Binge Drinking, Non-injection Drug Use, and Sexual Risk Behaviors among Adolescent Sexual Minority Males, 3 US Cities, 2015

Taylor Robbins · Cyprian Wejnert ·
Alexandra B. Balaji · Brooke Hoots ·
Gabriela Paz-Bailey · Heather Bradley ·
for the NHBS-YMSM Study Group

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Abstract In 2016, more than 90% of HIV diagnoses among young men aged 13–19 years were attributed to male-male sexual contact. Little is known about how binge drinking and non-injection drug use may be associated with risky sexual behavior among adolescent sexual minority males (ASMM). Using data from the National HIV Behavioral Surveillance, we examined how binge drinking and non-injection drug use may be associated with sexual risk among ASMM. ASMM were recruited for interviews in 3 cities: Chicago, New York City, and Philadelphia. Among 16–18-year-olds ($N=488$), we evaluated the association between binge drinking (≥ 5 drinks in one sitting in the past 30 days), non-injection drug use (past 12-month

use of methamphetamines, powder cocaine, downers, painkillers, ecstasy, poppers, and “other”), and two past 12-month sexual risk outcomes: condomless anal intercourse with a casual partner and having multiple sex partners. We used log-linked Poisson regression models with robust standard errors to estimate prevalence ratios (PR) and 95% confidence intervals (CI). Overall, 26% of 16–18-year-old ASMM binge drank, and 21% reported non-injection drug use. Among ASMM who binge drank, 34% reported condomless anal intercourse with a casual partner compared with 22% of those who did not (PR: 1.53, 95% CI: 1.04–2.26). Similarly, 84% of ASMM who binge drank reported having multiple partners compared with 61% of those who did not (PR: 1.38, 95% CI: 1.09–1.76). Among ASMM who used non-injection drugs, 37% reported condomless anal intercourse compared with 22% of those who did not (PR: 1.70, 95% CI 1.09–2.50), while 86% of those who used non-injection drugs had multiple partners compared with 62% of those who did not (PR: 1.40, 95% CI: 1.06–1.80). Our findings suggest that the prevalence of substance misuse is high among sexual minority youth and is associated with sexual risk in this population. Our findings highlight the need for high-quality HIV prevention programs for ASMM especially as HIV prevention programs for this population are scarce.

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T. Robbins (✉) · C. Wejnert · A. B. Balaji · B. Hoots ·
G. Paz-Bailey · H. Bradley
Division of HIV/AIDS Prevention, National Center for HIV/
AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for
Disease Control and Prevention, 1600 Clifton Road NE, MS E46,
Atlanta, GA 30329, USA
e-mail: kyx4@cdc.gov

T. Robbins
Oak Ridge Institute for Science and Education, 130 Badger Rd,
Oak Ridge, TN 37830, USA

T. Robbins
Icahn School of Medicine at Mount Sinai, 1428 Madison Avenue,
New York, NY 10029, USA

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Introduction

In 2016, more than 90% of HIV diagnoses among young men aged 13–19 years were attributed to male-male sexual contact [1]. Recently published data from three US cities indicate an HIV prevalence of 6% among sexually active adolescent sexual minority males (ASMM) aged 13–18 years [2]. The reasons for high HIV risk among ASMM are not well understood; however, possible explanations include the following: inadequate HIV prevention education and intervention, low perception of risk, alcohol and drug use, and feelings of rejection and isolation that may lead to more sexual risk behavior [3]. Identifying factors associated with sexual risk among ASMM can inform appropriate programs, resources, and services for this population and may help us to reach national HIV prevention goals [4].

Substance misuse is often associated with increased sexual risk [5–7]. Evidence suggests that sexual minority youth use substances at higher rates than their heterosexual peers [8–10]. For instance, among young male students (grades 9–12), the prevalence of binge drinking (≥ 5 drinks in one sitting) is higher among ASMM (26%) than among heterosexual males (19%) [8]. Similarly, the prevalence of ever misusing cocaine, ecstasy, methamphetamines, prescription drugs, or inhalants is higher among ASMM compared with their heterosexual peers [8]. Prior research on substance use among young men (aged 15–22) observed associations between alcohol, cocaine, amphetamine use, and both unprotected insertive and receptive anal sex [7]. In addition, condom use at last sex is higher among young heterosexual men (62.3%) than ASMM (52.7%) [8]. Studies have found that while Black MSM (aged 13–24) are disproportionately impacted by HIV infection, Black ASMM report lower prevalence of HIV-related risk behaviors [3, 9]. Combined data from 32 Youth Risk Behavior Surveys (2009–2013) found that Black ASMM (grades 9–12) had a significantly lower prevalence of binge drinking and drug use than White and Hispanic ASMM, suggesting that increased risk for HIV among Black ASMM may be due to other factors [9]. While a large number of existing studies document the association between substance misuse, especially club drugs, and sexual risk among men who have sex with men (MSM), none has focused exclusively on ASMM 18 years or younger [11–13].

