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Kyle Lester Date

Prevalence and Correlates of HIV and STIs Among Men Who Have Sex with Men in the United States: A Multiyear Analysis

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By

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2019

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Abstract

Prevalence and Correlates of HIV and STIs Among Men Who Have Sex with Men in the United States: A Multiyear Analysis

By Kyle Lester

Introduction: Human immunodeficiency virus (HIV) continues to be a crucial public health concern. Gay, bisexual, and other men who have sex with men (MSM) are overrepresented in HIV diagnoses and other sexually transmitted infections (STIs). Additionally, among MSM, there are racial disparities in HIV and STI diagnoses. The objective of this study was to analyze the HIV and STI prevalence in MSM according to key demographic and behavioral characteristics with data acquired through the American Men's Internet Survey (AMIS).

Methods: This study examined nationwide, multiyear data (2013-2019) from AMIS, an online, cross-sectional, self-administered survey (N=70,162). Overall prevalence of HIV, STIs, and concurrent HIV and STIs were examined in this cohort, as well as by demographic characteristics of interest, including race, and by behavioral variables of interest.

Results: There were significant disparities in HIV and STI prevalence with regard to race/ethnicity, age, residency, and behavioral risk factors. Compared to White MSM, the prevalence of HIV, STIs, and concurrent HIV and STIs was significantly greater among Black and Hispanic/Latino MSM. Living in an urban (vs. rural) setting was also associated with increased prevalence of HIV and STIs. Behavioral factors such as condomless anal intercourse, drug usage before or during sex, and having more than four sexual partners were each associated with an increase in the prevalence of HIV and STIs.

Discussion: The results of this study indicate that variations in HIV and STI diagnoses among MSM are prominent across many demographic and behavioral factors including race/ethnicity, age, sexual behaviors, and regional residency. These findings may indicate disparities in health and sexual behavior education received in different communities by different racial/ethnic groups. Further research is needed to elucidate the complex association between race/ethnicity, age, sexual behavioral, and urban residency with the risk of HIV infection and STIs to enhance prevention programs and ensure access to supportive care.

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Introduction

Human immunodeficiency virus (HIV) continues to be a crucial medical and public health concern. An estimated 1.2 million people aged 13 years and older were living with HIV in the United States in 2018; 14% of these people were unaware of their HIV-positive status[1]. HIV poses an economic burden both at the individual and societal level. Medical costs (e.g., for medical care, HIV medications, treatment of comorbid conditions) for patients with HIV are estimated to be 800-900% higher than for patients with other chronic conditions (e.g., diabetes, cardiovascular disease)[2]. Incident HIV cases were estimated to cost the United States $36.4 billion in medical costs and workforce productivity loss in 2002[3]. Importantly, the populations most affected by HIV in the United States are disproportionally burdened. Gay, bisexual, and other men who have sex with men (MSM) consist of approximately 3.9% of the United States population,[4] yet accounted for 69% of the 37,968 people with incident HIV diagnoses in 2018[5]. Concurrently, MSM are overrepresented in sexually transmitted infections (STIs), accounting for 64.3% of all reported syphilis cases among men and women in 2018[6]. Data suggests that MSM are 140 times more likely to contract both HIV and syphilis than men who have sex with women (MSW)[7]. Furthermore, United States MSM with prevalent STIs are more likely to have higher incidence rates of HIV than MSM without a previous STI diagnosis[8].

HIV and STI transmission have been reported to share several risk factors. For example, having riskier sexual behaviors, such as condomless anal intercourse (CAI) and having multiple partners, can lead to sexually contracted infections including HIV or other STIs[6]. Additionally, there are racial disparities in HIV and STI diagnoses among MSM; non-White MSM are more likely to be diagnosed with HIV and STIs than White MSM[7]. A 2018 study using state-level surveillance data

found that Blacks represent 44% of new HIV diagnoses and 29% of new syphilis infections, yet only represent 12% of the general population. Similarly, Latinos represent 25% of new HIV diagnoses and 20% of new syphilis infections yet represent 17% of the general population[9]. Lastly, studies have found that MSM in urban cities are at a higher risk of HIV and STIs than those in a more rural area[10-11]. This relationship has been linked to an increase in the number of sexual partners on average between MSM living in urban settings, compared to MSM living in settings that are more rural.

