



Published in final edited form as:

J Gay Lesbian Soc Serv. 2018 ; 30(1): 82–101. doi:10.1080/10538720.2018.1408519.

A three-city comparison of drug use and drug use before sex among young men who have sex with men in the United States

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Abstract

High rates of drug use have been documented among young men who have sex with men (YMSM). However, updated prevalence data are needed to understand current trends, especially for drug use before sex. We used baseline data from an HIV prevention trial to examine demographic differences in drug use (in general and before sex) among YMSM in Atlanta, Chicago, and NYC. Marijuana was the most commonly used drug, but alkyl nitrites (“poppers”), cocaine, and Ecstasy were also common. Drug use was more prevalent among older and White YMSM, and it was similar between cities, except use of poppers was higher in NYC. Our data generally support national prevention efforts.

Keywords

illicit drug use; substance use; men who have sex with men; gay; bisexual

In the United States, the estimated cost of illicit drug use is \$193 billion annually, including costs associated with healthcare, crime, and lost productivity (US Department of Justice National Drug Intelligence Center, 2011). Recent national data suggest that 27 million Americans ages 12 and older (10% of the population) used drugs in the past month and the rate was highest for those ages 18–25 (22%) (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015). Additionally, rates of drug use increased from 2002 to 2014,

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largely due to increases in marijuana and opiate use (CBHSQ, 2015). Studies have consistently demonstrated that drug use is more prevalent among men who have sex with men (MSM) compared to heterosexual men (Parsons, Grov, & Kelly, 2009; Ramo, Grov, Delucchi, Kelly, & Parsons, 2010), especially among young MSM (YMSM) (Greenwood et al., 2001; Lelutiu-Weinberger et al., 2013). Despite this, YMSM are infrequently targeted by drug use prevention campaigns and further research is needed to tailor community-level interventions.

Although sexual orientation disparities in drug use are well documented, most studies are limited in their ability to inform our current understanding of trends in drug use among YMSM ages 18 to 29. Most previous studies used data from the late 1990s and early 2000s, relied on small samples with wide age ranges, or were geographically restricted. For instance, Cochran and colleagues used data from 1996 that included 98 MSM with an average age of 34 (Cochran, Ackerman, Mays, & Ross, 2004); McCabe and colleagues used data from 2004–2005 that included 644 MSM ages 18 and older (McCabe, Hughes, Bostwick, West, & Boyd, 2009); and Greenwood and colleagues used data from 1992–1993 that included 428 MSM in San Francisco (Greenwood et al., 2001). In recent studies of YMSM (Corliss et al., 2010; Newcomb, Birkett, Corliss, & Mustanski, 2014; Newcomb, Ryan, Greene, Garofalo, & Mustanski, 2014), samples included men up to age 25, excluding part of the demographic driving recent increases (ages 26 and older) (CBHSQ, 2015). Further, studies have examined club drug use among YMSM (Parsons, Grov, & Kelly, 2009; Ramo et al., 2010), but samples included recent club drug users recruited from bars/clubs in NYC, limiting their generalizability to club-going YMSM. As such, updated prevalence data are needed to understand current trends in drug use among YMSM.

Drug use before sex among YMSM is particularly important, given its impact on HIV, especially since YMSM are at disproportionate risk for HIV (CDC, 2015). Strong evidence exists supporting the influence of drug use on condomless anal sex (CAS) among MSM (Lacefield, Negy, Schrader, & Kuhlman, 2015) and CAS is one of the most strongly supported correlates of HIV seroconversion (Mustanski, Newcomb, Du Bois, Garcia, & Grov, 2011). However, few studies have examined the prevalence of specific types of drug use before sex among YMSM. Data on MSM from 1999–2001 demonstrated that marijuana and alkyl nitrites (“poppers”) were the most common drugs used before sex (9%), followed by hallucinogens and cocaine (4%), amphetamines (3%), crack and injectable drugs (1%), and heroin (<1%) (Colfax et al., 2004). Given that these data were collected almost two decades ago, and that the sample was MSM in general rather than YMSM, there is also a need for updated prevalence data to understand current trends in drug use before sex among YMSM.

Substance use patterns among MSM are greatly influenced by local social norms and are frequently used for social integration among YMSM (Carpiano, Kelly, Easterbrook, & Parsons, 2011; Kecojevic, Corliss, & Lankenau, 2015), suggesting the potential for variability across different cities in the US because of social influences. Despite little attention to geographic differences in illicit drug use among YMSM, research in Europe found that patterns of drug use differed across cities and city was the strongest demographic predictor of the use of drugs associated with sex (e.g., methamphetamine, ketamine, GHB)

(Schmidt et al., 2016). Geographic differences in drug use are also possible in the US, given previous research from the early methamphetamine epidemic demonstrating more highly-potent formulations in some regions (Hirshfield, Remien, Humberstone, Walavalkar, & Chiasson, 2004; Sullivan, Nakashima, Purcell, Ward, & Group, 1998) and regional changes in prescription opiate and heroin use in the general US populous (Cicero, Ellis, & Harney, 2015). Data from the National HIV Behavioral Surveillance System (a survey of 20 US cities in 2014) (CDC, 2016) further indicate potential differences by city, but these data were reported as descriptive trends without comparative testing (CDC, 2014).