To investigate the potential relationship between substance misuse and HIV risk among ASMM, this

analysis examined the association between binge drinking, non-injection drug use, and sexual risk behaviors using data collected as part of CDC's National HIV Behavioral Surveillance among Young Men who have Sex with Men (NHBS-YMSM).

Methods

From November 2014 to December 2015, ASMM were recruited for interviews in 3 cities: Chicago, New York City, and Philadelphia. ASMM were eligible to enroll in the study if they met the following criteria: (1) aged 13–18 years; (2) assigned male sex at birth and currently living as a male; (3) a resident of the city in which they were recruited; (4) able to complete the survey in English or Spanish; and (5) reported any sexual contact with another male, self-identified as gay or bisexual, or indicated same-sex attraction. NHBS-YMSM included a sampling feasibility component to determine effective sampling strategies for this population; three methods were used to recruit participants: venue-based sampling (VBS) in New York City only, respondent-driven sampling (RDS) in all three participating cities, and Facebook sampling (FBS) in Philadelphia and Chicago. VBS is a sampling strategy that utilized venues (e.g., clubs, organizations, and street locations) within the project area to obtain the desired sample [14]. RDS is a chain recruitment method that began with a set of “seeds” who recruited members of their social networks to participate in project activities, who in turn recruited other members of their social networks [15, 16]. FBS employed targeted banner ads on [Facebook.com](https://www.facebook.com) to identify and recruit young men into the study.

All participants underwent an in-person eligibility screening, and if eligible and consenting, completed a face-to-face behavioral assessment with a trained interviewer. Anonymous HIV testing was offered to all participants regardless of self-reported HIV infection status. Participants were referred to supportive services as appropriate, including HIV care and treatment for HIV-positive participants. ASMM were compensated for their participation in project activities, receiving approximately \$25 for the behavioral assessment and \$25 for HIV testing. Study activities were approved by local institutional review boards in each participating city and reviewed and approved by CDC. A waiver of documentation of informed consent was requested and received for all three locations. In addition, a waiver of

parental permission for participants under 18 years of age was requested and received in New York City (approved for 13 to 17 years of age), Philadelphia (14 to 17 years of age), and Chicago (16 and 17 years of age).

Measures

Substance misuse and sexual behavior were self-reported. Non-injection drug use was defined as use of any of the following drugs not prescribed for you in the past 12 months: methamphetamines, powder cocaine, benzodiazepines or downers, painkillers, ecstasy, amyl nitrites, synthetic marijuana, and “other” non-injection drugs not specifically asked about in the questionnaire. Frequency of drug use was measured using an 8-category scale (never, more than once a day, once a day, more than once a week, once a week, more than once a month, once a month, less than once a month) which was dichotomized into “once a month or more” and “less than once a month.” Binge drinking was defined as having 5 or more alcoholic drinks in one sitting at least once during the past 30 days. Condomless anal intercourse with a casual partner was defined as having condomless anal intercourse with one or more male casual partners in the past 12 months. Respondents were considered to have had multiple partners if they reported having oral, anal, or vaginal sex with more than one partner in the past 12 months.

Statistical Analysis

We described participants’ demographic and behavioral characteristics stratified by age (Table 1). Next, we aimed to isolate net associations between substance misuse and sexual risk behaviors by assessing relationships between participant characteristics and substance misuse and sexual risk behaviors (confounding assessment). Due to small sample sizes, we were not able to conduct a confounding assessment among 13–15-year-olds, ASMM identifying as heterosexuals, and “other/mixed” race participants, and therefore these groups are excluded from the confounding assessment and subsequent analyses (Tables 2, 3, 4, and 5). Analyses in Tables 2, 3, 4, and 5 include all ASMM regardless of whether they were sexually active, though the majority of our sample (84%, $n = 375$) were sexually active (reported ever having oral, vaginal, or anal sex with male or female partners). We first assessed bivariate associations between participant characteristics and the two

exposures of interest: binge drinking in the past 30 days and non-injection drug use in the past 12 months. Next, we examined bivariate associations between participant characteristics and the two outcomes of interest: condomless anal intercourse with a casual partner and having multiple partners in the past 12 months. We used chi-square tests to assess the statistical significance of these associations. We used log-linked Poisson regression with robust standard error to estimate prevalence ratios and 95% confidence intervals of sexual risk behaviors by substance misuse behaviors. Unadjusted prevalence ratios are presented because none of the participant characteristics (race, current living situation, and financial instability) associated with both exposures and outcomes met our confounding criteria of changing the beta coefficient for the exposure-outcome relationship of interest by 10% or more when included in the model. Analyses were performed using SAS 9.4 (SAS Institute: Cary, NC).