In order to reduce the risk of acquiring HIV or STIs, the Centers for Disease Control and Prevention (CDC) recommends regular use of condoms, reducing the number of sexual partners, and limiting the usage of drugs and alcohol before and during sex[8]. Evidence from the literature supports that uptake of these recommendations among MSM is inversely associated with HIV infection. A 2019 United States nationwide survey of MSM found that those who were HIV-negative were two times as likely to report having used a condom during anal sex in the past 12 months, compared to those who were HIV positive (adjusted odds ratio [aOR] 2.02, 95% confidence interval [CI] 1.63-2.50)[12]. The same survey found HIV-positive MSM were more often users of marijuana (aOR 1.39, 95% CI 1.15-1.68), methamphetamines (aOR 3.42, 95% CI 2.41-4.87), and other illicit substances (aOR 1.90, 95% CI 1.56-2.32) in the past 12 months, when compared to HIV-negative MSM. Interventions focused on educating MSM about HIV prevention strategies have shown to be effective at increasing the occurrence of these behaviors. For example, a systematic review conducted in 2008 that evaluated 58 randomized controlled trials of behavioral HIV prevention in MSM found that behavioral interventions reduced self-reported CAI by 27%[13].

Most of the studies examining multiyear nationwide data on HIV and STI prevalence rates and correlates among MSM have been conducted internationally and not in the US[14-24]. One study conducted in New York City MSM aged 18 to 29 years old found that HIV rates more than doubled from 2005-2008[4]. While providing useful information, the study is limited in specificity to a regional population, age group, and nonrecent statistics. Furthermore, recent studies have suggested that trends in HIV prevalence may vary according to age group and race[25]. It is important to understand trends in HIV and STI prevalence rates and the factors that may be associated with these trends in order to understand how to best inform public health prevention efforts. The purpose of this study is to analyze the HIV and STI prevalence rates and correlates in MSM by age group and race in the United States, while examining the impact of certain prevention modalities, with recent data through the American Men's Internet Survey (AMIS) from 2013 to 2019.

Methods

Study Population

This study examined nationwide, multiyear data (2013-2019) from AMIS. AMIS participant recruitment and data collection methods have previously been described in detail[26]. Briefly, AMIS is an online, cross-sectional survey which aims to collect data on at least 10,000 MSM per annual cycle. All participant recruitment was conducted online, via either website advertisements or email blasts. Participants were eligible for survey inclusion if they were at least 15 years old, identify as male, were a United States resident, had a history of oral or anal sex with a man (or identified as gay or bisexual), and were able to complete the survey in English. The extensive questionnaire included prompts about demographic characteristics, HIV status and testing history, sexual behavior, and HIV prevention methods.

Measures

The primary outcome of interest for this analysis was HIV status. Survey participants were asked to report if they had ever received a positive HIV test result. HIV status was dichotomized as HIV-positive vs. HIV-negative (which included not tested, unknown, and preferred not to answer). The secondary outcome of interest was self-reported STI diagnosis within the past 12 months. For the purposes of this study, participants were considered to be STI positive if they reported a diagnosis of at least one of the following: gonorrhea, chlamydia, or syphilis. The reference group included those who did not report any diagnosis of these infections. In order to analyze the co-occurrence of HIV and STIs, a four-level variable was constructed: (1) neither (HIV-negative, no diagnosis of STI in past 12 months); (2) HIV only (HIV-positive, no diagnosis of STI in past 12 months); (3)

STI only (HIV-negative, at least one STI diagnosis in past 12 months); (4) or both (HIV-positive and at least one STI diagnosis in the past 12 months).