In addition to the need for updated prevalence data on drug use and drug use before sex among YMSM, understanding differences across major US cities and demographics (e.g., age, race/ethnicity, sexual orientation, education) can help tailor prevention and intervention efforts for drug-using YMSM in diverse communities. Previous studies have found that drug use is higher among younger (Halkitis & Palamar, 2008; Klitzman, Greenberg, Pollack, & Dolezal, 2002; Stall et al., 2001), White (Goldstein, Burstyn, LeVasseur, & Welles, in press; Thiede et al., 2003), and less educated MSM (Barnes, Hatzenbuehler, Hamilton, & Keyes, 2014; Pachankis, Eldahan, & Golub, 2016). Differences between gay and bisexual men are less clear. Some studies find that bisexual men report more drug use (Ford & Jasinski, 2006; Mimiaga et al., 2010; Mustanski, Andrews, Herrick, Stall, & Schnarrs, 2013; Thiede et al., 2003), but others do not (Halkitis & Palamar, 2008; White et al., 2014). In addition to changes in patterns of drug use in the US over time, none of the aforementioned studies examined demographic differences in drug use before sex and few focused demographic differences in the use of specific drugs. As such, updated data are needed to understand the current state of drug use patterns across demographics among YMSM in the US.

To address these gaps, the goals of the current study were to: (1) document the prevalence of drug use and drug use before sex in a large sample of YMSM; (2) examine demographic differences in drug use; and (3) compare drug use across three major US cities (Chicago, Atlanta, and NYC). Consistent with previous research, we hypothesized that drug use would be higher among younger, White, bisexual, and less educated YMSM (relative to older, Black/Latino, gay, and more educated YMSM). We expected findings to be similar for drug use in general and before sex. We did not make hypotheses for specific drugs, because of inconsistent previous findings.

Method

Data were from the baseline assessment prior to a randomized controlled trial of an HIV prevention program. Baseline assessment data were collected between June 2013 and December 2015. All participants met the following criteria: (1) birth male who identifies as male; (2) 18–29; (3) HIV-negative; (4) reported CAS with a male in the past 6 months; (5) able to read English; and (6) had e-mail. Individuals in monogamous relationships for more than 6 months were excluded based on the assumption that they require a different HIV prevention program. Participants were recruited online and in-person across the three cities and using a nationwide advertisement. Potential participants completed an online screener and an HIV test at one of our facilities or at home. Those who tested at home were mailed a self-test and required to photograph the result. Individuals who met eligibility criteria were

invited to complete the online baseline assessment after indicating their consent to participate. Procedures were approved by the affiliated Institutional Review Boards.

Of the 1,113 YMSM who completed the assessment, most ($N = 826$) lived in one of three cities (defined by zip codes within metropolitan statistical areas): Chicago ($N = 285$; 34.5%), Atlanta ($N = 208$; 25.2%), and NYC ($N = 333$; 40.3%). Of the remaining 287, 62 did not provide zip codes and 225 lived in other cities (but there were not enough to consider them separate groups). We focused on the three cities that most participants lived in rather than broad geographic regions to draw specific conclusions about drug use in major metropolitan areas. Additionally, we excluded 13 of the 826 participants who lived in Chicago, Atlanta, and NYC, because they identified as heterosexual. Given our interest in demographic correlates of recent drug use, there were too few heterosexual-identified participants to consider them their own sexual orientation group in analyses. Therefore, our analytic sample included 813 YMSM in Chicago, Atlanta, and NYC.

Measures

Demographics—Participants reported age, sexual orientation, race/ethnicity, education, and zip code to identify city (see Table 1 for response options).

Recent drug use—We operationalized recent drug use in two ways: (1) use versus no use (in the past three months); and (2) weekly use versus less than weekly use (among those who endorsed using each individual drug in the past three months). First, participants were asked, “In the last 3 months, have you used [drug]?” Drugs included: marijuana, cocaine, heroin, methamphetamine, opiates, Ecstasy, and GHB. A text box was also provided for participants to indicate other drugs they had used in the last three months. Based on these responses, we created two additional drug categories: alkyl nitrites (“poppers”) and hallucinogens (e.g., mushrooms, LSD, PCP). Although participants indicated additional other drugs (e.g., erectile dysfunction drugs, benzodiazepines), endorsement was too low to include in analyses. In addition to examining the use of specific drugs, we also examined polydrug use, which was defined as the use of three or more drugs during the past three months. The definition of polydrug use as the use of three or more drugs is consistent with previous research (Greenwood et al., 2001; Kecojevic, Jun, Reisner, & Corliss, 2017; Maslowsky, Schulenberg, O’Malley, & Kloska, 2013; Meshesha, Dennhardt, & Murphy, 2015; Mimiaga et al., 2008; Parsons, Grov, & Golub, 2012; Parsons, Rendina, Moody, Ventuneac, & Grov, 2015; Paul, Boylan, Gregorich, Ayala, & Choi, 2014; Stall et al., 2001).