Results

A total of 569 eligible respondents completed a valid interview; of those, 39% were Hispanic, 40% were Black, 16% were White, and 5% were other/mixed race (Table 1). One percent of 13–15-year-olds and 23% of 16–18-year-olds reported their living situation as something “other” than living with parents, guardians, or relatives. Among 13–15-year-olds, 10% binge drank in the past 30 days compared with 26% of 16–18-year-olds. Seven percent of 13–15-year-olds and 21% of 16–18-year-olds reported non-injection drug use in the past 12 months. Less than 1% of participants, all 16–18 years old, reported any lifetime injection drug use. Of 13–15-year-olds, 41% reported having multiple partners in the past 12 months compared with 66% of 16–18-year-olds. Nine percent of 13–15-year-olds and 24% of 16–18-year-olds reported condomless anal intercourse with a casual partner in the past 12 months. Among Black ASMM, 15% reported their living situation as “other” than living with parents, guardians, or relatives compared with 22% of non-Black ASMM. Twenty percent of Black ASMM binge drank in the past 30 days compared with 27% of non-Black ASMM. Twelve percent of Black ASMM and 23% of non-Black ASMM reported non-injection drug use in the past 12 months. Of Black ASMM, 69% reported having multiple partners in the past 12 months compared with 57% of non-Black ASMM. Twenty five percent of Black ASMM and 20%

Table 1 Demographic and behavioral characteristics of adolescent sexual minority males—National HIV Behavioral Surveillance, 3 US cities, 2015

	Total N = 569		13–15 years old		16–18 years old		Black		Non-Black	
	n	Col %	n	Col %	n	Col %	n	Col %	n	Col %
Age										
13–15	81	14	81	100			23	10	58	17
16–18	488	86			488	100	204	90	283	83
City										
Chicago, IL	231	41	14	17	217	45	75	33	156	46
New York City, NY	232	41	52	64	180	37	84	37	147	43
Philadelphia, PA	106	19	15	19	91	19	68	30	38	11
Identity										
Heterosexual or “straight”	16	3	5	6	11	2	3	1	13	4
Homosexual or “gay”	360	64	39	49	321	67	152	68	207	61
Bisexual	186	33	36	45	150	31	68	31	118	35
Race/ethnicity										
Hispanic ^a	222	39	39	48	183	38				
Black	227	40	23	28	204	42				
White	92	16	16	20	76	16				
Other/mixed race ^b	27	5	3	4	24	5				
Current living situation										
Living with parent(s), guardian or other relatives	457	80	80	99	377	77	192	85	265	78
Other ^c	112	20	1	1	111	23	35	15	76	22
Household financial instability, past 12 months ^d										
No	431	76	71	88	360	74	173	77	258	76
Yes	136	24	10	12	126	26	52	23	83	24
Binge drinking, past 30 days ^e										
No	431	76	73	90	358	74	180	80	250	73
Yes	137	24	8	10	129	26	46	20	91	27
Any non-injection drug use, past 12 months ^f										
No	461	81	75	93	386	79	200	88	261	77
Yes	107	19	6	7	101	21	27	12	79	23
Any injection drug use, ever										
No	566	99	81	100	485	99	226	99	339	99
Yes	3	< 1	0	0	3	< 1	1	< 1	2	< 1
Multiple sex partners, past 12 months ^g										
No	215	38	48	59	167	34	70	31	145	43
Yes	352	62	33	41	319	66	156	69	195	57
Condomless anal intercourse with a male partner, past 12 months										
No	337	59	66	81	271	56	131	58	205	60
Yes	231	41	15	19	216	44	94	42	136	40
Condomless anal intercourse with a casual male partner, past 12 months										
No	442	78	74	91	368	76	169	75	272	80
Yes	125	22	7	9	118	24	56	25	68	20

^a Hispanic ancestry can be of any race^b Includes American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, and belonging to multiple races^c Includes living alone in house/apartment/dwelling, living with other adults who are not relatives, living with friend(s) or roommate(s), living with a sexual partner/boyfriend/girlfriend, living in a school dormitory, and homeless^d Derived from survey question: “In the past 12 months, was there a time where there was not enough money in your house for rent, food, or utilities such as gas, electric, or phone?”^e Five or more alcoholic drinks in one sitting^f Includes non-injection misuse of any of the following drugs: methamphetamines, powder cocaine, downers, prescription opioids, ecstasy, amyl nitrite, and “other”^g Participants who had more than one partner in the past 12 months (includes oral, vaginal, and anal sex)

