concern about having to take a pill every day. The second assessed concern about taking PrEP without receiving daily reminders to take one's pill daily. Participants were asked to rate each item in terms of their level of concern. Responses were self-reported on a 5-item Likert scale ranging from 1 = Very Concerned to 5 = Very Unconcerned.

2.2.6. Stigma—Three items were employed to assess participants' concern about stigma surrounding PrEP use. Two measures particularly addressed stigma surrounding taking a daily pill. The first assessed level of concern that others will assume the participant has

HIV because they see them taking medication. The second more generally assessed level of concern that others will want to know why the participant is taking medication if they see them taking it. The third assessed stigma surrounding practitioner interactions, and assessed level of concern about having to talk with a doctor about one's sex life if taking PrEP. Participants were asked to rate each item in terms of their level of concern. Responses were self-reported on a 5-item Likert scale ranging from 1 = Very Concerned to 5 = Very Unconcerned.

2.3. Analytic Plan

Descriptive statistics were computed for each of the key demographic factors (race and ethnicity, sexual orientation, income and insurance status). To establish comparability, the baseline sample was compared to the analytic sample, and no socio-demographic differences were found between the two groups (Table 1). Socio-demographic factors were also analyzed using bivariable methods in relation to PrEP awareness and use, logistics, counseling/support, adherence and stigma. Next, using independent sample t-tests and one-way ANOVAs, we examined the relationships between PrEP use with logistics, counseling/support, adherence and stigma. Adjustments for multiple tests were made accordingly using Bonferroni correction. For the ANOVAs, we utilized Tukey comparisons for post-hoc testing. Covariates (logistics, counseling/support, adherence and stigma) significantly associated with PrEP use in the bivariable analyses were simultaneously examined with regard to their predictive power using a binary logistic model, controlling for demographic states. All analyses were conducted with SPSS version 23.

2.4. Results

2.4.1. Sample Characteristics—Included in the analytic sample were 492 HIV-negative participants who completed the six-month assessment. During this assessment, participants were asked questions about logistics, counseling, adherence, and stigma associated with PrEP use. As noted by this paper and other analyses of this sample, the baseline and analytic samples are comparable in terms of demographic characteristics of the participants (Table 1) [26]. The majority of the analytic sample is comprised of participants of color. Of the sample, 31.1% (n=153), identified as Hispanic/Latinx, 26.2% (n=129) identified as Black non-Hispanic, and 27.0% (n=133) identified as White non-Hispanic. The mean age was 22.47 years old (SD=0.63). Slightly more than half of the men in this sample identified as exclusively homosexual (50.8%, n=250) using the Kinsey Scale. The majority had (67.1%, n=330) had health insurance (either public or private). Nearly half (49.4%, n=243) of the sample had an annual personal income of \$15,00 or more.

2.4.2. PrEP Awareness and Use—Nearly all participants included in the analytic sample indicated they were aware of PrEP (96.1%, n = 473; CI = 94.4%, 97.8%); however, only 14.4% (n = 71; 95% CI 11.3%, 17.5%) had ever used PrEP. Bivariate analysis indicated that there were statistically significant differences in PrEP awareness by race and ethnicity ($\chi^2(4) = 11.99, p = 0.02$). Racial and ethnic minority men were less aware of PrEP than White non-Hispanic men. 95.4% (n=146) of Hispanic/Latinx, 93.0% (n=120) Black non-Hispanic, and 92.3% (n=36) of Asian non-Hispanic men indicated they were aware of PrEP as compared to 100% (n=133) of White non-Hispanic participants. We did not identify

any statistically significant difference in PrEP awareness by sexual orientation, insurance status, or annual personal income. We did not identify any statistically significant differences in PrEP use based on demographic characteristics (Table 2).