For any drug used in the last 3 months (with the exception of the “other drugs” that participants indicated via open-ended responses), participants were asked, “...how many times did you use [drug]?” Response options included: (1) 1–2 times; (2) once a month or less; (3) 2–3 times a month; (4) 1–2 times a week; (5) 3–5 times a week; and (6) every day or almost every day. Consistent with previous research (Balán et al., 2013; Greenwood et al., 2001; Mustanski, Garofalo, Herrick, & Donenberg, 2007; Stall et al., 2001), responses were dichotomized into weekly use versus less than weekly use to differentiate between regular use and rare/experimental use.

Drug use before sex—Participants reported their most recent partners in the last 3 months for up to 3 partners. For each partner, they were asked, “What drugs did you use during anal/vaginal sex?” The question referred to anal or vaginal sex, because partners could be of any sex/gender and drug use can influence condom use for both vaginal and anal sex. Drugs were asked about as categories: marijuana, club drugs, stimulants, opiates, and other. Using a drug with any partner was coded as use. For each partner, participants were asked, “How frequently did you use drugs in the 4 hours before having anal/vaginal sex with this partner?” Response options included: (0) never; (1) less than half the time; (2) about half the time; (3) more than half the time; and (4) always. The mean value across partners was used for analyses.

Analyses

Analyses were conducted using SPSS Version 24. First, we compared the three cities on demographic variables using a one-way ANOVA for age and chi-squared tests with follow-up *z*-tests for sexual orientation, race/ethnicity, and highest level of education completed. Then, we examined demographic and regional differences in recent drug use using logistic regression (for drug use, weekly drug use, and drug use before sex) and linear regression (for frequency of drug use before sex). Categorical variables were dummy-coded with the following reference categories: gay (for sexual orientation), White (for race/ethnicity), and less than a college degree (for highest level of education completed). For tests of demographic and regional differences in recent drug use, we examined bivariate and multivariate associations (i.e., associations adjusting for all other predictor variables). Below, we describe the significant multivariate associations, but we report both the bivariate and multivariate associations in the tables.

Results

Demographic characteristics

Demographic characteristics of the analytic sample as a function of city are reported in Table 1. There were significant between-city differences in sexual orientation, race/ethnicity, and education, but not age. First, Atlanta had a higher proportion of bisexual men compared to Chicago and NYC. Second, NYC had a lower proportion of White men compared to Chicago and Atlanta; Atlanta had a higher proportion of Black men compared to Chicago and NYC; and the proportion of Latino men differed across all three cities (i.e., it was highest in NYC and lowest in Atlanta). In contrast, the proportion of men with “other” races/ethnicities did not differ across the three cities. Third, Atlanta had a lower proportion of men with college degrees compared to Chicago and NYC.

Recent drug use

Marijuana was the most commonly used drug in the past three months ($n = 453$, 55.7%), followed by poppers ($n = 168$, 20.7%), cocaine ($n = 123$, 15.1%), Ecstasy ($n = 88$, 10.8%), GHB ($n = 34$, 4.2%), hallucinogens ($n = 32$, 3.9%), methamphetamine ($n = 28$, 3.4%), and opiates ($n = 22$, 2.7%). No participants reported using heroin in the past three months. Polydrug use was reported by 12.7% of the sample ($n = 103$) in the past three months.

Demographic differences in recent drug use are reported in Tables 2a, 2b, and 2c. Age and race/ethnicity were the most robust demographic correlates of recent drug use. There were significant positive associations between age and recent use of poppers, cocaine, Ecstasy, and polydrug use. Additionally, Black men were significantly less likely than White men to report recent use of poppers, Ecstasy, GHB, opiates, and polydrug use. Latino men were also significantly less likely than White men to report recent use of opiates. In regard to education, men with a college degree were significantly more likely to report use of poppers compared to men without a college degree. In contrast, sexual orientation was not significantly associated with recent drug use. In regard to differences across cities, men in Atlanta were significantly less likely to report use of poppers compared to men in NYC. Additionally, men in Chicago were significantly less likely to report polydrug use compared to men in NYC. In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta. Men in Atlanta were significantly more likely to report recent use of GHB compared to men in Chicago (aOR = 2.52, 95% CI = 1.03, 6.20). None of the other additional between-city comparisons were significant.

Weekly drug use

Percentages are based on the total number of men who reported using each drug in the past three months. Weekly use was reported by 48.0% for marijuana ($n = 217/452$), 14.7% for GHB ($n = 5/34$), 14.3% for methamphetamine ($n = 4/28$), and 8.1% for cocaine ($n = 10/123$). No participants reported weekly Ecstasy ($n = 0/85$) or opiate use ($n = 0/17$). We only examined demographic differences in weekly marijuana use, because too few participants reported weekly use of other drugs. Results are reported in Table 3. Bisexual men were significantly more likely to report weekly marijuana use compared to gay men. Additionally, men with a college degree were significantly less likely to report weekly marijuana use compared to men without a college degree. Age, race/ethnicity, and city were not significantly associated with weekly marijuana use. In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Drug use before sex

