



# Sex in the Era of COVID-19 in a U.S. National Cohort of Cisgender Men, Transgender Women, and Transgender Men Who Have Sex with Men: April–May 2020

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## Abstract

Since the emergence of the COVID-19 pandemic, there has been an increasing body of research focused on the effects that measures like stay-at-home orders and social distancing are having on other aspects of health, including mental health and sexual health. Currently, there are limited extant data on the effects of the pandemic on sexual and gender minorities. Between April 15, 2020, and May 15, 2020, we invited participants in an ongoing U.S. national cohort study (*Together 5000*) to complete a cross-sectional online survey about the pandemic, and its effects on mental and sexual health and well-being ( $n=3991$ ). Nearly all (97.7%) were living in an area where they were told they should only leave their homes for essentials. Most (70.1%) reported reducing their number of sex partners as a result of the pandemic. Among the 789 participants prescribed HIV pre-exposure prophylaxis (PrEP), 29.9% said they stopped taking their PrEP entirely, and 14.2% started selectively skipping doses. For those who had been taking PrEP, discontinuing PrEP was associated with having no new sex partners ( $\beta=0.90$ , 95% CI 0.40–1.40). Among the 152 HIV-positive participants, 30.9% said they were unable to maintain an HIV-related medical appointment because of the pandemic and 13.8% said they had been unable to retrieve HIV medications. Additionally, 35.3% of participants were experiencing moderate to severe anxiety because of the pandemic and 36.7% reported symptoms of depression. In a multivariable logistic regression, reporting a new sex partner in the prior 30 days was significantly associated with being aged 30 or older (vs. not, AOR = 1.21), being Black (AOR = 1.79) or Latinx (AOR = 1.40, vs. white), and being unsure if they had been in close contact with someone diagnosed with COVID-19 (AOR = 1.32, vs. no contact). It was unassociated with COVID-19-induced anxiety, depression, or knowing someone hospitalized with COVID-19. The pandemic has caused disruptions in sexual behavior (partner reduction) as well as difficulties navigating PrEP and HIV care continua. Findings will guide more comprehensive public health responses to optimize HIV prevention and treatment in the era of COVID-19.

**Keywords** COVID-19 · Sexual and gender minorities · Mental health · Pre-exposure prophylaxis · HIV care · Sexual behavior · Transgender

## Introduction

The emergence of the 2019 severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)—the virus that causes coronavirus disease 2019 (COVID-19)—and the worldwide pandemic that subsequently began in early 2020 has impacted life across the globe in profound ways. By April 15, 2020, there were almost 2 million confirmed cases of SARS-CoV-2, and over 130,000 COVID-19-related deaths globally, and by May 15, 2020 (just one month later), there were over 4.3 million cases and nearly 300,000 deaths globally, with the USA quickly bearing the brunt of case load and deaths per capita compared to other nations (World Health Organization, 2020). In response

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to the first wave of cases in the USA, top health officials issued nationwide recommendations for “social” (i.e., physical) distancing in order to slow the spread of the virus, though restrictions on movement (through the mandated closure of businesses and schools) were left to leaders in local states and municipalities (Moreland et al., 2020).

Since the onslaught of the pandemic, there has been an increasing body of research focused on the secondary and tertiary effects of measures like stay-at-home orders and social distancing on other aspects of health, including mental health and sexual health. This has been particularly the case for marginalized populations, including sexual and gender minorities (SGM) across the globe (Flentje et al., 2020; Gonzales et al., 2020; Phillips Ii et al., 2020). Some common themes observed in the literature to date have noted disruptions in sexual behavior (e.g., partner reduction; Hammoud, et al., 2020a, 2020b; Sanchez et al., 2020), as well as disruptions in access to health care, including sexual health care (Rao et al., 2020a; Santos et al., 2020). For example, studies of gay, bisexual, and other men who have sex with men have shown reductions in the number of casual sex partners, condomless anal sex, frequency of sex with casual partners, as well as reductions in SARS-CoV-2 risk behaviors like kissing (Hammoud, Grulich, et al., 2020; Hammoud, et al., 2020a, 2020b; Sanchez et al., 2020; Shilo & Mor, 2020; Starks et al., 2020). However, one study found slight increases in number of sexual partners between March and May of 2020, with higher numbers of casual sex partners associated with substance use (Stephenson et al., 2020). Further, a study of men who have sex with men (MSM) in Israel found that those who continued to engage in in-person sex despite COVID-19 restrictions were more likely to be younger and reported higher levels of distress, compared to those forgoing in-person sex (Shilo & Mor, 2020). Additionally, another study assessed the introduction of “a new addition” into participants’ sex lives, which included trying new sexual positions, sexting, sending nude photos, webcamming among other alternates to in-person sex, which SGM participants were more likely to endorse (Lehmiller et al., 2020). Thus, although much of the current data suggest decreases in in-person sexual behaviors, some may be more likely than others to engage in-person sex, while others opt for solo and cyber-sex to fill the COVID-19 “sex gap.”