Table 2 Frequency of non-injection drug use during the 12 months before interview among 16–18-year old adolescent sexual minority males ($N = 446^a$)—National HIV Behavioral Surveillance, 3 US cities, 2015

	Any use (%)	Frequency of use	
		Once a month or more (%)	Less than once a month (%)
Downers ^b	7	2	5
Ecstasy ^c	7	2	5
Painkillers ^d	7	3	4
Poppers ^e	6	1	5
Cocaine ^f	6	1	5
Synthetic marijuana ^g	5	2	4
Methamphetamine ^h	1	1	1
Other ⁱ	3	--	--

^a Sample size is less than 488 both due to missing data for variables presented in the table and because heterosexuals and other/mixed race participants were excluded from analyses in Tables 2, 3, 4, and 5

^b Benzodiazepines, such as Klonopin, Valium, Ativan, or Xanax

^c Also called X, MDMA, or Molly

^d Painkillers such as OxyContin, Vicodin, or Percocet

^e Also called amyl nitrite

^f Powder cocaine that is smoked or snorted

^g Also called spice or K2

^h Also called crystal meth, tina, crank, or ice

ⁱ Includes “other non-injection” drugs not specifically asked about in the survey. Frequency of use of “other” non-injection drugs was not collected

of non-Black ASMM reported condomless anal intercourse with a casual partner in the past 12 months.

Among 16–18-year-olds, 7% used downers in the past 12 months, 7% used ecstasy, 7% used painkillers, 6% used poppers, 6% used cocaine, 5% used synthetic marijuana, 1% used methamphetamine, and 3% used “other” non-injection drugs (Table 2). Binge drinking and non-injection drug use differed by participant characteristics (Table 3). By race, binge drinking was most common among White ASMM with 38% reporting this behavior followed by 30% among Hispanic and 21% among Black ASMM. Similarly, non-injection drug use was most common among white ASMM with 30% reporting this behavior followed by 23% among Hispanic and 12% among Black ASMM. Among ASMM who reported their current living situation as being something “other” than living with parents, guardians, or relatives, 45% binge drank while 22% who were living with parents, guardians, or relatives binge drank. Similarly, 30% of ASMM who reported an “other” living situation used non-injection drugs, while 16% of those who were living with parents, guardians, or relatives used non-injection drugs.

Binge drinking and non-injection drug use were associated with increased risk behaviors for HIV. Among ASMM who binge drank in the past 30 days, 34% reported condomless anal intercourse with a casual partner compared with 22% of those who did not binge drink (PR: 1.50, 95% CI 1.04–2.26) (Tables 4 and 5). Similarly, 84% of ASMM who binge drank in the past 30 days reported having multiple partners in the past 12 months compared with 61% of those who did not binge drink (PR: 1.40, 95% CI 1.09–1.76). Among ASMM who used non-injection drugs, 37% reported condomless anal intercourse compared with 22% of those who did not use drugs (PR: 1.70, 95% CI 1.09–2.50). Similarly, 86% of those who used non-injection drugs had multiple partners compared with 62% of those who did not use drugs (PR: 1.40, 95% CI 1.06–1.80).

Discussion

To our knowledge, this is the first study examining the relationship between substance misuse and sexual risk exclusively among ASMM 18 years or younger. Binge

Table 3 Demographic characteristics by substance misuse behaviors among 16–18-year-old adolescent sexual minority males ($N = 446^a$)—National HIV Behavioral Surveillance 3 US cities, 2015

	Binge drank past 30 days ^b		Did not binge drink past 30 days		<i>P</i> value ^c	Used non-injection drugs in the past 12 months ^d		Did not use non-injection drugs in the past 12 months		<i>P</i> value ^c
	<i>n</i>	Row%	<i>n</i>	Row%		<i>n</i>	Row%	<i>n</i>	Row%	
City					.45					.15
Chicago, IL	56	28	143	72		46	23	152	77	
New York City, NY	46	28	116	72		28	17	134	83	
Philadelphia, PA	18	21	66	79		12	14	73	86	
Identity					.55					.22
Homosexual, or gay	78	26	221	74		53	18	246	82	
Bisexual	42	29	104	71		33	23	113	77	
Race/ethnicity					.01					< .01
Hispanic	52	30	126	71		41	23	136	77	
Black	41	21	155	79		24	12	173	88	
White	27	38	44	62		21	30	50	70	
Current living situation					< .01					< .01
Living with parents, guardian, or other relatives	76	22	271	78		57	16	290	84	
Other ^e	44	45	54	55		29	30	69	70	
Household financial instability ^f					.49					.89
No	85	26	242	74		64	20	263	80	
Yes	34	29	82	71		22	19	94	81	