A total of 754 participants (92.7%) reported at least one partner in the past three months. In this subsample, the prevalence of drug use before sex was 27.2% ($n = 205$) for marijuana, 5.6% ($n = 42$) for stimulants, 4.1% ($n = 31$) for club drugs, 0.1% ($n = 1$) for opiates, and 2.3% ($n = 17$) for other (most of which were poppers, $n = 12$). We only examined demographic differences in marijuana, stimulant, and club drug use before sex, because too few participants reported opiate or other drug use before sex. Results are reported in Table 4. There were significant positive associations between age and both stimulant and club drug use before sex. The only racial/ethnic difference was for marijuana use before sex—Latino men were significantly more likely to report marijuana use before sex compared to White men. In contrast, sexual orientation, education, and city were not significantly associated with drug use before sex. In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Frequency of drug use before sex

Frequency of drug use before sex was measured on a 1–5 scale (1 = never, 3 = half the time, 5 = always) for up three partners and averaged across partners ($M = 1.52$, $SD = .94$). Most (66.0%; $n = 497$) reported never using drugs, 22.8% ($n = 164$) reported using drugs less than half the time (values greater than 1, but less than 3), 4.1% ($n = 31$) reported using drugs half the time, 6.5% ($n = 49$) reported using drugs more than half the time (values greater than 3, but less than 5), and 1.6% ($n = 12$) reported always using drugs. Demographic differences in frequency of drug use before sex are reported in Table 5. Age, sexual orientation, and education were not significantly associated with frequency of drug use before sex. In contrast, Latino men reported significantly more frequent drug use before sex compared to White men, and men in Chicago reported significantly less frequent drug use before sex compared to men in NYC. In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Discussion

Our updated epidemiological data on drug use among YMSM demonstrate a continued trend in higher drug use among YMSM compared to the general US population (Center for Behavioral Health Statistics and Quality, 2015). However, it should be noted that we measured drug use in the past three months, while national estimates represent drug use in the past month. Consistent with the general US population (Center for Behavioral Health Statistics and Quality, 2015), marijuana was the most commonly used drug in our sample. Specifically, 56% of the YMSM in our sample reported recent marijuana use and nearly half of them reported weekly marijuana use. While marijuana is likely perceived as less dangerous than other drugs, 8.3% of young adults ages 24–32 in the US meet criteria for lifetime cannabis dependence (Haberstick et al., 2014). Further, there is some evidence that marijuana use is associated with a greater likelihood of condomless anal sex (Hirshfield, Remien, Humberstone, Walavalkar, & Chiasson, 2004; Koblin et al., 2003; Purcell, Moss, Remien, Woods, & Parsons, 2005), although other studies have failed to replicate this association (Choi et al., 2005) or found that marijuana use was associated with a greater likelihood of condom use (Mutchler et al., 2011). Given these inconsistent findings, additional research is needed to understand the association between marijuana use and condom use. Regardless, it is important to recognize that marijuana use is common among YMSM and it can have negative consequences for some individuals. In recent years, there have been increased efforts to legalize marijuana for medical and recreational purposes. Our data were collected between June 2013 and December 2015, and during that time frame, medical marijuana was legalized (with some restrictions) in the three states that our participants lived in (Georgia, Illinois, and New York). However, recreational use of marijuana was illegal in those states, and we were not able to distinguish between medical and recreational use. Nonetheless, marijuana use remains a public health concern among YMSM, and its importance may continue to increase as its legalization becomes more widespread.

Prevalence of drug use in our sample was largely consistent with past-year rates among HIV-negative MSM in the National HIV Behavioral Surveillance System (Centers for Disease Control and Prevention, 2016). The largest difference was in marijuana use, which was higher in our sample (56% compared to 47%), perhaps related to the younger age of our sample and changing social norms and laws for marijuana use (Pew Research Center, 2013). Recent use of poppers, cocaine, and Ecstasy were also high in our sample, and the prevalence of these drugs was similar to national data on MSM from 2011 (CDC, 2014). These alarming trends support the need for public health campaigns to reduce drug use among YMSM.

The comparison of drug use among YMSM across three major metropolitan areas has implications for local and national interventions. We found that YMSM in NYC were most likely to report recent use of poppers as well as recent polydrug use. In our sample, 27% of YMSM in NYC had used poppers in the past three months compared to 21% in Chicago and 11% in Atlanta. Similarly, 15.4% of YMSM in NYC reported recent polydrug use compared to 10.2% in Chicago and 11.7% in Atlanta. Direct comparison with national data on MSM from 2011 is difficult, because they did not examine polydrug use, they did not report significance testing for differences between cities, and they did not account for demographic difference between cities (CDC, 2014). That said, in the national sample, the prevalence of poppers use was also higher in NYC (16%) and Chicago (22%) compared to Atlanta (12%) (CDC, 2014). The prevalence of poppers use in our sample and the national sample are nearly identical for Chicago and Atlanta, but higher in our sample for NYC (27% versus 16%). This difference may reflect demographic differences in the samples (e.g., our sample was restricted to MSM ages 18–29), but it may also reflect increased use of poppers in NYC from 2011 to 2013–2015. Therefore, local interventions may be required to reduce the use of poppers among YMSM in NYC and Chicago. This is particularly relevant to HIV prevention because MSM who used poppers had 2–2.5 times higher odds of CAS with HIV-positive/unknown status partners (Santos et al., 2013). We also found that men in Atlanta were more likely to report recent use of GHB compared to men in Chicago. However, this finding should be interpreted with caution because there were only 34 total participants who reported using GHB in the past three months. In sum, at the national-level, we found little evidence of differences in drug use between cities with the exceptions of poppers and polydrug use. This is generally consistent with national data on MSM from 2011 in which the rates of drug use other than poppers did not vary much between NYC, Chicago, and Atlanta (CDC, 2014). Together, this suggests that national campaigns could be used to target drug use similarly across major urban centers.