Demographic variables of interest included race/ethnicity, age, region, and urban vs. rural habitation. Participants were asked to self-report their race/ethnicity, and their responses were categorized as American Indian/Alaska Native, Asian/Native Hawaiian/Other Pacific Islander, Black, Hispanic/Latino, White, or Other/Multiple. Age was a free-text response, which for the purposes of this analysis was categorized into four groups: 15-24, 25-29, 30-39, and 40+ years. Region was defined based on the participant's zip code. Urban/rural classification was constructed according to participant zip code, using the National Center for Health Statistics (NCHS) Rural/Urban classification scheme[27]. The NCHS classification scheme categorizes counties into six levels: large central metro, large fringe metro, medium metro, small metro, micropolitan, and noncore. Based on the classification scheme, we organized micropolitan and noncore into the rural definition of a new dichotomous variable, and the four other levels into the urban definition of the variable.

Finally, behavioral variables related to HIV risk were also of interest, including CAI, drug usage, and having multiple sexual partners. CAI was a dichotomous variable that indicated whether or not participants had reported having had unprotected anal sex in the past 12 months. Two separate dichotomous variables regarding drug usage in the previous 12 months were examined: any vs. no marijuana usage, and any vs. no usage of illicit drugs other than marijuana. Participants were asked to report the number of different men with whom they had oral or anal sex in the past 12 months, and the distribution of responses was analyzed to determine a threshold for risky behavior. Those

who reported more than four unique sexual partners in the past 12 months (median of distribution) were considered to have higher-risk sexual behavior; those with four or less served as the reference group.

Statistical Analysis

The distribution of demographic characteristics in the overall study population was examined, and the occurrence of each categorical variable was summarized according to frequencies and percentages. The prevalence of overall HIV, overall STIs, and concurrent HIV and STIs was examined in the overall cohort and according to racial/ethnic group. Chi-square tests of proportions at the 95% significance level were used to examine whether significant racial disparities exist in these outcomes, using White race/ethnicity as the reference group. The prevalence of HIV only, STIs only, and concurrent HIV and STIs was also examined according to the demographic characteristics of interest. Finally, the occurrence of each behavioral variable of interest was examined according to demographic characteristics, separately for HIV-positive and HIV-negative MSM.

Results

Study Population

There were 70,162 total participants included in the AMIS dataset through years 2013-2019. Participation in the survey each year was similar, ranging from 9,159 to 10,312 yearly participants (**Table 1**). The majority of participants were White MSM (70.08%), with the second most common racial/ethnic group identified as Hispanic/Latino (13.90%), followed by Black (7.17%). 40.55% of participants were aged 40 years or older, with the second most common age group being 15-24 years (28.57%). The most commonly represented geographical region was the South (38.49%), with participation from the Northeast, Midwest, and West ranging from 18.11% to 22.79% of the cohort. 90.80% of participants resided in areas classified as urban, with 9.10% residing in rural classifications. Of the entire cohort, 9.50% (n=6,662) reported HIV-positive status, and 9.45% (n=6,628) reported having an STI diagnosis in the past 12 months.

HIV and STI Prevalence

83.15% (n=58,341) of participants reported that they were HIV-negative and had not received any STI diagnosis in the past 12 months (**Table 2**). Comparatively, 7.40% (n=5,193) reported an HIV-positive status without any STI diagnosis, 7.35% (n=5,159) reported an STI diagnosis and HIV-negative status, and 2.09% (n=1,469) reported both an HIV-positive status and an STI diagnosis. With the exception of 2013 (n=77, 0.75%), the prevalence of both HIV-positive status and STI diagnosis was consistent across the survey years, ranging from 135 (1.33%) to 301 (2.97%) participants yearly. However, from 2014-2019, STI diagnosis in HIV-negative individuals increased from 6.70% to 10.02%.

Compared to White MSM (8.27%), the prevalence of HIV was significantly greater among Black (24.17%, p<0.0001) and Hispanic/Latino (9.18%, p<0.003) MSM (**Table 3**). The prevalence of STIs was significantly greater among Black (18.06%, p<0.0001), Hispanic/Latino (12.94%, p<0.0001), Asian/Native Hawaiian/Other Pacific Islanders (11.37%, p<0.0001), and Multi/Other (9.27%, p=0.005) MSM compared to White MSM (7.81%). The prevalence of concurrent HIV and STIs was significantly greater among Black (7.45%, p<0.0001) and Hispanic/Latino (2.53%, p<0.0001) MSM compared to White MSM (1.48%). The prevalence of neither HIV nor STI was significantly lower among Black (65.22%, p<0.0001), Hispanic/Latino (80.42%, p<0.0001), and Multi/Other MSM (83.70%, p=0.01) compared to White MSM (85.41%).

