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Modifications to Sexual Behaviors Associated with Mpox (Monkeypox) Virus Transmission Among Persons Presenting for Mpox Vaccination, Washington, D.C., August–October, 2022

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Abstract

Background—Over 30,000 mpox cases were reported during the 2022 mpox outbreak with many cases occurring among gay, bisexual and other men who have sex with men (MSM). Decreases in U.S. mpox cases were likely accelerated by a combination of vaccination and modifications to sexual behaviors associated with mpox virus transmission. We assessed reports of sexual behavior change among participants receiving mpox vaccination in Washington, D.C.

Methods—During August–October 2022, 711 adults aged 18 years receiving mpox vaccination at two public health clinics in Washington, D.C. completed a self-administered questionnaire that asked whether sexual behaviors changed since learning about mpox. We calculated the frequency and percentages of participants reporting an increase, decrease or no change in four of these behaviors by demographic, clinical, and behavioral characteristics with 95% confidence intervals.

Results—Overall, between 46%–61% of participants reported a decrease in sexual behaviors associated with mpox virus transmission, 39%–54% reported no change in these behaviors, and <1% reported an increase. Approximately 61% reported decreases in one-time sexual encounters (95% CI: 56.8%–64.7%), 54.3% reduced numbers of sex partners (95% CI: 50.4%–58.0%), 53.4% decreased sex via a dating app or sex venue (95% CI: 49.7%–58.0%) and 45.6% reported less group sex (95% CI: 40.4%–50.9%). Reported decreases in these behaviors were higher for MSM than women; in non-Hispanic Black than non-Hispanic White participants; and in participants with HIV than participants without HIV.

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Conclusions—Most participants receiving mpox vaccination reported decreasing sexual behaviors associated with mpox virus transmission, including groups disproportionately affected by the outbreak.

Short summary :

Most adults 18 years receiving mpox vaccination at two Washington, D.C. public health clinics reported decreases in sexual behaviors associated with mpox virus transmission before receiving vaccination.

Keywords

JYNNEOS; sexual behaviors; mpox; outbreak

Introduction

As of September 2023, over 30,000 cases of mpox (formerly known as monkeypox) were reported in the United States (1). The current outbreak has affected primarily gay, bisexual, and other men who have sex with men (MSM) and racial and ethnic minority groups (2). According to the U.S. Centers for Disease Control and Prevention (CDC), mpox can spread from person to person through direct contact with infectious rash, scabs, or body fluids, and by respiratory secretions during prolonged face-to-face contact, or during intimate physical contact, such as kissing, cuddling, and sex (3). In addition to vaccination, CDC recommends temporary changes to some behaviors that may increase mpox exposure, including limiting the number of anonymous or multiple sex partners (4). Mpox cases in the United States have declined steadily since mid-August 2022 (5). Declining mpox cases have likely been bolstered by community-led responses to the outbreak and targeted prevention messaging through federal-state partnerships and community-based organizations. These efforts have included events focused on mpox testing and prevention and the initiation of a vaccine equity pilot program to reach populations most affected by vaccine disparities, including non-Hispanic Black and Hispanic MSM (6–8).

As a result of these interventions, affected groups have reported changing their sexual behaviors or activities to reduce their risk of mpox exposure (9). In a recent survey of U.S. MSM conducted near the peak of the outbreak, about 50% of those with sexual behaviors associated with mpox transmission reported reductions in one-time sexual encounters, number of sex partners, sex with someone met via a dating app or at a sex venue, attendance at sex venues or events, and group sex (10). As this study assessed, behavior changes occurred among participants during a time when <20% had received at least 1 dose of vaccine, suggesting that strategies to prevent mpox were often enacted before vaccination was widely utilized. CDC continues to recommend behavior changes to reduce the risk of mpox infection until maximum protection from the vaccine is achieved (i.e., up to 14 days after the second dose) (11). Current research describing behavior mitigation strategies to reduce mpox risk have focused primarily on the reported behavior changes among key risk groups, such as MSM, regardless of vaccination status (9,10). Since the expansion of mpox vaccination programs in the US, examination of mpox prevention strategies among all persons receiving mpox vaccination, in addition to MSM, is needed to inform interventions

aimed at reducing mpox virus infection. To further this aim, we examined reported changes in sexual behaviors among individuals receiving mpox vaccination in Washington, D.C.