In addition to changes in sexual behavior, access to sexual health care has been disrupted by the ongoing pandemic. Specifically, some studies have reported disruptions in HIV care (Ridgway et al., 2020), including challenges accessing HIV-related clinical appointments, laboratory testing and antiretroviral (ARV) medication as a result of COVID-19 (Rao et al., 2020b; Sanchez et al., 2020; Santos et al., 2020). One study of 122 US MSM found that although most were able to maintain their ARV regimen, 20% reported challenges making or keeping an HIV-related clinical appointment and 24% reported decreased access to viral load or other HIV disease marker reports (Sanchez et al., 2020). Further, several studies have

reported both disruptions in PrEP-related care, and/or voluntary discontinuations as a result of the pandemic (Chow et al., 2020; Hammoud, Grulich, et al., 2020; Sanchez et al., 2020; Stephenson et al., 2020). Some studies have also shown that SGM populations reported reduced access or perceived reduced access to HIV and STI testing during the pandemic (Rao et al., 2020a; Sanchez et al., 2020; Santos et al., 2020). For example, one (not peer reviewed) study found that with increased government “stringency” in response to COVID-19 came corresponding decreases in access to HIV testing and PrEP use, but not access to condoms (Rao et al., 2020a). Another non-peer reviewed study of non-binary and transgender individuals found that COVID-19 reduced access to gender affirming healthcare, including hormone and post-surgery care, as well as mental health care (Jarrett et al., 2020).

The limited extant literature also reveals that SGM populations have experienced mental health challenges as a result of the ongoing COVID-19 pandemic. For example, several studies have reported high and/or increased prevalence of anxiety and depression among SGM populations during the COVID-19 pandemic (Flentje et al., 2020; Gonzales et al., 2020; Jarrett et al., 2020; Sanchez et al., 2020; Suen et al., 2020). Although heightened mental health challenges have been reported across populations, social distancing and “stay-at-home” orders, as well as other COVID-19-related stressors, may have a unique impact on SGM communities, who may be physically and geographically separated from protective communities and resources and/or forced to stay at home with family or roommates who are not accepting of their gender or sexuality identities (Fish et al., 2020; Gonzales et al., 2020; Salerno, Devadas, Pease, Nketia, & Fish, 2020). Further, disproportionate rates of unemployment due to COVID-19 among SGM people of color and overall COVID-19 financial stressors may play an important role in mental health outcomes among SGM populations (Human Rights Campaign, 2020). All told, pandemic-related social, structural, and economic drivers of health outcomes among SGM individuals require further description in a national cohort of SGM persons.

## Current Study

For this analysis, our goal was to add to the growing body of the literature on the effects of the pandemic on sexual and gender minorities. In so doing, we conducted a cross-sectional survey between April 15 and May 15, 2020—effectively, in the middle of the first wave of the pandemic in the USA. The main aim of the survey was to assess the impact of the pandemic on participants’ lives, including mental health, well-being, sexual behavior and access to sexual health care. As the pandemic in the USA has gotten worse, with a second higher peak in infections during the summer, and a third peak at the time of this manuscript’s preparation, understanding the immediate effects

of the pandemic can serve to inform future health care measures to protect the lives and well-being of vulnerable populations.

## Method

For the present manuscript, participants in an ongoing US national, internet-based cohort study, described below, were invited to complete a one-time cross-sectional survey about the impact of the COVID-19 pandemic and subsequent nationwide “lockdowns<sup>1</sup>.” All participants who were enrolled in the cohort were emailed and texted a link to complete the online survey, which was active from April 15, 2020, until May 15, 2020. The survey took approximately 15 min to complete, and those completing it were entered into a drawing for one of 20 Amazon gift cards valued at \$200. In total, 3,911 participants completed this survey.

## Description of the Parent Cohort Study

The parent study, *Together 5000* (herein T5K), is a US national, internet-based cohort study of cisgender men, transgender men, and transgender women who have sex with men. The goal of T5K is to identify modifiable individual and structural factors associated with HIV risk and PrEP uptake. Enrollment occurred between October 2017 and June 2018 using ads on men-for-men geosocial networking phone applications (apps). The cohort and study procedures have been fully described elsewhere (Groves, Stief, et al., 2020; Groves et al., 2019; Nash et al., 2019). Briefly, core eligibility criteria for enrollment specified that participants were aged 16 to 49; had at least two male sex partners in the past three months; were not currently participating in an HIV vaccine or PrEP clinical trial; were not *currently* on PrEP; lived in the USA or its territories; were not known to be HIV-positive; had a gender identity other than cisgender female; and reported behavioral risk for HIV.

Participants clicking on one of our study ads were routed from geosocial apps to a secured informed consent and enrollment survey. Of those who completed the enrollment survey, 8,754 participants met eligibility and provided contact information for later follow-up. These participants were sent a link to complete a longer second survey. Of the 8,754 eligible, 6,266 (71.6%) completed the secondary survey and received a \$15 incentive.

