

PrEP Access Affected by COVID-19 Is Associated With Increased Odds of HIV Seroconversion

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Abstract: Black and Hispanic/Latino sexual minority men and gender diverse (SMMGD) individuals report lower uptake and adherence to pre-exposure prophylaxis (PrEP) compared with White SMMGD. For some, the COVID-19 pandemic has resulted in reduced access to PrEP prescriptions and related changes to PrEP use, yet little is known how pandemic-related changes to PrEP access and sexual activity might influence sexually transmitted infection (STI) status and HIV seroconversion among SMMGD of color. We used data from 4 waves of a national study of Black and Hispanic/Latino SMMGD's HIV, PrEP, and health experiences to assess whether self-reported changes to sexual activity were associated with STI status, and whether self-reported changes to PrEP access were associated with HIV seroconversion. Those who reported greater impact to their sexual activity during the pandemic [adjusted odds ratio (aOR) = 1.24; 95% confidence interval (CI): 1.10 to 1.40] and a greater number of sexual partners (aOR = 1.29; 95% CI: 1.21 to 1.38) were more likely to report a positive STI test. In addition, we found that compared with those who did not report pandemic-related changes to PrEP access, those who did report changes to PrEP access had significantly higher odds of HIV seroconversion during the study period (aOR = 2.80; 95% CI: 1.02 to 7.68). These findings have implications for HIV and STI prevention and highlight the importance of novel interventions to improve PrEP access among Black and Hispanic/Latino SMMGD. Importantly, these findings also demonstrate the need to stay focused on key populations at risk of HIV infection during emerging public health crises to avoid an increase in rates of new diagnoses.

Key Words: PrEP, HIV prevention, COVID-19, pandemic, MSM

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INTRODUCTION

Past research has long demonstrated that gay and bisexual men of color are at significantly greater risk of HIV infection relative to their White counterparts.^{1–3} For example, White men who have sex with men (MSM) have

experienced a recent decline in new HIV diagnoses, whereas rates of new diagnoses among Black and Hispanic/Latino MSM have continued to rise with the steepest increase seen among Hispanic/Latino MSM.⁴ Even after FDA approval of pre-exposure prophylaxis (PrEP), these disparities have persisted, largely because of differences in prescribing rates and uptake of the medication^{5–7} and even in light of heightened awareness of the PrEP.^{8,9} Unfortunately, access to and use of PrEP has been severely affected by the COVID-19 pandemic,¹⁰ yet little is known about how these changes may translate to changes in risk of HIV seroconversion.

Before the onset of the COVID-19 pandemic, uptake of PrEP, although increasing rapidly in some communities,⁶ was generally found to be slower than anticipated.^{11,12} For example, the Centers for Disease Control and Prevention estimates suggest that uptake of PrEP increased from about 3% of eligible individuals in 2015 to only 25% in 2020, although this did correspond to overall reductions in new HIV diagnoses.¹³ The COVID-19 pandemic, however, has presented challenges in limiting access to healthcare among marginalized populations such as sexual minorities, particularly in mechanisms such as social isolation and distancing.^{14,15} Past research in this area has consistently demonstrated that higher levels of social isolation and loneliness are associated with poorer health outcomes.^{16,17} During the pandemic, this social isolation/distancing may have translated into limited access to and use of PrEP. For example, one study, comprised primarily of sexual minority individuals of color, noted that 20% of participants had difficulty getting or filling prescriptions, approximately 14% discontinued use, and only 13.5% of eligible individuals were currently using PrEP.¹⁰ Missing from these past studies, however, is a more nuanced discussion of whether reduced or discontinued use of PrEP may be attributable to corresponding reductions in sexual activity. Even considering this missing discussion, data such as these could suggest a regression in PrEP uptake as a result of the pandemic which may directly affect the rate of new HIV diagnoses.