Methods

Investigation

Persons were eligible to receive JYNNEOS vaccine at a Washington, D.C. health clinic if they were a DC resident, 18 years old, had known or presumed exposures to mpox, or possible occupational exposure (e.g., sex workers or staff at establishments where sexual activity occurs). Adults 18 years presenting for their first dose of JYNNEOS vaccine at two D.C. clinics between August 11, 2022 and October 13, 2022 were asked to provide demographic, clinical, and recent mpox exposure information as part of a project examining immune response after mpox vaccination. Participants were eligible to participate if they did not previously have mpox vaccination, did not have characteristic skin lesions or rash associated with mpox virus infection and had no known history of mpox virus infection. Following vaccination and consent, 810 participants completed a self-administered paper questionnaire that included information on demographics, symptoms, medical history, and recent mpox risk-related exposures and behaviors, including sexual behaviors and information on the number and gender identity of sex partners within the past 14 days. Participants received a gift card as compensation. When compared with DC vaccine recipients through September 2023, participants in this analysis were younger (<35 years) and were similar by race/ethnicity (12). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.

Measures and Analytic Methods

Our analysis included four sexual behaviors associated with mpox transmission: one-time sexual encounters; number of sex partners; sex with someone met via a dating app or at a sex venue; and group sex. Participants were asked “Since learning of mpox, have you changed any of the following behaviors or practices because of mpox?” Participants could indicate that, in response to mpox, these behaviors decreased, increased, did not change, or were inapplicable. We calculated the frequency and percentage of participants reporting an increase, decrease or no change to these behaviors by demographic, clinical, and behavioral characteristics along with 95% binomial confidence intervals (CIs). All analyses were conducted using SAS Version 9.4 (SAS Inc., Cary, NC).

We described participants by the following characteristics: age, race and ethnicity, self-reported HIV status, gender identity and gender identity of sex partners, and number of sex partners. Gender identity and gender identity of sex partners included gay, bisexual or other MSM (hereafter referred to as MSM); men who had sex with women only; women; or other, the participant’s gender identity or gender identity of sex partner was not specified. While disaggregated reporting of sexual orientation and gender identity are among the best practices for data collection, we combined gender identity, sexual orientation (for men), and gender identity of sex partners to reflect categories that were inclusive of gender identity and to distinguish groups at higher risk for mpox virus infection, including MSM. Transgender persons have experienced a disproportionate prevalence of mpox virus infections (13), but

the number of transgender women (n=5) and transgender men (n=3) in this analysis were too small to analyze their reports of behavior change separately. Men, including transgender men, were categorized as MSM if they reported sex with men or transgender men in the past 14 days or they reported their sexual orientation as gay or bisexual. The remaining men and transgender men were grouped as men who had sex with women if they reported sex with only women or transgender women in the past 14 days and reported a sexual orientation of straight. Women included those who self-identified as women or transgender women, regardless of reported gender identity of sex partners or sexual orientation. Those in the other category included participants who reported another gender identity or reported their partners' gender identity as "other" or "unknown". Other gender identities reported by participants could include "nonbinary", "genderqueer", or they could write in a gender identity that was not listed. Participants could check all categories that applied to identify their gender identity or their sex partners' gender identity as male, female, transgender female, transgender male, "other" or unknown gender identity. Participants were asked the gender of sex partners and number of sex partners within the past 14 days which corresponded to mpox vaccination eligibility criteria under the PEP++ vaccination strategy (14).

Results

Among 810 survey participants, 711 (87.8%) provided information on sexual behaviors associated with mpox virus transmission. The 99 (12.2%) participants with missing or no information on these behaviors were excluded from the analysis. Compared with those who responded to questions about changes in their sexual behaviors, participants who did not respond to these questions were more likely to be aged ≥ 55 years (24.2% vs. 10.1%), be non-Hispanic Black (34.3% vs. 20.5%), have self-reported they had HIV (16.2% vs. 9.0%), or have reported no sex partners in the past 14 days (37.4% vs. 14.8%). Among the 711 participants who provided sexual behavior information, the median age of participants was 32 years (range: 18–87) (Table 1). Overall, 52.0% of these participants identified as non-Hispanic White, 20.5% non-Hispanic Black, 14.6% Hispanic, 7.9% non-Hispanic Asian, 2.0% multiracial and 0.3% non-Hispanic American Indian/Alaska Native. Approximately 9% (64/711) of participants self-reported having HIV. Most participants were categorized as MSM (61.0%), 3.8% as men who had sex with women only, and 27.0% as women. Among the 58 participants (8.2%) in the "other" category, 41 did not specify their gender identity and 17 did not specify the gender identity of their recent partners. Most participants reported 2–3 partners within 14 days of vaccination (42.5%).