In the US population, substance use is highest at ages 18–25 and then decreases (Center for Behavioral Health Statistics and Quality, 2015). Although previous studies support drug use being higher among younger MSM (Halkitis & Palamar, 2008; Klitzman et al., 2002; Stall et al., 2001), we found that age was positively associated with recent use of poppers, cocaine, and Ecstasy. This is likely due to our restricted age range (18–29), whereas other studies had larger age ranges with means in the 30s and 40s. Age was also positively associated with polydrug use in our sample. Although this is inconsistent with a previous study (Greenwood et al., 2001), their sample included HIV-positive/unknown status men and those men were more likely to be polydrug users than HIV-negative men. Consistent with previous findings

that drug use is higher among White MSM (Goldstein et al., in press; Newcomb, Birkett, et al., 2014; Newcomb, Ryan, et al., 2014; Thiede et al., 2003), we found that Black YMSM were less likely to report recent use of poppers, Ecstasy, GHB, opiates, and polydrug use compared to White YMSM, and Latino YMSM were less likely to report recent use of opiates compared to White YMSM.

There is evidence that drug use is higher among bisexual men when aggregate measures are used (Ford & Jasinski, 2006; Thiede et al., 2003), but differences are not apparent for specific drugs (Ford & Jasinski, 2006; White et al., 2014). Further, differences depend on how sexual orientation is defined, such that drug use is similar for gay- and bisexual-identified men, but higher for behaviorally bisexual men compared to MSM (McCabe, Hughes, Bostwick, West, & Boyd, 2009). Consistent with previous findings for specific drugs, we found limited evidence of differences between gay and bisexual men. The only difference was that bisexual men were more likely to report weekly marijuana. Given that marijuana was the most commonly used drug, sexual orientation differences may only be evident for heavy use. Although our sample had a relatively large number of bisexual men, larger samples are needed to test sexual orientation differences.

Despite evidence that education is protective against substance use among MSM (Barnes et al., 2014; Pachankis et al., 2016), we found that men with college degrees were more likely to report recent poppers use than those without college degrees. The aforementioned studies used aggregate measures of drug use, so it is possible that education is differentially associated with different drugs. It is also possible that education is differentially associated with heavy versus recreational use. In our sample, education was not associated with whether or not YMSM had used marijuana in the past three months, but men with college degrees were less likely to report weekly marijuana use than men without college degrees. The previous study that focused on heavy substance use defined it as weekly marijuana use or monthly other drug use (Pachankis et al., 2016), so it is possible that education is protective against heavy use in particular. Additionally, the samples in the aforementioned studies were comprised of young MSM who had recently migrated to NYC (Pachankis et al., 2016) and LGB adults (men and women) (Barnes et al., 2014), so education may be differentially associated with substance use in different demographics.

Most men in our sample reported never using drugs before sex. Consistent with previous research (Colfax et al., 2004), marijuana was the most commonly used drug before sex. Our rate was higher than the aforementioned study, which also likely reflects recent changes in norms and laws related to marijuana (Pew Research Center, 2013). In contrast to marijuana, other drugs were not commonly used before sex. Similar to our findings for drug use in general, age was positively associated with stimulant and club drug use before sex. Additionally, Latino men were more likely to use marijuana before sex and they reported more frequent drug use before sex compared to White men. Again, we found limited evidence of differences between cities, with the exception of men in Chicago reporting less frequent drug use before sex compared to men in NYC.

Findings should be interpreted in light of several limitations. First, our sample was comprised of HIV-negative YMSM who reported CAS in the past six months, expressed

interest in an HIV prevention program, and agreed to an HIV test in order to participate in the study. As such, findings may not generalize to all YMSM, such as HIV-positive YMSM, those who do not engage in sexual risk behavior, those who are not interested in HIV prevention programs, and those who refuse HIV tests. Second, data relied entirely on self-report, and some participants may not have been comfortable reporting drug use or they may not have remembered using specific drugs. Third, the prevalence of some drugs (e.g., poppers) was estimated from open-ended responses and, as such, are likely to be underestimates. Still, the high rate of poppers use was a surprising finding among these young men. Fourth, polydrug use typically refers to using multiple illicit drugs, but it can also include licit drugs (e.g., alcohol, tobacco) and prescription medication used for nonmedical purposes (Connor, Gullo, White, & Kelly, 2014). It is likely that the prevalence of polydrug use in our sample would have been higher if we had included these additional substances. Finally, although we had a large sample, we did not have sufficient statistical power to examine combinations of demographic characteristics (e.g., the interaction between sexual orientation and race/ethnicity) as predictors of drug use. In future studies, stratified sampling (i.e., sampling from each subgroup of interest) could be used to create a sample with enough participants in each subgroup of interest to examine interactions between demographic characteristics as predictors of drug use. Future research could examine substance use and sexual behavior retrospectively using timeline follow back or prospectively with ecological momentary assessment (i.e., daily diary). Research suggests that these methods of assessing drug use are in high agreement with biological measures and may be preferable when assessing drug use over longer assessment windows (Hjorthøj, Hjorthøj, & Nordentoft, 2012).