<sup>1</sup> Although a full US-wide lockdown did not occur—as decisions regarding the extent of lockdowns were left to state and local leaders—top US health officials had issued nationwide *recommendations* for social distancing at the time this survey was conducted. As reported in our data, nearly all participants said they were living in an area in which stay-at-home orders were in place.

Following completion of the secondary survey and for an additional \$15 incentive, participants were mailed an OraSure HIV-1 specimen collection device to use at home. Collection procedures involved taking an oral swab and placing it in an oral fluid container and mailing the specimen using provided pre-paid shipping materials to a laboratory for testing. HIV-positive results were delivered to participants via phone along with referrals to local clinics or other healthcare providers to link them to care following our clinical protocols. HIV-negative results were delivered to participants via email. These procedures (survey and HIV testing) are repeated annually on or close to the anniversary of when participants first enrolled in the cohort. As noted previously, we contacted all participants independent of their next scheduled annual assessment to complete a one-time survey focused on COVID-19.

## Measures on the COVID Survey

The main goal of the survey was to assess the impact of the pandemic on participants’ lives, including mental health, well-being, sexual behavior, and access to sexual health care. This included whether they were currently residing in an area in which stay-at-home orders were issued, loss of income due to the pandemic, coming in contact with someone with COVID-like symptoms in the past 2 weeks, knowing anyone hospitalized with COVID-19, and knowing someone who had died from COVID-19. We also assessed if participants had personally sought testing for the SARS-CoV-2 virus, as well as the results of that test.

For mental health, participants completed the 2-item Patient Health Questionnaire (PHQ-2) for depression (Kroenke et al., 2009). We administered the GAD-7 tool (Spitzer et al., 2006), slightly modified with a qualifier “*As a result of the new coronavirus*, how often have you been bothered by...”  $\alpha = 0.94$ . Finally, participants completed a 7-item instrument focused on COVID-19-induced stress that was developed by members of the authorship team. Items included the stem “in the last month,” followed by the following qualifiers: “How often have you worried that you would have symptoms of COVID-19 like a cough or fever?” “How often have you experienced financial stress related to COVID-19?” “How often have you thought about COVID-19 when you did not mean to?” “How often did you try not to think about COVID-19?” “How often did you feel overwhelmed about COVID-19?” “How often have you felt lonely because of COVID-19?” “How often have you felt bored because of COVID-19?” Items on this scale were coded 0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, 4 = Often, and items were summed (possible range 0–24),  $\alpha = 0.81$ .

For sexual behavior, participants indicated the total number of partners they had sex with in the prior 30 days, and the

number of *new* partners in the prior 30 days. (Someone they had not had sex with previously.) Participants indicated whether they had reduced their number of sex partners as a result of the pandemic (1 = Strongly disagree to 5 = Strongly agree), and whether they avoided kissing partners because of the pandemic (1 = Strongly disagree to 5 = Strongly agree). Although at enrollment, no participants were on PrEP nor had received a prior HIV diagnosis, some participants began using PrEP or were diagnosed with HIV in the time *since* enrolling. Those reporting PrEP use were asked if their dosing had changed (stopped entirely, began skipping doses, still taking it every day). Those who were HIV-positive were asked if they had been able to maintain their HIV-related medical appointments (in person, via telephone/video chat, or not able) and to receive their HIV medication since the start of the pandemic (using the same pharmacy, using a different pharmacy or mail order service, or not be able to retrieve prescriptions).

## Analyses

We used descriptive statistics to describe the effects of COVID-19 on participants by different sociodemographic characteristics and mental health. Descriptive statistics were also used to describe the effects of the pandemic on HIV, PrEP use, and sexual behavior. We compared differences between reduced number of partners and asking partners about COVID-19-like symptoms prior to sex and among various factor subgroups using *t* tests for continuous variables (or Wilcoxon rank sum and Kruskal–Wallis test in cases of data that is normally distributed) and Chi-squared tests for categorical variables. To assess the degree of correlation between number of sex partners and mental health, we used Spearman correlations. Test statistic values and *p*-values are reported for all bivariate tests. Due to an excessive number of zeros for number of new sex partners, we carried out a bivariate zero-inflated Poisson regression with number of new sex partners as the dependent variable. Bivariate regression coefficients and 95% confidence intervals (CIs) are reported. Finally, we ran two binary logistic regression models with having a new sex partner in the prior 30 days as the dependent variable (1 = yes, 0 = no). For both models, independent variables included whether participants were experiencing moderate/severe COVID-19-induced anxiety (1 = yes, 0 = no), depression (1 = yes, 0 = no), if they were age 30 or older (1 = yes, 0 = no), race or ethnicity, whether they had recent contact with someone who was diagnosed with COVID-19, or knew someone hospitalized with COVID-19 (1 = yes, 0 = no). The first model was performed for all participants, and the second was restricted to those reporting that they were taking PrEP with the added variable as to whether they had stopped taking PrEP entirely (1 = yes, 0 = no). All analysis was conducted using SAS 9.4.