Equally important to understanding PrEP use is the extent to which sexual activity was affected during the pandemic. Research in this area, however, has been mixed. A second study among Latino sexual minority men in Florida noted several themes; key among them were some reporting near abstinence during the pandemic, whereas others reported an initial reduction in the number of sexual partners followed by a return to prepandemic levels of sexual activity after “quarantine fatigue”.¹⁸ Still further research among young adults in Australia noted a decrease in the rate of condom use during the pandemic, relative to prepandemic levels.¹⁹

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Findings such as these suggest that not only may there be increased odds of sexually transmitted infections (STIs) as a result of changes in sexual activity during the pandemic, but that, coupled with reductions in PrEP access and use, odds of HIV seroconversion may also have changed drastically.

Given this body of past research and limited work in this area, it is key to develop a better understanding of COVID-19–related impact on STI and HIV transmission. To address this gap in the literature, we used data from the Study of PrEP and Substance Use National Survey, conducted among Black and Hispanic/Latino sexual minority men and gender diverse (SMMGD) individuals, a demographic at greatest risk of HIV diagnosis.² There are 2 primary goals of this analysis, namely to assess: (1) whether pandemic-related changes to self-reported sexual activity were associated with risk of either STI or HIV acquisition and (2) whether pandemic-related impact to PrEP access is associated with HIV seroconversion.

METHODS

Study Design and Participant Recruitment

Data for this analysis come from 4 waves of the *PrEP and Substance Use National Survey*, an online survey assessment of Black and/or Hispanic/Latino sexual minority men and gender diverse (SMMGD) individual's sexual health history and overall health experiences. All study protocols, including permission to recontact participants for follow-up waves 2–4, were approved by the University of Connecticut's Institutional Review Board.

In March–August of 2020, we conducted a baseline survey (wave 1) 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 (eg, 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.

Next, we used longitudinal methodologies to follow a subset of participants from the baseline survey (waves 2–4). Given the established limited uptake of and adherence to PrEP among our targeted population, researchers prioritized recontacting baseline (wave 1) participants who reported either current PrEP use or use at least once in their lifetime. Of the 992 participants who completed the baseline survey, 300 participants consented to participate in 3 additional survey waves (waves 2–4) that were administered every 4 months. The first follow-up survey (ie, wave 2) was completed between February and March 2021. The second

(ie, wave 3) was collected between July and August 2021—retention was N = 290/300. Finally, the third follow-up survey was completed (ie, wave 4) between October and November 2021, and N = 287/300 were retained. The recall period for all survey measures was thus 4 months. Participants were remunerated \$25, \$30, and \$35 gift cards to Amazon or Venmo (cash) payments for participation in second, third, and fourth surveys, respectively.

Measures

Variables Affected by COVID-19 Pandemic

As this survey began during the onset of the COVID-19 pandemic, we assessed changes in access to PrEP during the pandemic. To assess this impact, we asked the following, “Has your access to PrEP been impacted by the COVID-19 pandemic?” with no/yes responses. Secondly, we assessed COVID-19–related changes to participants' sexual activity using a Likert scale of not at all, a little, moderately, quite a bit, and extremely. This variable was operationalized as a continuous variable, with higher scores indicating greater COVID-19–related impact to one's sexual activity. Note that directionality cannot be inferred from the sexual activity variable because this was not specified in the survey.

HIV and STI Status

HIV and STI status were self-reported by participants and each operationalized as dichotomous variable. The HIV seroconversion variable was defined as those reporting as HIV-negative at baseline and HIV-positive at any of the 4 subsequent waves, operationalized as a dichotomous seroconverted/did not seroconvert variable. Participants were not required to participate in all 3 waves of data collection to be defined as seroconverted. To remain consistent with the HIV variable definition, STI status was defined as those reporting any positive STI test at baseline or any of the follow-up surveys.

Sociodemographics

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.” Given the low percentages of some racial identities, we recoded participants into categories of Black, White, and a different identity. Race was operationalized as a categorical variable. Ethnicity was assessed by asking participants, “Are you Hispanic/Latino?” Response options were “no” and “yes” and coded dichotomously for this analysis. Ethnicity and race were treated as separate variables in all analyses.