HIV and STI Prevalence by Race/Ethnicity

The prevalence of HIV-positive status, STI diagnosis, or both varied based on race/ethnicity (**Table 2**). When comparing HIV and STI prevalence among each individual race/ethnicity, Black participants were more likely to report HIV-positive status with no STI diagnosis (16.71%), STI diagnosis among HIV-negative participants (10.61%), and both HIV-positive and STI diagnosis (7.45%) compared to other race/ethnicity groups. White participants were least likely to have an STI only or with HIV (6.33% for STI diagnosis only, 1.48% for both HIV-positive and STI diagnosis). Finally, Asian/Native Hawaiian/Other Pacific Islanders reported the lowest prevalence of HIV (3.04%) and were the most likely racial/ethnic group to report neither HIV-positive status nor STI diagnosis (85.59%).

HIV and STI Prevalence by Age

Participants over the age of 40 years reported the highest prevalence of HIV-positive status with no STI diagnosis (12.52%), yet the lowest prevalence of STI diagnosis among HIV-negative participants (4.92%) (**Table 2**). Participants in the youngest age group (ages 15-24 years) were the most likely to report having neither HIV nor an STI diagnosis in the past 12 months (90.30%), and also had the lowest prevalence of HIV (1.46% for HIV only, 0.65% for both HIV-positive and STI diagnosis).

HIV and STI Prevalence by Region and Urbanicity

Regional variation in HIV and STI prevalence was also observed (**Table 2**). Participants who resided in the South or the West were less likely to report having neither HIV nor an STI diagnosis in the past 12 months (81.85% and 81.56%, respectively) compared to those residing in the Northeast or the Midwest (84.89% and 85.98%, respectively). Similarly, residents of the South and the West were more likely to report having both HIV and an STI diagnosis in the past 12 months (2.53% and 2.11%, respectively) compared to residents of the Northeast and the Midwest (1.72% and 1.57%, respectively). Finally, urban/rural classification was related to HIV status and diagnosis of STIs (**Table 2**). 89.56% (n=5,721) of participants residing in rural areas reported having neither HIV nor an STI diagnosis in the past 12 months, while 0.75% (n=48) reported having both, compared to 82.51% (n=52,564) and 2.23% (n=1,149), respectively, of those residing in urban areas.

Behavioral Risk Factors and HIV Status

77.14% (n=5,139) of HIV-positive MSM reported having had CAI in the past 12 months, compared to 65.65% (n=41,687) of HIV-negative MSM (**Table 4**). Among those who reported

having had CAI in the past 12 months, the racial and age distributions varied based on HIV status. For example, 17.38% of HIV-positive participants that reported having had CAI were Black, while only 5.86% of HIV-negative participants that reported having had CAI were Black. Among participants that reported having had CAI, 6.97% and 61.24% of HIV-positive participants were ages 15-24 years and 40+ years, respectively, whereas 29.96% and 35.20% of HIV-negative participants were ages 15-24 years and 40+ years, respectively.

Marijuana usage was reported by 27.71% (n=1,864) of HIV-positive participants and 26.15% (n=16,603) of HIV-negative participants, and other illicit drug usage was reported by 10.64% (n=709) of HIV-positive participants and 8.84% (n=5,616) of HIV-negative participants (**Table 4**). Among drug users, the percentage of participants that were of Black race/ethnicity was substantially greater among those who are HIV-positive (18.04% for marijuana users, 19.18% for other illicit drug users) than among those who are HIV-negative (5.35% for marijuana users, 5.04% for other illicit drug users). HIV-positive MSM who also reported using drugs were most commonly in the 40+ years age group (53.90% for marijuana users, 55.85% for other illicit drug users) and least commonly in the 15-24 years age group (8.23% for marijuana users, 5.64% for other illicit drug users). In contrast, a large proportion of people who are HIV-negative and use drugs were younger, (for ages 15-24 years: 41.99% used marijuana, 41.45% used other illicit drugs).