2.4.3. Demographic Differences in Logistics, Counseling, Adherence, and Stigma—We examined differences in PrEP-related logistics, counseling, adherence and stigma-related domains (Table 3). Differences arose by all demographic states. Concerns about PrEP arose by race/ethnicity across the following items: having to see a doctor regularly for prescriptions (F 5, 463 = 2.20, $p = 0.53$), not getting counseling and support for taking PrEP (F 5, 463 = 5.75, $p < 0.001$), not getting counseling and support for their sex life (F 5, 463 = 2.71, $p = 0.02$), taking a pill every day (F 5, 463 = 8.93, $p < 0.001$), taking PrEP without a daily reminder (F 5, 462 = 2.74, $p = 0.019$), having people think they are HIV positive if they are taking a pill every day (F 5, 464 = 3.56, $p = 0.004$), having people question why they are taking PrEP (F 5, 464 = 2.08, $p = 0.066$), and talking to their doctor about their sex life (F 5, 463 = 8.14, $p < 0.001$). Overall, White non-Hispanic participants reported being less concerned about these elements of PrEP logistics, counseling, adherence and stigma-related domains than racial and ethnic minority participants.

Differences arose among PrEP-related concerns by sexual orientation. Participants who identified as exclusively homosexual were less concerned about paying for PrEP (F 1, 468 = 4.11, $p = 0.043$). Similarly, participants who identified as exclusively homosexual were also less concerned about having to see a doctor regularly for prescriptions (F 1, 467 = 5.47, $p = 0.02$). Finally, participants who identified as exclusively homosexual were also less concerned about having people question why they are taking PrEP (F 1, 468 = 5.69, $p = 0.017$).

There were also differences about PrEP-related concerns based on insurance status. Those who did not have insurance were more concerned about not getting counseling and support for taking PrEP (F 6, 376 = 2.15, $p = 0.047$). Similarly, those without insurance were more concerned about taking PrEP without a daily reminder (F 6, 376 = 1.70, $p = 0.119$).

A number of differences also arose by annual personal income across the following items: concern about paying for PrEP (F 1, 446 = 5.12, $p = 0.024$), having to see a doctor regularly for prescriptions (F 1, 445 = 5.21, $p = 0.023$), not getting counseling and support for taking PrEP (F 1, 445 = 6.69, $p = 0.01$), not getting counseling and support for their sex life (F 1, 445 = 12.85, $p < 0.001$), taking PrEP without a daily reminder (F 1, 444 = 9.47, $p = 0.002$), having people think they are HIV positive if they are taking a pill every day (F 1, 446 = 12.36, $p < 0.001$), having people question why they are taking PrEP (F 1, 446 = 4.73, $p = 0.03$), and talking to their doctor about their sex life (F 1, 446 = 6.45, $p = 0.011$). Overall, participants with annual personal incomes higher than \$15,000 reported being less concerned about these elements of PrEP logistics, counseling, adherence and stigma-related domains than participants with annual personal incomes less than \$14,999.

2.4.4. PrEP Use by Logistics, Counseling, Adherence, and Stigma—We examined difference in PrEP use by logistics, counseling, adherence and stigma-related domains (Table 4). Those who had ever taken PrEP indicated less endorsement of logistical

concerns - paying for PrEP ($p < 0.001$) and routine medical visits for prescription refills ($p = 0.01$). Similarly, participants who had ever taken PrEP also indicated less endorsement of both counseling-related concerns including support for taking PrEP ($p < 0.001$) and support for their sex life ($p = 0.002$). Those who had ever taken PrEP also endorsed fewer concerns about taking PrEP without daily medication adherence reminders ($p = 0.005$). Finally, those who had ever taken PrEP endorsed fewer concerns about having to talk to their doctors about their sex life ($p = 0.001$).

Finally, we tested a multivariable model to explain PrEP use. Prior to the modeling, we assessed all PrEP-related domains for the effects of multicollinearity. We computed correlations between the logistics, counseling, adherence and stigma covariates which were to be included in the multivariable model (*i.e.*, only those associated with PrEP use). Most variables were either weakly or moderately correlated with the exception of concern about taking medication and thinking they have HIV, and taking medication and wanting to know why they are taking it, which was highly correlated (0.73, $p < 0.001$).