## Results

Table 1 reports demographic characteristics of the sample as well as some effects of the pandemic on participants. Mean age was 32.2 (SD = 7.9). Most were cisgender male, 4.0% were transgender men, 1.1% were non-binary/gender non-conforming (assigned male sex at birth), and 0.4% were transgender women. Nearly half (45.1%) were persons of color. Nearly all (97.7%) said they were presently living in an area in which there were stay-at-home order in place, greater than half (55.2%) had experienced a personal loss of income due to the pandemic, and 17.5% said they had been in close contact with someone with COVID-19-like symptoms in the past 2 weeks, but only 5.7% of participants reported having been tested for the coronavirus. Among those having been tested for SARS-CoV-2, 10.3% said they had received a positive diagnosis.

Among all participants, more than a quarter (28.3%) said they knew someone who was hospitalized with COVID-19, and 15.0% said they knew someone who died from it. Nearly one-third reported a PHQ depression score greater than or equal to 3 (a positive screen for depression), and the mean summary score of COVID-19-induced stress was 21.9 (out of a possible range from 0 to 24)—indicative of high levels of stress. Meanwhile, 17.4% reported moderate anxiety and an additional 17.9% reported severe anxiety symptoms (GAD-7, modified for COVID-19). There were significant moderate correlations between depression and anxiety ( $Rho = 0.66, p < 0.001$ ), depression and stress ( $Rho = 0.60, p < 0.001$ ), and stress and anxiety ( $Rho = 0.69, p < 0.001$ ).

Table 2 shows HIV, PrEP, and sexual behavior in the sample. One-fifth (20.2%) said they were taking PrEP, 72% were HIV-negative but not on PrEP, 3.9% were HIV-positive, and 3.8% had unknown or invalid HIV results. For those reporting that they were on PrEP, 29.9% said they had stopped taking it entirely, and an additional 14.2% said they had started skipping doses during the pandemic. For those that were HIV-positive, 30.9% said they were unable to maintain their HIV-related medical care due to the pandemic and 13.8% said they had been unable to obtain refills of HIV medications. In total, 38.8% said they did not have any sex partners in the prior 30 days, and 59.6% reported no new sex partners in the prior 30 days (i.e., having sex with someone with whom they had never had sex with before). Most (70.1%) strongly agreed or agreed that they had reduced their number of sex partners due to the pandemic. Nearly half (46.0%) said they agreed or strongly agreed that they avoided kissing partners because of the pandemic, and, among those reporting sex partners, greater than half (52.0%, 1,239 of 2,381) said they had asked their sex partners about COVID-19 symptoms either some or all of the time.

Using a bivariate, zero-inflated Poisson regression, we examined factors associated with the number of new sex partners participants reported in the prior 30 days. The number of new sex



**Table 1** Demographic characteristics, April–May 2020,  $n = 3911$ 

	Mean	Std Dev
Age	33.2	7.9
COVID-induced stress score ( $\alpha = 0.81$ )	21.91	6.0
	<i>n</i>	%
<i>Gender</i>		
Cisgender male	3697	94.5
Transgender female	14	0.4
Transgender male	157	4.0
Non-binary, gender non-conforming (assigned male sex at birth)	43	1.1
<i>Race</i>		
White	2147	54.9
Black	371	9.5
Latinx	918	23.5
All other, multiracial	475	12.2
<i>Resides in an area with stay-at-home orders</i>		
Yes	3820	97.7
No	76	1.9
I don't know	15	0.4
<i>Experienced personal loss of income as a result of COVID-19</i>		
Yes	2158	55.2
No	1639	41.9
Not applicable	114	2.9
<i>Came into close contact with someone with COVID-like symptoms in the past 2 weeks</i>		
Yes	685	17.5
No	2599	66.5
Don't know/ Not sure	627	16.0
<i>Have you been tested for the new coronavirus?</i>		
Yes	224	5.7
No, but I tried and was unable to be tested	452	11.6
No, because I did not need or try to be tested	3196	81.7
Don't know/ Not sure	39	1.0
<i>What was the result of the test? (valid <math>n = 224</math>)</i>		
Negative	177	79.0
Positive	23	10.3
I'm still waiting on my results	24	10.7
<i>Know anyone hospitalized with COVID-19</i>		
Yes	1105	28.3
No	2806	71.8
<i>Know anyone who died from COVID-19</i>		
Yes	588	15.0
No	3216	82.2
Don't know/ Not sure	107	2.7
<i>Depression (PHQ-2)</i>		
Yes (score $\geq 3$ )	1437	36.7
No	2474	63.3
<i>Anxiety induced by COVID (modified GAD-7) (<math>\alpha = 0.94</math>)</i>		
No anxiety	1295	33.1
Mild anxiety	1236	31.6
Moderate anxiety	679	17.4