38.82% of HIV-positive participants reported having had multiple (greater than 4) sexual partners in the past 12 months, compared to 30.82% of HIV-negative participants (**Table 4**). Among those reporting having had multiple sexual partners in the past 12 months, those who were HIV-positive

were more likely to be of Black race/ethnicity (17.87%) than those who were HIV-negative (6.57%). Those who had multiple sexual partners in the past 12 months that were HIV-positive were most commonly in the 40+ years age group (60.63%) and least commonly in the 15-24 years age group (6.23%). In contrast, 36.60% of HIV-negative participants who had multiple sexual partners in the past 12 months were 40+ years of age and 29.59% were 15-24 years of age.

Across all behavioral risk factors of interest, a higher percentage of HIV-positive participants resided in urban areas than HIV-negative participants (**Table 4**).

Discussion

The results of this study indicate that disparities in HIV and STI diagnoses among MSM are prominent across most demographic and behavioral factors, including race/ethnicity, age, sexual behaviors, and regional residency. Despite increased public health initiatives for the prevention of HIV, we did not find any evidence of a decrease in HIV prevalence in MSM from 2013 to 2019, and the prevalence of STIs increased during these years. Given the societal economic burden of HIV due to medical costs and workforce productivity loss, it is important to understand the distribution of HIV infections and STIs in the population in order to inform targeted prevention efforts.

This study found statistically significant differences in the prevalence of HIV, STIs, and concurrent HIV and STIs according to racial/ethnic groups. Black and Hispanic MSM were more likely than White MSM to report being HIV-positive and/or having had an STI diagnosis in the past 12 months. This observation is in support of previous findings[7,9]. These findings may indicate disparities in health and sexual behavior education received in different communities by different racial/ethnic groups. Further research is needed to elucidate the complex relationships between race/ethnicity and the risk of HIV infection and STIs.

Noticeable discrepancies in the prevalence of HIV and STIs between age groups were evident. MSM who were 40 years or older were found to have the highest prevalence of HIV in the absence of STIs, and the lowest prevalence of past-year STIs in the absence of HIV, compared to all other age groups. Furthermore, participants ages 25-29 years had the highest prevalence of STIs across the years of study. These results provide evidence that MSM may be more likely to partake in

higher-risk sexual behaviors and acquire STIs earlier in life, which may contribute to an increased risk of acquiring HIV infections later in life. It is possible that individuals ages 40 years or older, who were the mostly likely age group to report HIV-positive status, could have received more STI education and sexual behavior counseling, due to their increased rates of HIV.

Behavioral risk factors, such as CAI, drug usage, and more than four sexual partners in the past 12 months were correlated with HIV and STI prevalence. Many of the behaviors associated with HIV infection were also associated with STI infection, including reduced condom usage, use of drugs before and during sex, and the number of sexual partners[8]. HIV prevalence was highest in MSM who have had CAI, used marijuana and other drugs, and had more than four sexual partners in the past 12 months. These factors were particularly important in HIV-positive Black MSM, who have approximately a threefold increase in the self-reported prevalence of these behavioral risk factors compared to HIV-negative Black MSM.

Urban-rural classification was also found to be an important correlate of HIV and STI prevalence, as has been previously noted in the literature[10-11]. The prevalence of HIV only, STI only, and both HIV and STI was higher in urban communities compared to rural communities. This increase in the burden of HIV, STI, and both HIV/STI in urban communities may be linked to sexual network size (i.e., due to the higher population density in urban settings where there are more potential sexual partners per capita). Additionally, high-risk behaviors (CAI, drug usage, multiple sexual partners) were found to be more common among MSM living in urban communities compared to rural communities. Among MSM who reported engaging in high-risk behaviors, urban residencies were more common among participants who are living with HIV than participants who are HIV-

negative. Overall, this study provides evidence of a greater prevalence of HIV-positive people in urban communities engaging in higher-risk behaviors.