Among participants who reported modifications to one-time sexual encounters, 60.8% reported a decrease, 38.5% reported no change, and 0.7% reported an increase. Among participants who reported number of sex partners, 54.3% reported a decrease, 45.3% reported no change, and 0.4% reported an increase (Table 2). Similar levels of decline were reported among those who reported sex via a dating app or sex venue (53.9%), or group sex (45.6%). The percentages of participants who reported that these behaviors were inapplicable were as follows: 47.7% for group sex, 18.5% for sex via a dating app or sex venue, 12.8% for one-time sexual encounters, and 3.1% for number of sex partners (Supplemental Digital Content 1).

Reports of decreases in these behaviors associated with mpox transmission were similar by age group. For all 4 behaviors examined, a higher percentage of non-Hispanic Black participants reported decreases in these behaviors since learning about mpox (61%–76%) compared with non-Hispanic White participants (41%–54%). Additionally, a higher percentage of participants with HIV reported decreases in these behaviors since learning about mpox (72%–82%) than participants without HIV (43%–59%). In examining the full range of answer choices provided by participants, it is also noteworthy that a higher percentage of participants aged ≥55 years compared with younger participants, and Hispanic or non-Hispanic Black participants compared with non-Hispanic White participants, reported that specific behaviors were inapplicable, such as sex via a dating app or sex venue or group sex (Supplemental Digital Content 1).

Among participants who reported their gender identity or gender identity of sex partners, a higher percentage of MSM reported decreases across the range of sexual behaviors associated with mpox virus transmission since learning about mpox (53%–68%) compared with women (32%–50%). Among men who only reported sex with women, a higher percentage reported no change to these sexual behaviors (70%–94%) than those reporting decreases in these behaviors (6%–30%). Across the 4 sexual behaviors examined, between 42%–52% of participants who reported “other” gender identity or who did not specify the gender identity of their sex partners reported a decrease in sexual behaviors since learning about mpox. A higher percentage of participants who reported no sex partners (55%–68%) or only 1 sex partner (42%–69%) in the 14 days before vaccination reported decreases in these behaviors since learning about mpox compared with those reporting 2–3 partners (44%–55%) within the same time frame.

Discussion

Most participants receiving mpox vaccination in two public health clinics in Washington, D.C. reported modifying sexual behaviors associated with mpox transmission, including groups disproportionately affected during the outbreak, such as MSM, non-Hispanic Black participants and participants with HIV. In addition, a higher percentage of participants reporting no sex partners or only 1 partner in the 14 days prior to vaccination indicated decreasing sexual behaviors in response to mpox compared with those reporting 2–3 sex partners. Participants reporting fewer sex partners in the recent period before vaccination may have limited their sexual encounters as a response to the mpox prevention messaging at that time to reduce their exposure to mpox through sexual contact (10). The number of recent sex partners has implications for mpox transmission because individuals may not know whether a new sex partner has been exposed to mpox or experienced mpox symptoms, their partners' vaccination status, or their partners' plans to get vaccinated (15). Similarly, temporary reductions in the frequency of one-time sexual encounters, as reported by participants, may have been important for averting additional mpox cases during Fall 2022 when mpox incidence was high (16). As another indication of behavioral change, participants who marked some sexual behaviors as inapplicable could be a signal that behavioral adaptation occurred before vaccination for a reason other than mpox or could indicate that some participants did not engage in these behaviors or be due to other factors.