Conclusion

These data provide an updated account of drug use among YMSM across three major US cities and have important implications for prevention efforts. The high rates of use (especially for marijuana, poppers, cocaine, and club drugs) and polydrug use indicate that drug use remains a significant concern among YMSM and continued efforts are needed to reduce drug use in this population. Weekly use was high for marijuana, suggesting a particular need for services that target this drug. Although weekly use was lower for other drugs, efforts to reduce use of these drugs remain important given their potential consequences. Demographic difference varied by drug, but findings suggest there some YMSM need prevention services more than others. While drug use before sex was less common than drug use in general, a significant proportion reported using marijuana before sex and using poppers. These drugs are likely perceived as less dangerous than others, but there is evidence that they are associated with CAS (Choi et al., 2005; Hirshfield et al., 2004; Purcell et al., 2005). HIV prevention programs could benefit from addressing their influence on condom use. Drug use among YMSM remains an important public health concern and continued efforts to identify subgroups who are at greatest risk has the potential to improve prevention services. The current data highlight the urgency for prevention at the national-level and for supplemental efforts related to poppers and polydrug use in NYC.

Acknowledgments

This study was supported by grants from the National Institute on Drug Abuse and the National Institute of Mental Health (1R01DA035145 and R01DA035145-02S1). Brian A. Feinstein's time was supported by a grant from the National Institute on Drug Abuse (F32DA042708). The content of this article is solely the responsibility of the authors and does not necessarily reflect the views of the National Institutes of Health, the National Institute on Drug Abuse, or the National Institute of Mental Health.

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Table 1

Demographic characteristics of the analytic sample as a function of city.

Total (N = 813)										Chicago (N = 283)		Atlanta (N = 206)		New York City (N = 324)		χ^2 (df)
Categorical Variables		n	%	n	%	n	%	n	%	n	%	n	%			
Sexual orientation																
Gay		720	88.6%	255	90.1%	172	83.5%	293	90.4%							7.01* (2)
Bisexual		93	11.4%	28	9.9%	34	16.5%	31	9.6%							
Race/ethnicity																
White		249	30.6%	107	37.8%	66	32.0%	76	23.5%							101.46*** (6)
Black		228	28.0%	63	22.3%	100	48.5%	65	20.1%							
Latino		265	32.6%	88	31.1%	24	11.7%	153	47.2%							
Other		71	8.7%	25	8.8%	16	7.8%	30	9.3%							
Education																
Less than college degree		339	41.7%	109	38.5%	101	49.0%	129	39.8%							
College degree or more		474	58.3%	174	61.5%	105	51.0%	195	60.2%							
Continuous Variables																
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD			F(2, 809)
Age		24.27	2.88	24.45	2.77	24.24	2.89	24.13	2.97							.98

Notes.

* $p < .05$;

** $p < .001$; Percentages may not add up to 100 because of rounding; one participant was missing data for age.

Table 2a

Demographic differences in recent drug use (marijuana, poppers, and cocaine).

Predictor	Marijuana (<i>n</i> = 453)			Poppers (<i>n</i> = 168)			Cocaine (<i>n</i> = 123)		
	OR (95% CI)	aOR (95% CI)		OR (95% CI)	aOR (95% CI)		OR (95% CI)	aOR (95% CI)	
Age	.98 (.93, 1.03)	.98 (.93, 1.03)		1.15 (1.08, 1.22)	1.13 (1.05, 1.21)		1.11 (1.04, 1.19)	1.11 (1.03, 1.19)	
Bisexual	1.11 (.72, 1.73)	1.09 (.70, 1.71)		.54 (.29, 1.01)	.68 (.35, 1.31)		.90 (.48, 1.67)	1.08 (.57, 2.04)	
Race/ethnicity									
Black	1.13 (.79, 1.62)	1.18 (.81, 1.72)		.31 (.18, .53)	.39 (.22, .68)		.57 (.34, .97)	.60 (.35, 1.05)	
Latino	1.54 (1.08, 2.18)	1.44 (.996, 2.09)		1.18 (.79, 1.76)	1.29 (.83, 1.99)		.93 (.59, 1.47)	.96 (.59, 1.57)	
Other	.86 (.50, 1.45)	.84 (.49, 1.42)		1.09 (.60, 2.01)	1.14 (.60, 2.14)		.78 (.37, 1.64)	.76 (.36, 1.62)	
College	.98 (.74, 1.29)	1.06 (.78, 1.45)		2.38 (1.63, 3.46)	1.69 (1.11, 2.57)		1.45 (.97, 2.17)	1.09 (.70, 1.70)	
City									
Chicago	.92 (.66, 1.27)	.97 (.70, 1.36)		.75 (.51, 1.09)	.75 (.50, 1.11)		.85 (.55, 1.32)	.82 (.52, 1.28)	
Atlanta	.71 (.50, 1.002)	.76 (.52, 1.11)		.33 (.20, .55)	.46 (.27, .80)		.70 (.43, 1.16)	.79 (.46, 1.35)	

Notes. OR = odds ratio; aOR = adjusted odds ratio (i.e., adjusted for all other predictor variables); CI = confidence interval; 95% CIs that do not include 1 are significant at $p < .05$ and indicated with bold font; reference groups: gay (for sexual orientation), White (for race/ethnicity), and NYC (for city). In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Table 2b

Demographic differences in recent drug use (Ecstasy, GHB, and hallucinogens).