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 these analyses, 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,” “nonbinary,” “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; eg, transgender, agender, nonbinary).

Age

Participants’ 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.

Analyses

Analytic Sample

In total, 992 SMMGD responded to the run-in baseline survey (wave 1). Although run-in baseline data collection began in March 2020, COVID-19 was declared a pandemic after we had begun collecting data. After we collected data from N = 186 participants, we introduced items to better understand how the pandemic was affecting health behaviors. Because of this delayed inclusion of COVID-19 items into our study, the analytic sample size for baseline data was reduced to 796 (additional 1.2% because of missing data). Analyses that measure the associations between changes in behavior related to COVID-19 use data from the run-in baseline survey (ie, wave 1), N = 796 (Tables 1 and 2).

Based on the variable definition, HIV seroconversion could only be assessed among those who participated in more than only the run-in baseline survey (ie, wave 1). We measured HIV seroconversion and STIs among participants who self-reported newly testing positive for HIV or self-reported a diagnosis of a STI during any wave of the study (ie, at waves 2–4). A total of 292 participants reported their HIV and STI statuses in at least one of 3 follow up waves, but 22 participants were missing data, resulting in a sample size of N = 270 in the second model. Table 3 reports the findings related to this analytic sample of N = 270 participants.

Statistical Analyses

Participant characteristics were described using mean values, standard deviations, and proportions, as appropriate. First, separate multivariable logistic regression models used data to assess the association between odds of testing positive for any STI across the 4 study visits and (1) COVID-19–related changes to sexual activity; and (2) COVID-19–related impacts

to PrEP access. Next, among participants who reported an HIV-negative status at the baseline, multivariable logistic regression models were used to assess the association between COVID-19–related impacts to PrEP access and odds of HIV seroconversion during the study period. Both models were adjusted for demographic characteristics and known confounders based on a priori hypotheses and previous literature. Statistical significance was established at alpha <0.05. All analyses were performed in Stata 17.0.

RESULTS

At baseline (Table 1), the mean age of the analytic sample (N = 796) was 25.1 years (SD = 2.8). Four hundred ninety-nine (62.7%) participants identified as Hispanic/Latino, whereas 297 (37.3%) identified as not Hispanic/Latino. In relation to race, 328 (41.2%) identified as Black, 228 (28.6%) as White, and 240 (30.2%) as a different race or as multiracial. A majority of the sample identified as gay (n = 613, 77.0%), followed by those identifying as bisexual (n = 98, 12.2%), and those identifying in a different way (n = 85, 10.7%). A plurality of participants reported an income level of <\$25,000 per year (n = 359, 45.1%). Access to PrEP during the COVID-19 pandemic was reported as affected by 109 participants (13.8%), whereas COVID-

TABLE 1. Demographic Characteristics Among Sample Participants (N = 796)

Characteristic	n (%)	Mean (SD)
Age	—	25.1 (2.8)
Race		
White	228 (28.6)	—
Black	328 (41.2)	—
Different identity	240 (30.2)	—
Ethnicity		
Not Hispanic/Latino	297 (37.3)	—
Hispanic/Latino	499 (62.7)	—
Sexual orientation		
Gay	613 (77.0)	—
Bisexual	98 (12.2)	—
Different orientation	85 (10.7)	—
Gender		
Cisgender	753 (94.6)	—
Gender diverse	43 (5.4)	—
Income		
<\$25,000	359 (45.1)	—
\$25,001–\$50,000	258 (32.4)	—
≥\$50,001	179 (22.5)	—
No. of sexual partners	—	2.8 (2.5)
Affected by COVID-19		
PrEP access	109 (13.8)	—
Sexual activity scale	—	3.0 (1.5)
STI, any positive test	204 (25.6)	—
HIV, seroconvert	25 (8.6)*	—

*Percent of those who participated in baseline assessment and reported HIV status at at least one follow-up wave, n = 292.

19-related changes to sexual activity were, on average, moderate (mean = 3.0, SD = 1.5). Two hundred four participants (25.6%) reported any positive STI test and 25 (8.6%) reported HIV seroconversion over the study period.