Participants who reported reducing sexual behaviors associated with mpox virus transmission were among groups disproportionately affected by the 2022 mpox outbreak, including non-Hispanic Black persons and MSM. However, between 39%–54% of participants receiving mpox vaccination reported no change to these sexual behaviors in response to mpox. Levels of knowledge about how mpox is transmitted were explored during in-depth interviews of the same DC participants in another analysis (17). This study found that most participants reported a general understanding of how mpox virus is transmitted, but also expressed confusion about their own levels of personal risk and the timing of protection from mpox vaccination. Knowledge gaps about the level of potential mpox risk is related to the historically rooted and persistent health disparities and inequities among sexual, gender, and racial/ethnic minority groups, including challenges with healthcare access (18,19). LGBTQ+ persons face structural and cultural barriers to the utilization of health services, including stressors such as stigma and discrimination related to sexual orientation and gender identity status (20–22). Similarly, existing barriers to the receipt of comprehensive and culturally sensitive health services can be compounded by public misconceptions and fear surrounding mpox (23,24). The inclusion of clear and evidence-based information about mpox prevention in mass and social media can help to clarify facts about mpox virus transmission, thereby increasing self-efficacy in initiating behavior change that can reduce mpox risk, seeking mpox testing, and increasing vaccine confidence.

The reduction in sexual behaviors associated with mpox virus transmission reported by participants is consistent with previously published analyses that indicated most MSM engaging in behaviors associated with mpox transmission reported taking specific actions to reduce mpox risk before getting vaccinated (9,10). A study that simulated mpox incidence among MSM in Washington, D.C. demonstrated that sexual behavior changes were instrumental in reducing mpox cases early in the outbreak while vaccination implementation efforts were brought to scale (25). Using a network transmission model, the study examined the independent and combined effects of vaccination and sexual behavior change on mpox incidence, measured by one-time sexual encounters, to conclude that both factors contributed to an 80% decline in mpox cases that would not have occurred in the absence of either intervention. The study showed that vaccination alone would have prevented 64% of cases and behavior change alone would have prevented 21% of cases one year into the outbreak. In these scenarios, reducing one-time sexual encounters among MSM had an early impact on reducing mpox transmission when vaccine supply was limited, particularly among those who were not vaccinated, while vaccination, as a long-term prevention strategy, averted more cases overall. Findings from this network transmission modelling study support the combination of both behavior change and vaccination as mpox prevention strategies that may be used by individuals at different times during an outbreak depending on their perceptions of personal risk and vaccine availability. In particular, changes in sexual behavior in response to mpox may be instrumental in preventing future mpox outbreaks before vaccination can be obtained, when vaccine uptake is low, or when there is reduced vaccine coverage in affected communities.

While reported cases of mpox continue to be low (5), individuals may return to behaviors and practices that they engaged in prior to the outbreak. In turn, behavior mitigation

strategies may only be implemented as temporary protective measures, underscoring the importance of mpox vaccination for continued protection. Clear and consistent guidance offered by CDC, state, and local jurisdictions regarding mpox virus transmission continues to be important to inform perceptions of personal risk and guide messaging about community and individual preventive actions. In addition to being clear and scientifically accurate, messaging about mpox prevention, testing, and treatment should contain inclusive language to reduce stigma (26). Inclusive healthcare is essential for reducing health disparities among LGBTQ+ and other populations disproportionately affected by mpox through promotion of engagement and retention in care and facilitating provider awareness about their patients' sexual health needs and concerns. Education about and adoption of strategies to prevent mpox is of particular importance among persons with HIV, as severe manifestations of disease and poor outcomes have been reported among mpox patients with concurrent HIV infection or other immunocompromising conditions (27–30). In addition to educational strategies to increase mpox awareness, the provision of mpox vaccination as part of routine health care could boost confidence in the effectiveness and safety of the vaccine, as well as facilitate provider-initiated conversations about mpox prevention. Future longitudinal studies on the impact of behavior change on mpox transmission may shed light on which behavior mitigation messages and strategies are most effective at preventing future mpox outbreaks.

The high level of adherence to behavior mitigation strategies reported among participants is likely related to mpox prevention efforts and knowledge gained early in the outbreak within community settings that provide affirming care for these groups. However, some of these same participants also expressed mistrust of public health officials for mpox information. In an aforementioned analysis of these participants (17), 93% reported trusting doctors or other healthcare providers for accurate mpox information, but only 72% reported this level of trust for state/local health officials. Similarly, the prevalence of trust of state/local health officials for accurate mpox information was lower for non-Hispanic Black than non-Hispanic White participants, controlling for age and gender/gender of sex partners. The distrust of official public health messaging about mpox, as described by these participants, signify the continued need for socially and culturally responsive strategies for mpox prevention that acknowledge and address disparities in health care access.