**Table 1** (continued)

	Mean	Std Dev
Severe anxiety	701	17.9

partners was not significantly associated with anxiety, depression, knowing someone hospitalized with COVID-19, or knowing someone who died from COVID-19. However, participants were less likely to ask partners about symptoms of COVID-19 prior to having sex ( $\beta = 0.99$ , 95% CI 0.80–1.19) if they did not have a new partner in the last 30 days. For those who had been taking PrEP ( $n = 788$ ), stopping PrEP entirely ( $\beta = 0.90$ , 95% CI 0.40–1.40) was associated with having no new sex partners in the last 30 days. Among those who were HIV-positive ( $n = 152$ ), the number of new sex partners in the prior 30 days was not statistically associated with whether participants were able to maintain their HIV-related medical appointments in person ( $\beta = -0.34$ , 95% CI -1.38–0.69) or not ( $\beta = -0.85$ , 95% CI -1.95–0.25), compared to those who were able to maintain their HIV-related appointments via telephone/video chat. There was also no significant association in terms of whether they were able to refill their HIV medication using another pharmacy/mail order service ( $\beta = 23.51$ , 95% CI 175,989–175,942.3) or not at all ( $\beta = -0.73$ , 95% CI -1.92–0.47), compared to participants who were able to refill HIV medications using the same pharmacy since the beginning of the pandemic.

Next, Table 3 reports on factors associated with participants agreeing with the statement that they had reduced their number of partners due to the pandemic, and Table 4 reports about asking partners about COVID-19-like symptoms prior to sex (among those reporting partners,  $n = 2,381$ ). Agreement/strong agreement that they had reduced their number of sex partners was associated with greater COVID-19-induced anxiety, depression, knowing someone hospitalized with COVID-19, and asking partners about COVID-19-like symptoms. Meanwhile, being age 30 or older was associated with disagreeing that they had reduced their number of sex partners. Similarly, among those having had partners ( $n = 2,381$ ), asking partners about COVID-19-like symptoms before sex was associated with greater COVID-19-induced anxiety, less depression, maintaining consistent PrEP use, and being a person of color. Other factors were not significantly associated. Values are shown in Tables 3 and 4.

Finally, Table 5 reports the results of two logistic regression models in which having had a new sex partner in the prior 30 days (1 = yes, 0 = no) was the dependent variable. Among all participants, reporting a new partner was associated with being aged 30 or older, Black or Latinx (vs. White) as well as not being sure if they had recent contact with someone diagnosed with COVID-19 (vs. no contact with someone diagnosed with COVID-19). In our second model, nested among those who reported they were taking PrEP, reporting a new sex partner in

**Table 2** HIV, PrEP, and sexual behavior, April–May 2020,  $n = 3911$ 

	Frequency	Percent
<i>HIV and PrEP Status<sup>a</sup></i>		
HIV-negative not on PrEP	2822	72.2
HIV-negative on PrEP	788	20.2
HIV-positive	152	3.9
HIV status not known/invalid	149	3.8
<i>Reduce/Discontinue PrEP as a result of the pandemic (among those on PrEP)<sup>b</sup></i>		
Stopped taking PrEP entirely	236	29.9
I have begun skipping doses	112	14.2
Still taking PrEP every day	441	55.9
<i>Have you been able to maintain your HIV-related medical appointments<sup>c</sup></i>		
Yes in person	44	29.0
Yes, via telephone/video chat	61	40.1
No, I have not been able to maintain my HIV-related medical appointments	47	30.9
<i>Have you been able to receive your HIV medication since the beginning of the pandemic<sup>c</sup></i>		
Yes, using same pharmacy	109	71.7
Yes, using another pharmacy/mail order service	22	14.5
I've been unable to retrieve prescription	21	13.8
<i>Number of sex partners in the last 30 days</i>		
0	1517	38.8
1	1420	36.3
> 1	974	24.9
<i>Number of new sex partners in the last 30 days<sup>d</sup></i>		
0	1424	59.6
1	496	20.8
> 1	470	19.7
<i>Reduced number of sexual partners because of COVID-19</i>		
Strongly agree	2017	51.6
Agree	723	18.5
Neutral	332	8.5
Disagree	170	4.4
Strongly disagree	203	5.2
Not applicable	466	11.9
<i>Asked partner about COVID-19 symptoms before sex</i>		
Not applicable (I have not had sex)	1530	39.1
All the time	948	24.2
Some of the time	291	7.4
Rarely	249	6.4
Never	893	22.8
<i>Avoided kissing partners because of COVID-19</i>		
Strongly agree	1249	31.9
Agree	548	14.0
Neutral	603	15.4
Disagree	718	18.4
Strongly disagree	793	20.3

<sup>a</sup> $n = 1$  participant on PrEP had invalid HIV status<sup>b</sup> $n = 3$  participants did not provide a valid response. Question restricted to those saying they were on PrEP<sup>c</sup>HIV-positive participants only<sup>d</sup>among participants reporting partners  $n = 4$  participants did not provide a response

**Table 3** Bivariate characteristics associated with reduced number of partners because of the COVID-19 pandemic, April–May 2020