Table 2 used multivariable logistic regression models to examine the association between COVID-19-related changes to sexual activity and a positive STI test at any point during the study period. Relative to gay-identifying participants, those who identified as bisexual [adjusted odds ratio (aOR) = 0.41; 95% confidence interval (CI): 0.22 to 0.78] or a different sexual orientation (aOR = 0.52; 95% CI: 0.28 to 0.97) each were significantly less likely to report a positive test for any STI. Those reporting both greater impact to their sexual activity during the pandemic (aOR = 1.24; 95% CI: 1.10 to 1.40) and a greater number of sexual partners (aOR = 1.29; 95% CI: 1.21 to 1.38) were each more likely to report a positive STI test. No significant association was observed between STI status and age, race, ethnicity, or income. There was also no significant association between COVID-19-related impact to PrEP access and STI status (data not shown).

Table 3 presents findings that used multivariable logistic regression models to assess the relationship between pandemic-related impacts to PrEP access and odds of HIV seroconversion during the study period among those completing follow-up surveys. Compared with those whose PrEP access was not affected, those whose access was affected were significantly more likely to report HIV seroconversion during the study period (aOR = 2.80; 95% CI: 1.02 to 7.68).

TABLE 2. Adjusted Logistic Regression Analyses Examining the Association Between Diagnosis for Any STI and COVID-19-Related Changes to Sexual Activity (N= 796)*

	aOR	95% CI
Age	1.03	0.96 to 1.10
Race		
White	Ref	—
Black	1.45	0.68 to 3.07
Different identity	1.21	0.78 to 1.89
Ethnicity		
Not Hispanic/Latino	Ref	—
Hispanic/Latino	1.28	0.62 to 2.62
Sexual orientation		
Gay	Ref	—
Bisexual	0.41†	0.22 to 0.78
Different orientation	0.52‡	0.28 to 0.97
Income		
<\$25,000	Ref	—
\$25,001–\$50,000	0.99	0.66 to 1.49
≥\$50,001	1.14	0.72 to 1.79
COVID sexual activity impact scale	1.24§	1.10 to 1.40
No. of sexual partners	1.29§	1.21 to 1.38

*Gender did not moderate relationship, thus was not included in model.

†P ≤ 0.01.

‡P ≤ 0.05.

§P ≤ 0.001.

TABLE 3. Adjusted Logistic Regression Analyses Examining the Association Between HIV Seroconversion and COVID-Related Impacts to PrEP Access (n = 270)*†

	aOR	95% CI
Age	0.84‡	0.72 to 0.99
Race		
White	Ref	—
Black	3.37	0.54 to 21.07
Different identity	1.39	0.39 to 4.99
Ethnicity		
Not Hispanic	Ref	—
Hispanic	1.20	0.21 to 6.84
Sexual orientation		
Gay	Ref	—
Bisexual	2.18	0.68 to 7.02
Different orientation	0.50	0.06 to 4.29
Income		
<\$25,000	Ref	—
\$25,001–\$50,000	0.84	0.30 to 2.35
≥\$50,001	0.48	0.14 to 1.68
COVID sexual activity impact scale	0.86	0.62 to 1.18
No. of sexual partners	1.01	0.84 to 1.21
PrEP COVID access		
No	Ref	—
Yes	2.80‡	1.02 to 7.68

*Among those who participated in baseline assessment and reported HIV status at at least one follow-up wave, n = 292, model observations further reduced because of missing data.

†Gender did not moderate relationship, thus was not included in model.

‡P ≤ 0.05.

Additionally, age was significantly associated with seroconversion during the study period (aOR = 0.84; 95% CI: 0.72 to 0.99). No significant association was observed with regards to sexual orientation, race, ethnicity, income, COVID-19 sexual activity impact, or number of sexual partners. No significant relationship existed between COVID-19-related changes to sexual activity and HIV seroconversion (data not shown).