We report on behavioral changes related to mpox virus transmission among vaccine recipients which may have contributed to selection bias and limited our ability to generalize our findings to those with exposure risk who were not vaccinated. Furthermore, we were unable to provide details about the motivation for behavioral changes beyond that they were in response to learning about mpox. Changes to sexual practices and behaviors could have also occurred for reasons other than mpox that were not ascertained. Participants seeking mpox vaccination may have also been more likely to report preventive behaviors or expressed increased willingness to report these changes. Similarly, a participant who marked no change to a behavior is not necessarily an indication that the behavior occurred or occurred within a time frame that would be relevant for potential mpox exposure risk. Additionally, the small numbers of transgender persons in this analysis do not allow us to examine their reports of sexual behavior change separately, despite evidence that transgender persons nationally have accounted for a disproportionate share of mpox virus

infections (13). Despite these limitations, our findings could be extended to understand how individuals who engage in behaviors associated with mpox transmission use prevention messages, whether in lieu of or in addition to vaccination; this information is pivotal to the development of interventions to increase vaccine uptake and vaccine coverage.

In late 2022, Washington, D.C. administered nearly 40,000 vaccinations and experienced significant declines in mpox cases (12). As of January 2023, DC was the only jurisdiction in the U.S. to achieve >50% 2-dose vaccine coverage among persons at increased risk for mpox (31s). Reductions in mpox incidence were likely supported by community-based messaging on ways to reduce exposure, expanded vaccination eligibility criteria, the availability of walk-up clinics, flexible clinic hours, and other prevention strategies. As patient education was an integral component of care within these clinics, the expansion of mpox vaccine eligibility and operations and strategic partnerships with community-based organizations may have broadened access to information about mpox prevention, symptoms, and treatment. Behavior changes in relation to perceived mpox risk could also be examined among other populations that may encounter barriers to vaccine access, such as sex workers, persons experiencing homelessness, and persons who inject drugs. Service and outreach professionals might consider the multiple sources of stressors and stigmas that can affect the receipt of healthcare, including access to mpox vaccination, in these and other populations at increased risk for mpox (32s).

In summary, the high levels of reported sexual behavior change in response to mpox among individuals surveyed while obtaining vaccination supports a multifaceted approach to mpox prevention. The continued success of behavioral strategies in preventing another mpox public health emergency requires that public health messages about mpox prevention are shared in an inclusive, non-stigmatizing environment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Demographic, clinical and behavioral characteristics among persons presenting for mpox vaccination, Washington, D.C., August–October, 2022

	n (%)
Total	711
Age, yrs	
18–24	137 (19.3)
25–34	277 (39.0)
35–44	150 (21.1)
45–54	75 (10.5)
55	72 (10.1)
Missing or unknown	0 (0.0)
Race/ethnicity ¹	
American Indian/Alaska	2 (0.3)
Native, non-Hispanic	
Asian, non-Hispanic	56 (7.9)
Black, non-Hispanic	146 (20.5)
Hispanic	104 (14.6)
Multiracial, non-Hispanic	14 (2.0)
White, non-Hispanic	370 (52.0)
Missing or unknown	19 (2.7)
Self-reported HIV status	
Reported HIV	64 (9.0)
Did not report HIV	642 (90.3)
Missing or unknown	5 (0.7)
Gender identity and gender identity of sex partners ²	
Gay, bisexual and other MSM	434 (61.0)
Men, sex with women only	27 (3.8)
Women	192 (27.0)
Other, gender identity or gender identity of partner not specified	58 (8.2)
Number of sex partners ³	
0	105 (14.8)
1	237 (33.3)
2–3	302 (42.5)
4	37 (5.2)
Missing or unknown	30 (4.2)

MSM: Men who have sex with men. Percentages may not add to 100 due to rounding.

¹ Participants with Hispanic or Latino/a ethnicity were categorized as Hispanic and might be of any race; persons with non-Hispanic ethnicity were categorized into single race groups or as multiracial.