	Reduced number of sexual partners because of COVID-19 <sup>a</sup>						$\chi^2$	<i>p</i>
	Strongly Agree / Agree		Neutral		Strongly disagree / Disagree			
	<i>n</i> = 2740		<i>n</i> = 332		<i>n</i> = 373			
	Frequency	(%)	Frequency	%	Frequency	(%)		
COVID-induced Anxiety (modified GAD-7-anxiety)							17.56	0.007
No anxiety	859	31.4	133	40.1	136	36.5		
Mild anxiety	878	32.0	101	30.4	116	31.1		
Moderate anxiety	494	18.0	56	16.9	53	14.2		
Severe anxiety	509	18.6	42	12.7	68	18.2		
Depression (PHQ-2)							11.64	0.003
Yes	1044	38.1	99	29.8	122	32.7		
No	1696	61.9	233	70.2	251	67.3		
Know anyone hospitalized with COVID-19							9.77	0.008
Yes	818	29.9	74	22.3	97	26.0		
No	1922	70.2	258	77.7	276	74.0		
Know anyone who died from COVID-19							5.95	0.20
Yes	437	16.0	43	12.95	50	13.4		
No	2221	81.1	280	84.3	317	85.0		
Don't know/ Not sure	82	3.0	9	2.7	6	1.6		
Asked partner about COVID-19 symptoms before sex <sup>b</sup>							142.10	<.0001
Yes	975	63.9	110	48.0	97	29.1		
No	551	36.1	119	52.0	236	70.9		
Reduce/Discontinue PrEP as a result of the pandemic (among those on PrEP) <sup>c</sup>							7.89	0.98
Stopped taking PrEP entirely	186	30.6	15	26.8	12	19.4		
I have begun skipping doses	94	15.5	6	10.7	6	9.7		
Still taking PrEP every day	328	54.0	35	62.5	44	70.9		
Have you been able to maintain your HIV-related medical appointments <sup>d</sup>							6.45	0.17
Yes in person	25	26.0	9	45.0	4	19.1		
Yes, via telephone/ video chat	43	44.8	4	20.0	8	38.1		
No, I have not been able to maintain my HIV-related medical appointments	28	29.2	7	35.0	9	42.9		
Have you been able to receive your HIV medication since the beginning of the pandemic							7.85	0.10
Yes, using same pharmacy	66	68.8	15	75.0	17	81.0		
Yes, using another pharmacy/mail order service	19	19.8	1	5.0	0	0.0		
I've been unable to retrieve prescription	11	11.5	4	20.0	4	19.1		
Age							13.18	0.001
Under 30	1012	36.9	121	36.5	102	27.4		
30+	1728	63.1	211	63.6	271	72.7		
Race or Ethnicity							11.09	0.09
White	1463	53.7	183	55.1	221	59.3		

**Table 3** (continued)

	Reduced number of sexual partners because of COVID-19 <sup>a</sup>							
	Strongly Agree / Agree		Neutral		Strongly disagree / Disagree		$\chi^2$	<i>p</i>
	<i>n</i> = 2740		<i>n</i> = 332		<i>n</i> = 373			
	Frequency	(%)	Frequency	%	Frequency	(%)		
Black	251	9.2	37	11.1	41	11.0		
Latinx	670	24.5	76	10.8	34	9.1		
All other, multiracial	356	13.0	36	10.8	34	9.1		

<sup>a</sup> *n* = 466 participants selected not applicable and were excluded

<sup>b</sup> *n* = 1530 did not have sex

<sup>c</sup> *n* = 3 participants did not provide a valid response

<sup>d</sup> HIV-positive participants only

the prior 30 days was positively associated with depression, and being Black or Latinx (vs. white). Those who reported having stopped taking their PrEP entirely had significantly lower odds of reporting a new sex partner in the prior 30 days. Full values are reported in the table.

## Discussion

In this national cross-sectional study, we report on the impact of the COVID-19 pandemic on sexual behavior, mental health, and access to sexual health care during a one-month period early in the US “lockdown” among a cohort of sexual and gender minorities during the first wave of infections in the USA. As has been shown in emerging research on the effect of the pandemic, depression and anxiety were elevated (Flentje et al., 2020; Gonzales et al., 2020; Parcesepe et al., 2020; Sanchez et al., 2020; Santos et al., 2020), testing was difficult to access (only one-third of those seeking access to testing were able to get tested) (c.f., Rao et al., 2020a; Sanchez et al., 2020; Santos et al., 2020), and greater than half of participants had experienced a personal loss of income due to the pandemic (c.f., Human Rights Campaign, 2020). Meanwhile, and as has been observed in other studies, nearly half of participants on PrEP reported a reduction in dosing or having stopped entirely (Hammoud, Grulich, et al., 2020; Stephenson et al., 2020), and, among all participants, there was an observed reduction in sex partners due to the pandemic (Hammoud, et al., 2020a, 2020b; Sanchez et al., 2020)—only a quarter reported more than one partner in the prior 30 days. However, in our multivariable model, we observed that reporting a new sex partner in the prior 30 days was associated with being aged 30 or older, Black or Latinx (vs. white), and being unsure if one had recent contact with someone who had COVID-19. These findings highlight the need for accurate and widespread messaging around the risks of COVID-19

as well as how it is transmitted. We note, however, that we do not have detailed information on any risk mitigation strategies participants may have taken (such as wearing a mask during a sexual encounter).