Predictor	Ecstasy (<i>n</i> = 88)			GHB (<i>n</i> = 34)			Hallucinogens (<i>n</i> = 32)		
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	
Age	1.19 (1.10, 1.30)	1.21 (1.11, 1.32)	1.11 (.98, 1.25)	1.10 (.97, 1.26)		.95 (.85, 1.07)		.92 (.80, 1.05)	
Bisexual	1.26 (.66, 2.41)	1.66 (.84, 3.30)	.74 (.22, 2.47)	.84 (.24, 2.90)		2.26 (.95, 5.39)		2.07 (.84, 5.07)	
Race/ethnicity									
Black	.49 (.27, .91)	.45 (.24, .85)	.26 (.09, .79)	.24 (.08, .74)		1.22 (.49, 3.07)		1.22 (.47, 3.20)	
Latino	.81 (.48, 1.36)	.87 (.50, 1.53)	.75 (.35, 1.60)	1.03 (.46, 2.33)		.94 (.37, 2.40)		.99 (.37, 2.66)	
Other	.46 (.17, 1.23)	.43 (.16, 1.16)	.21 (.03, 1.60)	.22 (.03, 1.71)		1.59 (.48, 5.33)		1.52 (.45, 5.20)	
College	1.44 (.90, 2.29)	.94 (.56, 1.56)	1.76 (.83, 3.72)	1.37 (.61, 3.08)		1.60 (.75, 3.43)		2.18 (.93, 5.13)	
City									
Chicago	.79 (.47, 1.34)	.73 (.42, 1.25)	.95 (.41, 2.24)	.94 (.39, 2.26)		.76 (.31, 1.88)		.77 (.31, 1.95)	
Atlanta	.95 (.55, 1.64)	1.04 (.57, 1.91)	1.61 (.71, 3.65)	2.36 (.96, 5.83)		1.61 (.71, 3.65)		1.55 (.64, 3.74)	

Notes. OR = odds ratio; aOR = adjusted odds ratio (i.e., adjusted for all other predictor variables); CI = confidence interval; 95% CIs that do not include 1 are significant at $p < .05$ and indicated with bold font; reference groups: gay (for sexual orientation), White (for race/ethnicity), and NYC (for city). In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta. Men in Atlanta were significantly more likely to report recent use of GHB compared to men in Chicago (aOR = 2.52, 95% CI = 1.03, 6.20). None of the other additional between-city comparisons were significant.

Table 2c

Demographic differences in recent drug use (methamphetamine, opiates, and polydrug use).

Predictor	Methamphetamine (<i>n</i> = 28)			Opiates (<i>n</i> = 22)			Polydrug use (<i>n</i> = 103)		
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	OR (95% CI)	aOR (95% CI)	
Age	1.00 (.88, 1.14)	1.01 (.88, 1.16)	1.00 (.86, 1.15)	1.00 (.85, 1.17)	1.00 (.85, 1.17)	1.11 (1.03, 1.19)	1.12 (1.03, 1.21)		
Bisexual	1.30 (.44, 3.84)	1.29 (.42, 3.92)	1.23 (.36, 4.24)		1.65 (.46, 5.96)	1.14 (.61, 2.13)	1.41 (.74, 2.71)		
Race/ethnicity									
Black	.97 (.37, 2.56)	.87 (.32, 2.39)	.26 (.07, .95)	.26 (.07, .96)		.45 (.25, .81)	.42 (.23, .78)		
Latino	1.16 (.47, 2.84)	1.20 (.46, 3.14)	.46 (.17, 1.24)		.40 (.14, 1.16)	.88 (.54, 1.42)	.85 (.51, 1.43)		
Other	-	-	.28 (.04, 2.21)	.27 (.03, 2.10)		.57 (.24, 1.34)	.53 (.22, 1.25)		
College	.95 (.44, 2.04)	1.01 (.43, 2.33)	1.03 (.44, 2.45)	.79 (.30, 2.08)		1.39 (.90, 2.13)	1.01 (.63, 1.63)		
City									
Chicago	.83 (.33, 2.09)	.85 (.33, 2.18)	1.45 (.56, 3.72)	1.26 (.48, 3.31)		.63 (.38, 1.02)	.58 (.35, .97)		
Atlanta	1.30 (.53, 3.19)	1.42 (.53, 3.79)	.78 (.23, 2.63)	.72 (.20, 2.58)		.72 (.43, 1.22)	.81 (.46, 1.43)		

Notes. OR = odds ratio; aOR = adjusted odds ratio (i.e., adjusted for all other predictor variables); CI = confidence interval; 95% CIs that do not include 1 are significant at $p < .05$ and indicated with bold font; reference groups: gay (for sexual orientation), White (for race/ethnicity), less than college (for education), and NYC (for city). There were no participants in the “other” race/ethnicity category who reported recent methamphetamine use. In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Table 3

Demographic differences in weekly marijuana use ($n = 217$).