Our study has several key strengths. The usage of the AMIS dataset, a dataset compiled from an annual survey administered online, allowed for the assembly of a large, nationally representative cohort of MSM. The organized collection of data across survey years enabled us to accumulate information on over 70,000 nationwide MSM, and further allowed for the examination of changes in prevalence of HIV and STIs over time. In addition, the quality of the data is high; the data is collected and cleaned by the same study team each year and is formatted in a consistent fashion. The use of an online format for the survey was beneficial for the efficient, systematic collection of data from a consistent questionnaire, which provided each participant with identical, objectively written prompts, thus eliminating the potential for interviewer bias. Furthermore, as many of the behavioral risk factors of interest are sensitive topics, use of an online, anonymous survey, rather than face-to-face interviewing, likely elicited more truthful responses, reducing the potential for social desirability bias.

There are several limitations with regard to our study. The AMIS cohort is cross-sectional, and due to the lack of temporality of the HIV/STI and risk factor variables, we are unable to determine whether a participant's current HIV status may be a result of their risk behaviors, or if knowledge of their HIV status has influenced their risk behaviors. Additionally, the construction of questions regarding drug usage and CAI inhibits the inferences that can be made. The drug usage variable does not necessarily indicate whether the usage was occurring simultaneously with sexual activity (i.e., it is possible that drug usage was occurring before, during, or after sexual activity, or with no

regard to sexual activity). Questions regarding the occurrence of CAI were not able to take the presence of monogamous partnerships into consideration, which would be expected to have a different HIV/STI risk profile compared to casual partnerships. This could lead to a potential increase in those reporting drug usage and CAI, despite the lack of association with a higher risk of acquiring HIV or STIs. With participant recruitment and survey administration being conducted exclusively online, it is important to consider the generalizability of these results. Particularly, this study is restricted to those with access to a computer or smartphone, and therefore may not represent the general population of MSM in the United States. Furthermore, the study has the potential for misclassification of exposure due to the self-reported nature of response. For example, those who are HIV-positive may have a clear memory of previous high-risk sexual behaviors due to the experience of receiving a HIV-positive diagnosis compared to those that are HIV-negative.

Potential future studies focusing on a prospective cohort could yield more advantageous data, as this would allow for analysis on the progression of sexual behavior throughout a participant's movement through each of the age categories. A more in-depth analysis of participant socioeconomic status, education level, HIV/STI testing history, and access to healthcare would be beneficial to understanding the racial/ethnic, age, sexual behavioral, and regional variations that this study has found.

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Table 1. Characteristics of men who have sex with men in the American Men's Internet Survey

Characteristic	N (%)
Survey Year	
2013	10,312 (14.70)
2014	9,159 (13.05)
2015	10,217 (14.56)
2016	10,166 (14.49)
2017	10,049 (14.32)
2018	10,129 (14.44)
2019	10,130 (14.44)
Race/Ethnicity	
American Indian/Alaska Native	446 (0.64)
Asian/Native Hawaiian/Other PI	1,742 (2.48)
Black	5,032 (7.17)
Hispanic/Latino	9,753 (13.90)
White	49,171 (70.08)
Multi/Other	2,804 (4.00)
Missing	1,214 (1.73)
Age	
15-24	20,043 (28.57)
25-29	10,350 (14.75)
30-39	11,318 (16.13)
40+	28,451 (40.55)
Region	
Northeast	12,709 (18.11)
Midwest	14,239 (20.29)
South	27,007 (38.49)
West	15,993 (22.79)
U.S. dependent areas	59 (0.08)
Missing	155 (0.22)
Urban vs. Rural	
Urban	63,705 (90.80)
Rural	6,388 (9.10)
Missing	69 (0.10)
HIV Status	
Positive	6,662 (9.50)
Negative	63,500 (90.50)
STI Status	
Yes	6,628 (9.45)
No	63,534 (90.55)

Table 2. Characteristics of men who have sex with men in the American Men's Internet Survey stratified by HIV and STI status