² Men, including transgender men, were categorized as gay, bisexual or other MSM if they reported sex with men or a transgender male partner in the past 14 days or reported they were gay or bisexual. The remaining men and transgender men were grouped as men who had sex with women if they reported sex with only women or transgender women in the past 14 days and reported a sexual orientation of straight. Women included those who self-identified as women or transgender women, regardless of reported gender identity of sex partners or sexual orientation. The other category includes 41 participants who reported “other” gender identity and 17 participants who did not specify gender of sex partner.

³ In the past 14 days.

Table 2.

Sexual behavior modifications associated with mpox transmission by demographic, clinical, and behavioral characteristics among persons presenting for mpox vaccination, Washington, DC, August–October 2022

	One-time sexual encounters				Number of sex partners				Sex via a dating app or sex venue				Group sex			
	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change
	n, %, 95% CI															
Total	615	4	374	237	682	3	370	309	570	2	307	261	364	2	166	196
		0.7 (0.2, 1.7)	60.8 (56.8, 64.7)	38.5 (34.7, 42.5)		0.4 (0.0, 1.3)	54.3 (50.4, 58.0)	45.3 (41.5, 49.1)		0.3 (0.0, 1.3)	53.9 (49.7, 58.0)	45.8 (41.6, 50.0)		0.5 (0.0, 2.0)	45.6 (40.4, 50.9)	53.9 (48.6, 59.1)
Age (y)																
18–24	123	2	69	52	133	0	75	58	118	1	60	57	71	0	28	43
		1.6 (0.2, 5.8)	56.1 (48.6, 65.0)	42.3 (33.4, 51.5)		0.0	56.4 (47.5, 65.0)	43.6 (35.0, 52.5)		0.8 (0.0, 4.6)	50.9 (41.5, 60.2)	48.3 (39.0, 57.7)		0.0	39.4 (28.0, 51.8)	60.6 (48.3, 72.0)
25–34	238	0	140	98	270	0	133	137	225	0	115	110	134	1	60	73
		0.0	58.8 (52.3, 65.1)	41.2 (34.9, 47.7)		0.0	49.3 (43.2, 55.4)	50.7 (44.6, 56.9)		0.0	51.1 (44.4, 57.8)	48.9 (42.2, 55.6)		0.7 (0.0, 4.1)	44.8 (36.2, 53.6)	54.5 (45.7, 63.1)
35–44	125	1	73	51	139	2	71	66	119	1	64	54	88	1	40	47
		0.8 (0.0, 4.4)	58.4 (49.3, 67.2)	40.8 (32.1, 50.0)		1.4 (0.1, 5.1)	51.1 (42.4, 59.7)	47.5 (39.0, 56.1)		0.8 (0.0, 4.6)	53.8 (44.4, 63.0)	45.4 (36.2, 54.8)		1.1 (0.0, 6.1)	45.5 (34.8, 56.4)	53.4 (42.5, 64.1)
45–54	68	0	48	20	73	1	50	22	60	0	39	21	42	0	22	20
		0.0	70.6 (58.3, 81.0)	29.4 (19.0, 41.7)		1.4 (0.0, 7.4)	68.5 (56.6, 78.9)	30.1 (19.9, 42.0)		0.0	65.0 (51.6, 76.9)	35.0 (23.1, 48.4)		0.0	52.4 (36.4, 68.0)	47.6 (32.0, 63.6)
55	61	1	44	16	67	0	41	26	48	0	29	19	29	0	16	13
		1.6 (0.0, 8.8)	72.1 (59.2, 82.9)	26.2 (15.8, 39.1)		0.0	61.2 (48.5, 72.9)	38.8 (27.1, 51.5)		0.0	60.4 (45.3, 74.2)	39.6 (25.8, 54.7)		0.0	55.2 (35.7, 73.6)	44.8 (26.5, 64.3)
Race/ Ethnicity																