Predictor	OR (95% CI)	aOR (95% CI)
Age	.94 (.88, 1.001)	.99 (.92, 1.06)
Bisexual	2.40 (1.32, 4.37)	2.39 (1.27, 4.51)
Race/ethnicity		
Black	1.83 (1.11, 3.01)	1.49 (.88, 2.53)
Latino	1.19 (.75, 1.90)	.82 (.49, 1.36)
Other	.83 (.38, 1.81)	.64 (.29, 1.43)
College	.49 (.34, .72)	.53 (.35, .82)
City		
Chicago	.74 (.48, 1.13)	.66 (.42, 1.04)
Atlanta	.90 (.55, 1.45)	.61 (.35, 1.05)

Notes. OR = odds ratio; aOR = adjusted odds ratio (i.e., adjusted for all other predictor variables); CI = confidence interval; 95% CIs that do not include 1 are significant at $p < .05$ and indicated with bold font; reference groups: gay (for sexual orientation), White (for race/ethnicity), less than college (for education), and NYC (for city). In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Table 4

Demographic differences in recent drug use before sex.

Predictor	Marijuana use before sex (<i>n</i> = 205)		Stimulant use before sex (<i>n</i> = 42)		Club drug use before sex (<i>n</i> = 31)	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Age	.96 (.91, 1.02)	.98 (.92, 1.04)	1.20 (1.06, 1.35)	1.16 (1.02, 1.32)	1.23 (1.07, 1.42)	1.22 (1.06, 1.42)
Bisexual	1.29 (.80, 2.08)	1.21 (.74, 1.99)	.36 (.09, 1.53)	.44 (.10, 1.88)	1.13 (.39, 3.30)	1.32 (.43, 4.03)
Race/ethnicity						
Black	1.40 (.90, 2.17)	1.37 (.87, 2.16)	.66 (.28, 1.55)	.77 (.32, 1.88)	.92 (.37, 2.27)	.92 (.35, 2.39)
Latino	1.88 (1.25, 2.82)	1.62 (1.05, 2.49)	1.00 (.48, 2.08)	1.31 (.60, 2.84)	.76 (.31, 1.87)	1.04 (.40, 2.70)
Other	.97 (.50, 1.88)	.91 (.47, 1.78)	.45 (.10, 2.01)	.49 (.11, 2.22)	.62 (.13, 2.87)	.65 (.14, 3.08)
College	.78 (.56, 1.07)	.85 (.60, 1.22)	2.66 (1.25, 5.63)	2.02 (.91, 4.47)	1.72 (.78, 3.80)	1.27 (.54, 2.96)
City						
Chicago	.76 (.52, 1.09)	.83 (.57, 1.21)	.92 (.45, 1.89)	.91 (.43, 1.93)	1.62 (.67, 3.90)	1.51 (.61, 3.74)
Atlanta	.65 (.43, .98)	.68 (.43, 1.06)	.90 (.41, 1.99)	1.20 (.50, 2.87)	1.85 (.74, 4.64)	1.94 (.71, 5.28)

Notes. OR = odds ratio; aOR = adjusted odds ratio (i.e., adjusted for all other predictor variables); CI = confidence interval; 95% CIs that do not include 1 are significant at $p < .05$ and indicated with bold font; reference groups: gay (for sexual orientation), White (for race/ethnicity), less than college (for education), and NYC (for city). In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.

Table 5

Demographic differences in frequency of recent drug use before sex.

Predictor	B (95% CI)	SE	aB (95% CI)	SE
Age	.01 (-.01, .04)	.01	.02 (-.01, .04)	.01
Bisexual	.08 (-.14, .29)	.11	.06 (-.16, .27)	.11
Race/ethnicity				
Black	.16 (-.02, .34)	.09	.14 (-.04, .33)	.09
Latino	.21 (.05, .38)	.09	.20 (.02, .38)	.09
Other	.04 (-.22, .29)	.13	.02 (-.24, .28)	.13
College	.03 (-.11, .17)	.07	.04 (-.11, .19)	.08
City				
Chicago	-.20 (-.35, -.04)	.08	-.17 (-.33, -.01)	.08
Atlanta	-.05 (-.22, .12)	.09	-.02 (-.20, .17)	.09

Notes. B = unstandardized coefficient; aB = adjusted unstandardized coefficient (i.e., adjusted for all other predictor variables); CI = confidence interval; 95% CIs that do not include 0 are significant at $p < .05$ and indicated with bold font; reference groups: gay (for sexual orientation), White (for race/ethnicity), less than college (for education), and NYC (for city). In supplemental analyses (not presented), we changed the reference group for city in order to compare men in Chicago to men in Atlanta, but none of the additional between-city comparisons were significant.