	Neither N (%)	HIV Only N (%)	STI Only N (%)	Both N (%)
	58,341 (83.15)	**5,193 (7.40)**	**5,159 (7.35)**	**1,469 (2.09)**
Survey Year				
2013	9,053 (87.79)	1,021 (9.90)	161 (1.56)	77 (0.75)
2014	7,517 (82.07)	817 (8.92)	614 (6.70)	211 (2.30)
2015	8,510 (83.29)	710 (6.95)	752 (7.36)	245 (2.40)
2016	8,255 (81.20)	834 (8.20)	813 (8.00)	264 (2.60)
2017	8,168 (81.28)	728 (7.24)	917 (9.13)	236 (2.35)
2018	8,626 (85.16)	481 (4.75)	887 (8.76)	135 (1.33)
2019	8,212 (81.07)	602 (5.94)	1,015 (10.02)	301 (2.97)
Race/Ethnicity				
American Indian/Alaska Native	370 (82.96)	35 (7.85)	34 (7.62)	7 (1.57)
Asian/Native Hawaiian/Other PI	1,491 (85.59)	53 (3.04)	166 (9.53)	32 (1.84)
Black	3,282 (65.22)	841 (16.71)	534 (10.61)	375 (7.45)
Hispanic/Latino	7,843 (80.42)	648 (6.64)	1,015 (10.41)	247 (2.53)
White	41,995 (85.41)	3,337 (6.79)	3,111 (6.33)	728 (1.48)
Multi/Other	2,347 (83.70)	197 (7.03)	208 (7.42)	52 (1.85)
Missing	1,013 (83.44)	82 (6.75)	91 (7.50)	28 (2.31)
Age				
15-24	18,099 (90.30)	292 (1.46)	1,521 (7.59)	131 (0.65)
25-29	8,527 (82.39)	436 (4.21)	1,152 (11.13)	235 (2.27)
30-39	8,932 (78.92)	902 (7.97)	1,085 (9.59)	399 (3.53)
40+	22,783 (80.08)	3,563 (12.52)	1,401 (4.92)	704 (2.47)
Region				
Northeast	10,789 (84.89)	776 (6.11)	923 (7.26)	221 (1.74)
Midwest	12,243 (85.98)	888 (6.24)	885 (6.22)	223 (1.57)
South	22,106 (81.85)	2,308 (8.55)	1,911 (7.08)	682 (2.53)
West	13,044 (81.56)	1,182 (7.39)	1,429 (8.94)	338 (2.11)
U.S. Dependent Areas	48 (81.36)	3 (5.08)	6 (10.17)	2 (3.39)
Missing	111 (71.61)	36 (23.23)	5 (3.23)	3 (1.94)
Urban vs. Rural				
Urban	52,564 (82.51)	4,851 (7.61)	4,871 (7.65)	1,419 (2.23)
Rural	5,721 (89.56)	339 (5.31)	280 (4.38)	48 (0.75)
Missing	56 (81.16)	3 (4.35)	8 (11.59)	2 (2.90)

Table 3. Prevalence of HIV and STIs by race/ethnicity among men who have sex with men in the American Men's Internet Survey

	Neither		HIV		STI		Both	
	%	p value	%	p value	%	p value	%	p value
Race/Ethnicity								
American Indian/Alaska Native	82.96	0.15	9.42	0.38	9.19	0.28	1.57	0.88
Asian/Native Hawaiian/Other PI	85.59	0.83	4.88	<0.0001	11.37	<0.0001	1.84	0.23
Black	65.22	<0.0001	24.17	<0.0001	18.06	<0.0001	7.45	<0.0001
Hispanic/Latino	80.42	<0.0001	9.18	<0.003	12.94	<0.0001	2.53	<0.0001
White	85.41	REF	8.27	REF	7.81	REF	1.48	REF
Multi/Other	83.7	0.01	8.88	0.25	9.27	0.005	1.85	0.11

Table 4. Risk behaviors of men who have sex with men in the American Men's Internet Survey according to HIV status