	One-time sexual encounters						Number of sex partners						Sex via a dating app or sex venue						Group sex	
	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change
Asian, non Hispanic	49	1 2.0 (0.0, 10.9)	32 65.3 (50.4, 78.3)	16 32.7 (20.0, 47.5)	56	0 0.0	35 62.5 (48.6, 65.1)	21 37.5 (24.9, 51.5)	47	0 0.0	31 66.0 (50.7, 79.1)	16 34.0 (20.9, 49.3)	29	0 0.0	13 44.8 (26.5, 64.3)	16 34.0 (20.9, 49.3)	29	0 0.0	13 44.8 (26.5, 64.3)	16 34.0 (20.9, 49.3)
Black, non-Hispanic	120	3 2.5 (0.0, 7.1)	91 75.8 (67.2, 83.1)	26 21.7 (14.6, 30.1)	139	2 1.4 (0.0, 5.1)	94 67.6 (59.2, 75.3)	43 30.9 (23.3, 39.3)	102	1 0.9 (0.0, 5.3)	68 66.7 (56.6, 75.7)	33 32.4 (23.4, 42.3)	64	1 1.6 (0.0, 8.4)	39 60.9 (47.9, 72.9)	33 32.4 (23.4, 42.3)	64	1 1.6 (0.0, 8.4)	39 60.9 (47.9, 72.9)	24 37.5 (25.7, 50.5)
Hispanic	87	0 0.0	56 64.4 (53.3, 74.4)	31 35.6 (25.7, 46.6)	99	1 1.0 (0.0, 5.5)	54 54.6 (44.2, 64.6)	44 44.4 (34.5, 54.8)	80	1 1.3 (0.0, 6.8)	46 57.5 (45.9, 68.5)	33 41.3 (30.4, 52.8)	43	0 0.0	22 51.2 (35.5, 66.7)	33 41.3 (30.4, 52.8)	43	0 0.0	22 51.2 (35.5, 66.7)	21 48.8 (33.3, 64.5)
White, non-Hispanic	333	0 0.0	180 54.1 (48.5, 59.5)	153 45.9 (40.5, 51.5)	355	0 0.0	172 48.5 (43.1, 53.8)	183 51.5 (46.2, 56.9)	317	0 0.0	151 47.6 (42.0, 53.3)	166 52.4 (46.7, 58.0)	213	0 0.0	87 40.9 (34.2, 47.8)	166 52.4 (46.7, 58.0)	213	0 0.0	87 40.9 (34.2, 47.8)	126 59.2 (52.2, 65.8)
Self-reported HIV status																				
Reported HIV	50	0 0.0	41 82.0 (68.6, 91.4)	9 18.0 (8.5, 31.4)	60	0 0.0	46 76.7 (64.0, 86.6)	14 23.3 (13.3, 36.0)	46	0 0.0	32 69.6 (54.3, 82.3)	14 30.4 (17.7, 45.8)	32	0 0.0	23 71.9 (53.3, 86.3)	14 30.4 (17.7, 45.8)	32	0 0.0	23 71.9 (53.3, 86.3)	9 28.1 (13.8, 46.8)
Did not report HIV	560	4 0.7 (0.0, 1.8)	329 58.8 (54.6, 62.9)	227 40.5 (36.4, 44.7)	618	3 0.5 (0.0, 1.4)	321 51.9 (47.9, 55.9)	294 47.6 (43.6, 51.6)	521	2 0.4 (0.0, 1.4)	273 52.4 (48.0, 56.8)	246 47.2 (42.9, 51.6)	329	2 0.6 (0.0, 2.2)	141 42.9 (37.4, 48.4)	246 47.2 (42.9, 51.6)	329	2 0.6 (0.0, 2.2)	141 42.9 (37.4, 48.4)	186 56.5 (51.0, 62.0)
Gender identity and gender identity of sex partners ²																				