Of added concern, among HIV-positive participants, 30.9% were unable to maintain an HIV-related medical appointment and greater than one-out-of-every-eight were unable to retrieve an HIV-related prescription as a direct result of the pandemic—a phenomenon that has been observed elsewhere (Rao et al., 2020a; Santos et al., 2020). All told, our findings add to the growing body of research highlighting that the pandemic has resulted in serious disruptions in mental health, sexual behavior, and overall sexual health and well-being.

Taking actions to reduce one’s sexual partners was associated with other variables in ways that one might expect—greater anxiety and depression, reductions in PrEP use (for those on PrEP), and explicitly asking partners about COVID-19-like symptoms prior to sex. This suggests that, despite limited and sometimes mixed information about how the novel coronavirus can be spread, participants understood it was transmissible though close contact. In addition, our findings suggest that fear of the virus, accompanied social isolation necessary to avoid the virus, and negative financial effects were collectively associated with negative mental health outcomes. The mental and sexual health of sexual and gender minorities was of great concern pre-pandemic (Kidd et al., 2016; Russell & Fish, 2016), and our findings heighten the urgency for additional resources to prevent further degradation of mental and sexual health in these already vulnerable communities.

Our findings should be understood in light of their limitations. First, these data were collected early in the pandemic’s evolution in the USA. Since then, many states have engaged in processes of opening and closing economies in ways that have resulted in spikes in cases (The New York Times, 2020), and—unlike many developed countries—the USA failed to



**Table 4** Bivariate characteristics associated with asking partners about COVID-like symptoms, April–May 2020

	Asked partner about COVID-19 symptoms before sex <sup>a</sup>		Did not ask partner about COVID-19 symptoms before sex <sup>a</sup>		$\chi^2$	<i>p</i>
	<i>n</i> = 1239		<i>n</i> = 1142			
	Frequency	(%)	Frequency	(%)		
COVID-induced Anxiety (modified GAD-7-anxiety)					17.79	0.001
	No anxiety	373	30.1	434	38.0	
	Mild anxiety	413	33.3	353	30.9	
	Moderate anxiety	213	17.2	176	15.4	
	Severe anxiety	240	19.4	179	15.7	
Depression (PHQ-2)					5.31	0.02
	Yes	774	62.5	765	67.0	
	No	465	37.5	377	33.0	
Know anyone hospitalized with COVID-19					1.09	0.30
	Yes	348	28.1	299	26.2	
	No	891	71.9	843	73.8	
Know anyone who died from COVID-19					3.01	0.22
	Yes	188	15.2	149	13.1	
	No	1020	82.3	970	84.9	
	Don't know/ Not sure	31	2.5	23	2.0	
Reduce/Discontinue PrEP as a result of the pandemic (among those on PrEP) <sup>b</sup>					8.24	0.02
	Stopped taking PrEP entirely	48	16.7	54	27.3	
	I have begun skipping doses	46	16.0	24	12.1	
	Still taking PrEP every day	193	67.3	120	60.6	
Have you been able to maintain your HIV-related medical appointments <sup>c</sup>					0.42	0.81
	Yes in person	17	27.4	13	26.0	
	Yes, via telephone/video chat	25	40.3	18	36.0	
	No, I have not been able to maintain my HIV-related medical appointments	20	32.3	19	38.0	
Have you been able to receive your HIV medication since the beginning of the pandemic					1.48	0.48
	Yes, using same pharmacy	43	69.4	34	68.0	
	Yes, using another pharmacy/mail order service	11	17.7	6	12.0	
	I've been unable to retrieve prescription	8	12.9	10	20.0	
Age					1.84	0.17
	Under 30	476	38.4	408	35.7	
	30+	763	61.6	734	64.3	
Race or Ethnicity					31.65	<0.001
	White	607	49.0	682	59.7	
	Black	137	11.1	99	8.7	
	Latinx	356	28.7	236	20.7	
	All other, multiracial	139	11.2	125	11.0	

Fatima: Add age and race/ethnicity bivariate chars

<sup>a</sup>*n* = 1530 did not have sex and are therefore not included in the analyses

<sup>b</sup>*n* = 3 participants did not provide a valid response

<sup>c</sup>HIV-positive participants only

**Table 5** Multivariable logistic regression, factors associated with meeting a new sex partner in the prior 30 days, April–May 2020