The binary logistic model was tested using a hierarchical entry with two blocks, controlling for race and ethnicity, sexual orientation, insurance status, and annual personal income, given their associations of these demographic states with PrEP use. Only the logistics, counseling, adherence and stigma covariates that were associated with ever using PrEP (Table 4) were entered in Block 2. The fit for the Block 1 model was not significant ($\chi^2(7) = 24.392$, $p = 0.605$), with Block 2 entry improving the fit over the demographic beginning block ($\chi^2(7) = 24.39$, $p = 0.001$). Table 5 reports results of the multivariate analysis. Less concern about paying for PrEP was associated with a higher likelihood of ever having used PrEP (AOR = 1.31, 95% CI = 1.02, 1.68, $p = 0.04$). Similarly, less concern about having to talk to their doctor about their sex life was associated with a higher likelihood of ever having used PrEP (AOR = 1.52, 95% CI = 1.03, 2.26, $p = 0.04$).

3. DISCUSSION

As noted here and elsewhere [26], PrEP awareness among our sample was nearly 100%, and yet the use was low. While Black and Latinx SMM were slightly less likely than White non-Hispanic SMM to be aware of PrEP, no differences were found in terms of PrEP use. This is an encouraging finding that perhaps suggests that the disparities in PrEP use are diminishing. This aligns with a previous study that also found no racial and ethnic differences in PrEP use [12]. However, other studies have suggested that SMM of color are dramatically less likely to use PrEP than White SMM [57]. More research is needed to further understand how PrEP use may differ among various subgroups of YSMM.

Our findings suggest that structural factors play a significant role in influencing PrEP use. In our bivariate models, healthcare access (seeing a doctor regularly for prescriptions), counseling support for PrEP use, counseling support for one's sex life, medication logistics (daily reminders) and stigma (talking to doctor about one's sex life) were statistically significant factors in predicting PrEP use. Our multivariate model revealed that concerns about paying for PrEP and concerns about talking to one's provider about sexual behaviors were the most salient factors in explaining an increased likelihood of having never used

PrEP. These findings align with previous literature that has found that cost concerns and provider stigma concerns are potential barriers to PrEP use for YSMM [58–60]. Taken together, these findings suggest that despite increased PrEP awareness among many subpopulations, the failings of the healthcare system have made it difficult for YSMM to successfully learn about and obtain PrEP. Starting and maintaining a PrEP regimen is a multi-step process for the individual with barriers to access and use at every point. In order to initiate PrEP, an individual must first visit a healthcare provider, test negative for HIV, and return for HIV testing every three months and STI testing every six months for as long as they are using PrEP. Each of these steps assumes that SMM have access to healthcare services either through a private doctor or community-based health facility. Moreover, it assumes that an individual has a provider with whom they feel comfortable talking about sexual behaviors.

Even when YSMM have access to healthcare services, providers may be ill-equipped to educate and prescribe PrEP. Provider knowledge of SMM's healthcare needs, especially knowledge of PrEP, is limited [61–65]. A 2015 study found that nationally, only 66% of physicians and nurse practitioners were aware of PrEP [63, 66], yet increased provider knowledge is associated with higher rates of both prescribing PrEP and future intent to prescribe [16]. Even if providers are aware of PrEP, many studies have found that providers are reluctant to prescribe PrEP due to concerns over adherence, future drug resistance, and prescribing toxic drugs to healthy patients [33, 67, 68]. Since these provider concerns mirror common patient concerns about PrEP use [16, 25, 26], it is unlikely that a provider with these concerns would be able to allay the concerns of a patient.