	One-time sexual encounters				Number of sex partners				Sex via a dating app or sex venue				Group sex			
	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change
Gay, bisexual or other MSM	386	2 0.5 (0.0, 1.9)	263 68.1 (63.2, 72.8)	121 31.4 (26.8, 36.2)	413	2 0.5 (0.0, 1.7)	259 62.7 (57.8, 67.4)	152 36.8 (32.1, 41.7)	353	1 0.3 (0.0, 1.6)	217 61.5 (56.1, 66.6)	135 38.2 (33.2, 43.5)	230	1 0.4 (0.0, 2.4)	123 53.4 (46.8, 60.1)	106 46.1 (39.5, 52.8)
Men, sex with women only	20	0 0.0	6 30.0 (11.8, 54.2)	14 70.0 (45.7, 88.1)	27	0 0.0	5 18.5 (6.3, 38.1)	22 81.5 (61.9, 93.7)	18	0 0.0	1 5.6 (0.1, 27.3)	17 94.4 (72.7, 99.9)	13	0 0.0	1 7.7 (0.0, 36.0)	12 92.3 (64.0, 99.8)
Women	159	1 0.6 (0.0, 3.5)	79 49.7 (41.7, 57.7)	79 49.7 (41.7, 57.7)	186	1 0.5 (0.0, 3.0)	78 41.9 (34.8, 49.4)	107 57.5 (50.0, 64.7)	148	1 0.7 (0.0, 3.7)	63 42.6 (34.5, 51.0)	84 56.8 (48.4, 64.9)	88	1 1.1 (0.0, 6.2)	28 31.8 (22.2, 42.6)	59 67.1 (56.2, 76.7)
Other, gender identity or gender identity of sex partner not specified	50	1 2.0 (0.0, 10.7)	26 52.0 (37.4, 66.3)	23 46.0 (31.8, 60.7)	56	0 0.0	28 50.0 (36.3, 63.7)	28 50.0 (36.3, 63.7)	51	0 0.0	26 51.0 (36.6, 65.3)	25 49.0 (34.8, 63.4)	33	0 0.0	14 42.4 (25.5, 60.8)	19 57.6 (39.2, 74.5)
Number of sex partners³																
0	92	1 1.1 (0.0, 5.9)	62 67.4 (56.8, 76.8)	29 31.5 (22.2, 42.0)	98	1 1.0 (0.0, 5.6)	67 68.4 (58.2, 77.4)	30 30.6 (21.7, 40.7)	85	1 1.2 (0.0, 6.4)	57 67.1 (56.0, 76.9)	27 31.8 (22.1, 42.8)	47	1 2.1 (0.0, 11.3)	26 55.3 (40.1, 69.8)	20 42.6 (28.3, 57.8)
1	184	1 0.5 (0.0, 3.0)	127 69.0 (61.8, 75.6)	56 30.4 (23.9, 37.6)	225	2 0.9 (0.0, 3.2)	119 52.9 (46.1, 59.6)	104 46.2 (39.6, 53.0)	167	0 0.0	102 61.1 (53.2, 68.5)	65 38.9 (31.4, 46.8)	109	0 0.0	46 42.2 (32.8, 52.0)	63 57.8 (48.0, 67.2)
2-3	277	2 0.7 (0.0, 2.6)	151 54.5 (48.5, 60.5)	124 44.8 (38.8, 50.8)	296	0 0.0	144 48.7 (42.8, 54.5)	152 51.4 (45.5, 57.2)	263	1 0.4 (0.0, 2.1)	122 46.4 (40.2, 52.6)	140 53.2 (47.0, 59.4)	161	0 0.0	70 43.5 (35.7, 51.5)	91 56.5 (48.5, 64.3)

	One-time sexual encounters				Number of sex partners				Sex via a dating app or sex venue				Group sex			
	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change	N	Increase	Decrease	No change
4	35	0 0.0	16 45.7 (28.8, 63.3)	19 54.3 (36.7, 71.2)	35	0 0.0	20 57.1 (39.4, 73.7)	15 42.9 (26.3, 60.7)	31	0 0.0	12 38.7 (21.9, 57.8)	19 61.3 (42.2, 78.2)	30	0 0.0	15 50.0 (31.3, 68.7)	15 50.0 (31.3, 68.7)

n, %, 95% CI

CI: Confidence interval; MSM=Men who have sex with men. Percentages may not add to 100 due to rounding.

Note: Persons who reported the behavior was inapplicable or with missing data for that characteristic or behavior were excluded from the denominator.

¹Participants with Hispanic or Latino/a ethnicity were categorized as Hispanic and might be of any race; persons with non-Hispanic ethnicity were categorized into single race groups or as multiracial. Participants reporting multiracial identity were not shown separately.

²Men, including transgender men, were categorized as gay, bisexual or other MSM if they reported sex with men or a transgender male partner in the past 14 days or reported they were gay or bisexual. The remaining men and transgender men were grouped as men who had sex with women if they reported sex with only women or transgender women in the past 14 days and reported a sexual orientation of straight. Women included those who self-identified as women or transgender women, regardless of reported gender identity of sex partners or sexual orientation. The other category includes 41 participants who reported "other" gender identity and 17 participants who did not specify gender of sex partner.

³In the past 14 days.