DISCUSSION

Research conducted during the COVID-19 pandemic has documented changes in sexual minority men and gender diverse individuals' PrEP access and use. In this study, we evaluated whether changes in PrEP access and use were associated with HIV seroconversion in a sample of 18- to 29-year-old Black and Hispanic/Latino SMMGD. This study builds upon previous findings by demonstrating that, over a 1-year period, disruptions to PrEP access were associated with higher odds of HIV seroconversion compared with those who reported no disruptions to PrEP access. We also found that those who reported more pandemic-related changes to sexual activity and a greater number of sexual partners were associated with higher odds of a positive self-reported STI test during the study period. These findings highlight the

importance of adapting HIV prevention services, such as PrEP provision, during public health crises to continue reducing the number of new HIV diagnoses.

We found that those who reported changes to their PrEP access during the pandemic had higher odds of HIV seroconversion compared with those who reported no changes to PrEP access. In previous studies among samples of sexual minority men, changes were reported in access to PrEP prescriptions during the pandemic and difficulty accessing HIV testing.^{10,20} Conversely, work among HIV-diagnosed sexual minority men, female sex workers, and transgender women observed that community-based organizations assisted with antiretroviral medication delivery resulting in generally consistent adherence during the pandemic.²¹ Taken together, these findings suggest that PrEP prescriptions, and potentially HIV testing services, may have fallen during the pandemic unlike HIV medication delivery demonstrating implications for HIV transmission. Novel interventions are needed to improve PrEP access among Black and Hispanic/Latino SMMGD, particularly during public health crises such as the pandemic, to reduce odds of HIV seroconversion and transmission. For example, the expansion of telehealth and mail-order prescriptions could help SMMGD retain access to PrEP prescriptions. Structural-level interventions are also warranted, such as programs and policies that address loss of health insurance resulting from pandemic-related unemployment.

We also found that greater sexual activity and a greater number of sexual partners in the previous 3 months were associated with higher odds of an STI diagnosis.

Given that 10.5% of sexual minority young men reported difficulty accessing STI tests during the pandemic,¹⁰ this result highlights an ongoing need for STI prevention services amidst the pandemic.

Bisexual men and men with sexual orientations that were not listed as options (eg, something else) had lower odds of reporting any STI compared with gay men. Furthermore, compared with gay men, bisexual men had higher odds of HIV seroconversion during the study period. This finding highlights sexual orientation-related disparities in HIV outcomes among SMMGD of color—findings that are often not available because of the conflation of sexual identities in HIV research.⁸ Future research should continue to investigate differential impacts of the COVID-19 pandemic on SMMGD's HIV outcomes.

LIMITATIONS

Despite the contributions of this study in expanding knowledge about HIV seroconversion during the COVID-19 pandemic, these findings should be considered in light of several limitations. First, data were collected online from a nonprobability 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. Moreover, following the baseline survey, we prioritized men with a history of PrEP use for follow-up. Future research is needed to understand how changes to PrEP

access may affect HIV seroconversion among men seeking to initiate PrEP for the first time. STI and HIV status were also self-reported and were not verified via laboratory testing nor were participants asked to self-report individual STI status to protect their privacy. Next, social desirability biases may play or have played a role in participant's responses; however, this issue should have been mitigated by the anonymity of the survey, methods which have been shown to substantially reduce this bias.²² Finally, with respect to changes in sexual activity, this study did not measure the direction of change, only whether it changed in general. Future work should aim to develop a better longitudinal understanding of the relationship between these PrEP use and directional changes in sexual activity.

CONCLUSIONS

The COVID-19 pandemic has disrupted PrEP access for some SMMGD, yet the consequences of these disruptions on HIV risk are unknown. To our knowledge, this is the first study to document that changes to PrEP access during COVID-19 were associated with higher odds of HIV seroconversion in a sample of 18- to 29-year-old Black and Hispanic/Latino SMMGD. HIV prevention efforts—including healthcare system and policy-level interventions—are necessary to ensure that those who use PrEP retain access to their medication, particularly in the face of coinciding public health epidemics.

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