When individuals do manage to have access to a prescribing clinician, fears about experiencing stigma can dissuade YSMM from disclosing information about their sexual behaviors to their providers. In our study, a statistically significant portion of the participants was concerned about talking to their health care provider about their sex lives. This concern may arise from a lack of a regular health care provider, a discomfort with a current health care provider, or anticipation of judgment around sexual behavior [39, 40, 69]. The literature has strongly suggested that providers should specifically ask patients about their sexual behaviors [36, 70, 71], as disclosure of sexuality is a critical aspect of providing meaningful and comprehensive care [39, 72, 73]. It is important to note that in our sample, the proportion of participants who reported discomfort talking to their health care provider about their sex life was higher among those who identified as men of color. YSMM with intersectional identities are known to be the most vulnerable to infection with HIV and face the highest barriers to engaging in care [74–76]. Our finding echoes Lelutiu-Weinberger and colleagues' recent finding that Black and Latinx SMM were more likely than other SMM to perceive having to talk to their doctor about their sex life as a barrier to PrEP. Moreover, Black and Latinx SMM in this study were more likely to identify supportive services, such as counseling and text-based support, as significant facilitators [77]. This need for additional services, yet increased hesitance to disclose about sexuality/sex lives, calls for an especially sensitive approach on the part of providers. It is essential that these conversations be framed in a patient-centered way that encourages patient participation and limits perceptions of stigmatization and judgment.

Finally, our study showed that concerns about paying for PrEP persist despite public health efforts in New York City to help people uptake and pay for PrEP. Concerns about paying for PrEP have been documented across the country among SMM [78–80]. In a study of young SMM, researchers found that participants were more likely to have heard of PrEP if they were older, had more education, and had health insurance, among other factors. Moreover, concerns about paying for PrEP were specifically identified by participants as a perceived barrier to uptake [8]. In a multi-city study of clinical PrEP programs, having health insurance coverage was significantly associated with PrEP utilization, as participants with insurance were four times more likely than their non-insured counterparts to utilize PrEP services [81]. In a follow-up with participants from the US PrEP Demo Project, researchers found that those with health insurance and those with a primary care provider were more likely to successfully obtain PrEP [82]. These findings highlight the need for individuals to not only have health insurance, but to also perceive that PrEP is obtainable, and to specifically have a provider that is able to prescribe it. It is also essential that healthcare providers and their agents learn how to discuss not only sexuality and sexual behaviors, but also the resources that exist to pay for PrEP. Private and public insurance (including Medicaid), in conjunction with co-pay assistance programs, may help reduce costs for patients concerned about paying for PrEP. For those without insurance, patient assistance programs and safety-net hospitals and clinics may also reduce financial burdens. YSMM may not know how to begin these conversations, especially those who have never taken medications regularly, and thus it may fall to the provider to discuss this openly and proactively with patients who may be candidates for PrEP.

4. LIMITATIONS

There are some important limitations to note. The data presented here is cross-sectional and thus we are unable to establish causality. While our sample is a convenience sample, our study engaged in rigorous recruitment strategies to ensure that we sampled YSMM of diverse racial, ethnic and socioeconomic backgrounds. However, given that the study takes place in New York City where public health messaging around PrEP is higher, PrEP awareness among our sample may be higher than average. This particular urban context may also partially account for the lack of differences in PrEP use by race and ethnicity. Similarly, because the study takes place in New York City, where healthcare services are more readily available and often at a lower cost compared to other parts of the country, generalizability of concerns about health care providers may be limited. Given the availability of services in New York City, however, it is even more concerning that our sample expressed significant concern about paying for PrEP, as the availability of public health programming around PrEP might be even more limited in other parts of the country. It is also significant that this sample expressed concern in talking about sexual behaviors with health care providers, as NYC has more LGBTQ-affirming healthcare providers than most cities. Thus, it is worth noting that concerns about paying for PrEP and talking with health care providers about one's sexual behaviors are likely exacerbated in less urban areas [52]. Finally, there is always a risk of social desirability. To mitigate this risk, research staff received extensive training on how to elicit sensitive and potentially stigmatizing information. Moreover, the research team has established a strong rapport with P18 participants over the course of

the study, which enables participants to openly share information about their sexuality and sexual behaviors.