	Model 1:		Model 2:	
	Among All Participants ( <i>n</i> = 2390) <sup>a</sup>		Among Participants on PrEP ( <i>n</i> = 502) <sup>a</sup>	
	Adjusted Odds Ratio	95% CI	Adjusted Odds Ratio	95% CI
Moderate/Severe COVID-induced anxiety (1 = Yes, 0 = No)	1.03	0.84 – 1.26	1.08	0.68 – 1.71
Depression (1 = Yes, 0 = No)	1.17	0.96 – 1.43	<b>1.60</b>	<b>1.01</b> – <b>2.52</b>
Age 30 or older (1 = Yes, 0 = No)	<b>1.21</b>	<b>1.02</b> – <b>1.44</b>	0.81	0.55 – 1.19
Race or Ethnicity (ref = White)				
Multiracial, other	1.13	0.86 – 1.48	1.15	0.62 – 2.11
Black	<b>1.79</b>	<b>1.35</b> – <b>2.39</b>	<b>3.23</b>	<b>1.71</b> – <b>6.08</b>
Latinx	<b>1.40</b>	<b>1.14</b> – <b>1.70</b>	<b>1.69</b>	<b>1.09</b> – <b>2.60</b>
Recent contact with someone diagnosed with COVID (ref = No)				
Don't know/ Not sure	<b>1.32</b>	<b>1.05</b> – <b>1.67</b>	1.67	0.98 – 2.84
Yes	1.21	0.97 – 1.50	1.00	0.60 – 1.68
Know someone hospitalized with COVID (1 = Yes, 0 = No)	0.86	0.71 – 1.03	0.81	0.54 – 1.21
Stopped taking PrEP entirely (1 = Yes, 0 = No)	N/A	–	<b>0.45</b>	<b>0.27</b> – <b>0.72</b>

<sup>a</sup>Some responses are missing due to listwise deletion

Items in **bold** are significant at  $p < 0.05$

flatten its curve after the initial wave in spring 2020 (The Centers for Disease Control and Prevention, 2020). Thus, while it would be important to replicate this study in the USA, it would be important to see how these findings contrast to nations that were able to suppress high rates of viral transmission after the initial spike in infections. Next, these data were collected at a time before there was widespread denial of COVID-19 or the proliferation of anti-mask and anti-lockdown movements (Arantani, 2020). Suffice to say, our data provide an important snapshot of the impact of the pandemic on sexual and gender minorities' lives at that time and it is important to continue to monitor how the pandemic has impacted their sexual and mental health over time.

Third, our COVID-19 survey was supplemental to the goals of the parent study (which is a study focused on HIV). The response rate that we observed in this survey was lower than that we have observed in scheduled annual assessments as part of the parent study. Those assessments include guaranteed incentives (i.e., completing the survey results in an automatic incentive, as opposed to a drawing in the case of this COVID-19 survey). We also give participants a larger window of time to complete their annual assessment—in the present study, participants had 30 days. It is likely that these factors impacted our response rate, which was lower than observed at the scheduled annual assessment (Groves, Westmoreland, Morrison, Carrico, & Nash, 2020a, 2020b). We also note that this survey was sent to participants during a time of significant social and economic stress created by the pandemic itself.

Next, because the parent study is focused on HIV and had enrollment criteria to identify a sample vulnerable to HIV, our sample, while large and geographically diverse, is not meant to be representative or generalizable. Participants were 16–49 years old at the time of enrollment, and the survey was coming to them approximately 2 years after enrollment (meaning our oldest participants were 51). People over the age of 65 are particularly vulnerable to COVID-19, and those individuals were not included in our study—stress and other mental health outcomes might be particularly acute in this population. Survey items were self-reported and thus subject to both recall bias as well as some social desirability. Participants reflected on sexual behavior with partners in the 30 days prior. This was intentional, as the survey began approximately 30 days after the start of the US “lockdown.” Given this narrow recall period as well as potential fear of contracting the virus that causes COVID-19, we observed that the vast majority of participants reported no partners or only one partner. We lack enough granularity to say much about those reporting, for example, two, three, or four or more partners. Finally, we note that many of our questions were framed with regard to preventing the spread of the virus that causes COVID-19 (such as limiting partners, avoiding kissing, asking partners about COVID-19-like symptoms). We did not ask questions about condom use, a behavior that can prevent HIV but not the spread of COVID-19. It would be important to examine the impact of the pandemic not just on behaviors that could mitigate the spread of the virus, but also other health

behaviors like condom use—especially regarding changes in access to PrEP or HIV care.

In conclusion, in this geographically diverse sample of SGM persons, we observed several negative public health outcomes as a consequence of the first wave of COVID-19 infections and national stay-at-home orders. Our findings underscore the urgent need for scaled up tracking of the secondary effects of the pandemic among this already vulnerable population. Further, ensuring the safety and well-being of SGM persons may require enhanced outreach early on and innovative solutions to address the sexual and mental health needs of these diverse populations. Currently (Fall 2020), the primary strategies for preventing transmission of the virus are social distancing and personal protective equipment (e.g., face masks), and in 2021 the uptake of effective vaccines. Thus, we highlight the need for outreach, prevention, and treatment via telephone and telehealth to address the secondary effects of COVID-19, which take on renewed urgency in the face on additional waves of COVID-19 and stay-at-home orders.

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## Declarations

**Conflicts of interest** The author declared that there is no conflict of interest.

**Data Availability** Data are available by contacting the corresponding author.

**Human and Animal Rights** All research procedures were reviewed and approved by the corresponding author's Institutional Review Board.

**Informed Consent** All participants provided informed consent

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