	CAI N (%)	Marijuana N (%)	Other Drugs N (%)	>4 Partners N (%)
HIV Positive (n = 6,662)				
	5,139 (77.14)	**1,846 (27.71)**	**709 (10.64)**	**2,586 (38.82)**
Race/Ethnicity				
American Indian/Alaska Native	29 (0.56)	10 (0.54)	6 (0.85)	10 (0.39)
Asian/Native Hawaiian/Other PI	66 (1.28)	18 (0.98)	7 (0.99)	33 (1.28)
Black	893 (17.38)	333 (18.04)	136 (19.18)	462 (17.87)
Hispanic/Latino	678 (13.19)	258 (13.98)	101 (14.25)	334 (12.92)
White	3,196 (62.19)	1,116 (60.46)	417 (58.82)	1,615 (62.45)
Multi/Other	190 (3.70)	77 (4.17)	29 (4.09)	96 (3.71)
Missing	87 (1.69)	34 (1.84)	13 (1.83)	36 (1.39)
Age				
15-24	358 (6.97)	152 (8.23)	40 (5.64)	161 (6.23)
25-29	573 (11.15)	261 (14.14)	91 (12.83)	300 (11.60)
30-39	1,061 (20.65)	438 (23.73)	182 (25.67)	557 (21.54)
40+	3,147 (61.24)	995 (53.90)	396 (55.85)	1,568 (60.63)
Region				
Northeast	770 (14.98)	275 (14.90)	115 (16.22)	412 (15.93)
Midwest	865 (16.83)	306 (16.58)	92 (12.98)	410 (15.85)
South	2,267 (44.11)	805 (43.61)	321 (45.28)	1,136 (43.93)
West	1,202 (23.39)	443 (24.00)	179 (25.25)	627 (24.25)
U.S. dependent areas	4 (0.08)	3 (0.16)	2 (0.28)	1 (0.04)
Missing	31 (0.60)	14 (0.76)	0 (0.00)	0 (0.00)
Urban vs. Rural				
Urban	4,861 (94.59)	1,756 (95.12)	676 (95.35)	2,464 (95.28)
Rural	274 (5.33)	87 (4.71)	31 (4.37)	121 (4.68)
Missing	4 (0.08)	3 (0.16)	2 (0.28)	1 (0.04)
HIV Negative (n = 63,500)				
	41,687 (65.65)	**16,603 (26.15)**	**5,616 (8.84)**	**19,568 (30.82)**
Race/Ethnicity				
American Indian/Alaska Native	268 (0.64)	94 (0.57)	35 (0.62)	125 (0.64)
Asian/Native Hawaiian/Other PI	993 (2.38)	341 (2.05)	134 (2.39)	577 (2.95)
Black	2,444 (5.86)	888 (5.35)	283 (5.04)	1,286 (6.57)
Hispanic/Latino	5,998 (14.39)	2,587 (15.58)	979 (17.43)	3,014 (15.40)
White	29,633 (71.08)	11,580 (69.75)	3,766 (67.06)	13,489 (68.93)
Multi/Other	1,686 (4.04)	832 (5.01)	305 (5.43)	770 (3.93)
Missing	665 (1.60)	281 (1.69)	114 (2.03)	307 (1.57)
Age				
15-24	12,491 (29.96)	6,971 (41.99)	2,328 (41.45)	5,790 (29.59)
25-29	7,151 (17.15)	3,009 (18.12)	1,067 (19.00)	3,283 (16.78)
30-39	7,372 (17.68)	2,699 (16.26)	967 (17.22)	3,333 (17.03)
40+	14,673 (35.20)	3,924 (23.63)	1,254 (22.33)	7,162 (36.60)
Region				
Northeast	7,356 (17.65)	3,268 (19.68)	1,004 (17.88)	3,602 (18.41)
Midwest	8,612 (20.66)	3,318 (19.98)	1,074 (19.12)	3,783 (19.33)
South	16,006 (38.40)	5,787 (34.86)	2,048 (36.47)	7,405 (37.84)
West	9,595 (23.02)	4,188 (25.22)	1,486 (26.46)	4,762 (24.34)
U.S. dependent areas	40 (0.10)	7 (0.04)	4 (0.07)	16 (0.08)
Missing	78 (0.19)	35 (0.21)	0 (0.00)	0 (0.00)
Urban vs. Rural				
Urban	37,723 (90.49)	15,254 (91.87)	5,218 (92.91)	18,011 (92.04)
Rural	3,918 (9.40)	1,340 (8.07)	394 (7.02)	1,536 (7.85)
Missing	46 (0.11)	9 (0.05)	4 (0.07)	21 (0.11)