CONCLUSION

Although PrEP awareness appears to be increasing among YSMM populations, structural barriers hamper the ability of individuals to successfully learn about and obtain PrEP. Concerns about paying for PrEP, as well as concerns over experiencing stigma from one's patient-provider relationship and society more broadly, shape the context in which individuals think about potential side effects and contend with other beliefs, concerns and perceptions regarding PrEP [26]. Thus, it is imperative to address both individual-level and cognitive barriers as well as structural drivers in order to shift the trend in PrEP use among populations most in need of HIV prevention. These structural drivers demand urgent and meaningful changes to healthcare policy and the healthcare system, inclusive of the clinicians that are at the forefront of patient care.

Finally, it is important to note that efforts to increase PrEP knowledge and buy-in among healthcare providers necessitate a significant paradigm shift in HIV prevention. Prior to the introduction of PrEP, the message from health care providers regarding sexual risk among MSM predominantly revolved around overcoming barriers to condom use, and were often fear-based [83]. Many healthcare providers still struggle with a more nuanced conversation about sexual risk that involves a more varied approach to mitigating sexual risk [33]. It is critical for providers who prescribe PrEP to initiate conversations about sexual risk in an open, nonjudgmental way with all patients who may benefit from PrEP. This will demand that many providers reframe previous "safer sex" messages that spoke exclusively to the use of condoms to include biomedical prevention strategies (*e.g.*, PEP and PrEP). Thus, although endeavors to increase PrEP knowledge and awareness among SMM populations are increasing, clinicians, especially primary care providers, must be ready to create a nonjudgmental space to ask about sexual behaviors, be prepared to answer questions about cost concerns and help facilitate their patients' financially obtaining PrEP, and support policy efforts to provide health care coverage for all.

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Table 1. Demographic characteristics of P18 cohort study participants and analytic sample.

	Total Baseline Sample n=665		Analytic Sample n=492	
	%	n	%	n
Race/Ethnicity				
Hispanic/Latinx	32.2	214	31.1	153
Black non-Hispanic	27.4	182	26.2	129
Asian non-Hispanic	7.7	51	7.9	39
Mixed/Other non-Hispanic	6.0	40	7.7	38
White non-Hispanic	25.1	167	27.0	133
Sexual Orientation				
Not Exclusively Homosexual	49.9	332	49.2	242
Exclusively Homosexual	50.1	333	50.8	250
Insurance Status				
Has Insurance	56.9	378	67.1	330
Does Not Have Insurance	15.8	105	14.2	70
Annual Personal Income				
< 14,999	74.1	493	45.7	225
>15,000	3.5	23	49.4	243

Table 2.

PrEP awareness and use by participant demographics.

	PrEP Awareness n=473			PrEP Use n=71		
	%	n	p	%	n	p
Race/Ethnicity			0.02			0.31
Hispanic/Latinx	95.4	146		19.2	28	
Black non-Hispanic	93.0	120		14.2	17	
Asian non-Hispanic	92.3	36		5.6	2	
Mixed/Other non-Hispanic	100	38		15.8	6	
White non-Hispanic	100	133		15.0	18	
Sexual Orientation			0.44			0.73
Not Exclusively Homosexual	95.5	231		15.6	36	
Exclusively Homosexual	96.8	242		14.5	35	
Insurance Status			0.34			0.67
Has Insurance	96.4	318		13.5	43	
Does Not Have Insurance	98.6	69		11.6	8	
Annual Personal Income			0.68			0.18
< 14,999	96.0	216		12.5	27	
>15,000	96.7	235		17.0	40	

Table 3.

Logistics, counseling, adherence and stigma by participant characteristics.

	Race/Ethnicity					Sexual Orientation			Insurance Status			Annual Personal Income	
	Hispanic/Latinx	Black non-Hispanic	Asian non-Hispanic	Mixed/Other non-Hispanic	White non-Hispanic	Not Exclusively Homosexual	Exclusively Homosexual	Has Insurance	Does Not Have Insurance	<14,999	>15,000	Mean (SD)	P
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	P	P
Healthcare access (p_{crit} =.025)													
I am concerned about paying for PrEP	2.85 (1.52)	2.64 (1.48)	2.22 (1.15)	2.47 (1.54)	2.73 (1.35)	2.47 (1.36)	2.73 (1.50)	2.67 (1.42)	2.36 (1.48)	2.44 (1.38)	2.74 (1.49)	0.10	0.02
I am concerned about having to see my doctor regularly to refill my prescriptions for PrEP	3.57 (1.33)	3.22 (1.31)	2.89 (1.33)	3.32 (1.42)	3.45 (1.26)	3.23 (1.37)	3.51 (1.27)	3.41 (1.29)	3.36 (1.40)	3.22 (1.34)	3.50 (1.30)	0.77	0.02
Counseling and Support(p_{crit} =.025)													
I am concerned about taking PrEP without also getting counseling and support for taking PrEP	3.32 (1.24)	3.11 (1.38)	2.83 (1.11)	3.29 (1.43)	3.81 (1.12)	3.29 (1.30)	3.44 (1.27)	3.49 (1.25)	2.97 (1.35)	3.17 (1.29)	3.59 (1.23)	0.002	<0.001
I am concerned about taking PrEP without also getting counseling and support for my sex life	3.69 (1.25)	3.38 (1.24)	3.00 (1.15)	3.79 (1.32)	4.14 (0.96)	3.61 (1.21)	3.77 (1.22)	3.79 (1.18)	3.54 (1.24)	3.54 (1.24)	3.84 (1.18)	0.11	0.01

	Race/Ethnicity					Sexual Orientation			Insurance Status		Annual Personal Income	
	Hispanic/Latinx	Black non-Hispanic	Asian non-Hispanic	Mixed/Other non-Hispanic	White non-Hispanic	Not Exclusively Homosexual	Exclusively Homosexual	Has Insurance	Does Not Have Insurance	<14,999	>15,000	P
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	P
Medication logistics (P_{crit} = .025)												
I am concerned about taking a pill everyday	3.02 (1.36)	2.52 (1.35)	2.53 (1.08)	3.53 (1.41)	3.45 (1.35)	2.94 (1.36)	3.09 (1.42)	3.11 (1.38)	3.09 (1.43)	2.92 (1.40)	3.14 (1.40)	0.08
I am concerned about taking PrEP if I don't receive daily reminders (text messages, etc.) to take my pill	3.50 (1.37)	3.33 (1.42)	3.03 (1.25)	3.71 (1.29)	3.75 (1.17)	3.41 (1.36)	3.60 (1.29)	3.63 (1.28)	3.28 (1.43)	3.30 (1.39)	3.69 (1.26)	0.002
Stigma (P_{crit} = .02)												
I am concerned that people will see me taking medication and think I have HIV	3.64 (1.38)	3.46 (1.50)	3.53 (1.21)	4.05 (1.31)	4.08 (1.12)	3.66 (1.37)	3.82 (1.32)	3.82 (1.28)	3.83 (1.40)	3.54 (1.38)	3.98 (1.26)	0.001
I am concerned that people will see me taking medication (PrEP) and will want to know why I am taking it	3.29 (0.87)	3.40 (1.34)	3.28 (1.26)	3.66 (1.34)	3.85 (1.17)	3.43 (1.35)	3.72 (1.26)	3.64 (1.29)	3.59 (1.43)	3.47 (1.28)	3.74 (1.31)	0.03
I am concerned about having to talk to my doctor about	4.03 (1.23)	3.78 (1.35)	3.56 (1.34)	4.05 (1.27)	4.21 (1.09)	3.93 (1.26)	4.03 (1.23)	4.06 (1.21)	4.20 (1.05)	3.87 (1.34)	4.16 (1.10)	0.01

	Race/Ethnicity					Sexual Orientation		Insurance Status		Annual Personal Income		
	Hispanic/Latinx	Black non-Hispanic	Asian non-Hispanic	Mixed/Other non-Hispanic	White non-Hispanic	Not Exclusively Homosexual	Exclusively Homosexual	Has Insurance	Does Not Have Insurance	<14,999	>15,000	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	P
my sex life if I am on PrEP												

NOTE: Five point Likert scale 1= very concerned, 5= very unconcerned.

Table 4.

Use of PrEP by PrEP-related logistics, counseling, adherence and stigma.

	PrEP Ever Used				p
	No		Yes		
	Mean (SD)	n	Mean (SD)	n	
Healthcare access (p_{crit} = .025)					
I am concerned about paying for PrEP	2.48 (1.37)	399	3.31 (1.64)	71	<0.001
I am concerned about having to see my doctor regularly to refill my prescriptions for PrEP	3.31 (1.30)	398	3.73 (1.38)	71	0.01
Counseling and Support (p_{crit} = .025)					
I am concerned about taking PrEP without also getting counseling and support for taking PrEP	3.27 (1.27)	398	3.89 (1.25)	71	<0.001
I am concerned about taking PrEP without also getting counseling and support for my sex life	3.62 (1.21)	398	4.10 (1.17)	71	0.002
Medication logistics (p_{crit} = .025)					
I am concerned about taking a pill everyday	2.97 (1.41)	399	3.30 (1.24)	71	0.07
I am concerned about taking PrEP if I don't receive daily reminders (text messages, etc.) to take my pill	3.44 (1.34)	397	3.89 (1.19)	71	0.005
Stigma (p_{crit} = .02)					
I am concerned that people will see me taking medication and think I have HIV	3.72 (1.35)	399	3.85 (1.34)	71	0.48
I am concerned that people will see me taking medication (PrEP) and will want to know why I am taking it	3.53 (1.31)	399	3.85 (1.28)	71	0.06
I am concerned about having to talk to my doctor about my sex life if I am on PrEP	3.91 (1.27)	399	4.41 (1.05)	71	0.001

NOTE: Five point Likert scale 1 = very concerned, 5= very unconcerned

Table 5.

Multivariable model explaining PrEP use.

	Demographic Block Model			Full Model		
	OR	95% CI	p-value	OR	95% CI	p-value
Race/Ethnicity						
Hispanic/Latinx	1.42	0.68–2.97	0.35	1.50	0.68–3.31	0.31
Black non-Hispanic	0.84	0.35–2.01	0.69	0.80	0.31–2.05	0.64
Asian non-Hispanic	0.54	0.12–2.51	0.43	0.89	0.18–4.41	0.89
Mixed/Other non-Hispanic	1.49	0.49–4.59	0.48	1.28	0.39–4.20	0.68
White non-Hispanic	1.00	---	0.57	1.00	---	0.69
Sexual Orientation						
Not Exclusively Homosexual	1.00	---				
Exclusively Homosexual	1.06	0.58–1.95	0.84	1.51	0.60–2.20	0.67
Insurance Status						
Has Insurance	0.73	0.31–1.72	0.47	0.83	0.34–2.07	0.69
Does Not Have Insurance	1.00	---				
Annual Personal Income						
< 14,999	1.00	---				
> 15,000	0.66	0.35–1.24	0.20	0.77	0.40–1.49	0.44
Access/counseling support/med. logistics/stigma						
I am concerned about paying for PrEP	---	---	---	1.31	1.02–1.68	0.04
I am concerned about having to see my doctor regularly to refill my prescriptions for PrEP	---	---	---	0.88	0.65–1.19	0.41
I am concerned about taking PrEP without also getting counseling and support for taking PrEP	---	---	---	1.16	0.77–1.74	0.49
I am concerned about taking PrEP without also getting counseling and support for my sex life	---	---	---	1.09	0.70–1.71	0.71
I am concerned about taking PrEP if I don't receive daily reminders (text messages, etc.) to take my pill	---	---	---	0.98	0.73–1.31	0.89
I am concerned about having to talk to my doctor about my sex life if I am on PrEP	---	---	---	1.52	1.03–2.26	0.04