^a Sample size is less than 488 both due to missing data for variables presented in the table and because heterosexuals and other/mixed race participants were excluded from analyses in Tables 2, 3, 4, and 5

^b Five or more alcoholic drinks in one sitting

^c Chi-square test of significance between demographic characteristic and substance misuse behavior

^d Includes non-injection misuse of any of the following: methamphetamines, powder cocaine, downers, painkillers, ecstasy, poppers, or “other”

^e Includes living alone in house/apartment/dwelling, living with other adults who are not relatives, living with friend(s) or roommate(s), living with a sexual partner/boyfriend/girlfriend, living in a school dormitory, and homeless

^f Derived from survey question: “In the past 12 months, was there a time where there was not enough money in your house for rent, food, or utilities such as gas, electric, or phone?”

drinking and non-injection drug use were both found to be associated with our two outcomes of interest: condomless anal intercourse with a casual partner and having multiple sex partners. Our findings suggest that the high prevalence of substance misuse in combination with its association with sexual risk may be an important contributing factor to HIV risk in this population.

ASMM are distinct from heterosexual adolescents in terms of HIV risk behaviors, which is important to note when designing and implementing HIV prevention interventions. ASMM misuse substances at higher rates than their heterosexual peers. For instance, the overall

prevalence of binge drinking among 16–18-year-olds in our sample (26%) was higher than the national prevalence among all male students in grades 9–12 (19%) and the same as the national prevalence among gay and bisexual male students [8]. Similarly, ASMM are more likely than their heterosexual peers to have ever tried synthetic marijuana, cocaine, ecstasy, methamphetamines, and prescription drugs [8]. When compared with adult MSM, ASMM binge drink at lower rates. Hess et al. found nearly double the prevalence of binge drinking among adult MSM (50%) compared with the prevalence reported here (26%) [17]. While ASMM

Table 4 Demographic characteristics and substance misuse behaviors by sexual risk behaviors among 16–18-year-old adolescent sexual minority males ($N = 453^a$)—National HIV Behavioral Surveillance, 3 US cities, 2015.

	Condomless anal intercourse with a casual male partner past 12 months		<i>P</i> value ^b	Had multiple partners past 12 months ^c		<i>P</i> value ^b
	<i>n</i>	Row%		<i>n</i>	Row%	
City			.63			.88
Chicago, IL	53	27		133	67	
New York City, NY	40	25		106	66	
Philadelphia, PA	18	21		58	69	
Identity			.09			.57
Homosexual, or gay	82	27		202	68	
Bisexual	29	20		95	65	
Race/ethnicity			.80			.26
Hispanic	42	24		114	64	
Black	52	27		139	71	
White	17	24		44	62	
Current living situation			< .01			< .01
Living with parents, guardian, or other relatives	80	23		221	64	
Other ^d	31	32		76	78	
Household financial instability ^e			.01			.16
No	72	22		212	65	
Yes	39	34		83	72	
Binge drinking past 30 days ^f			.01			< .01
No	71	22		197	61	
Yes	40	34		100	84	
Reported any non-injection drug use in the past 12 months ^g			.01			< .01
No	79	22		223	62	
Yes	31	37		73	86	

^a Sample size is less than 488 because heterosexuals and other/mixed race participants were excluded from analyses in Tables 2, 3, 4, and 5

^b Chi-square test of significance between demographic characteristic or substance misuse behavior and sexual behavior

^c Participants who had more than one male or female partner in the past 12 months (includes oral, vaginal, and anal sex)

^d Includes living alone in house/apartment/dwelling, living with other adults who are not relatives, living with friend(s) or roommate(s), living with a sexual partner/boyfriend/girlfriend, living in a school dormitory, and homeless

^e Derived from the survey question: “In the past 12 months, was there a time where there was not enough money in your house for rent, food, or utilities such as gas, electric, or phone?”

^f Five or more alcoholic drinks in one sitting

^g Includes non-injection misuse of any of the following drugs: methamphetamines, powder cocaine, downers, painkillers, ecstasy, poppers, and “other”

binge drink less than adult MSM, the overall prevalence of non-injection drug use in our sample (19%) was higher than club drug use among MSM in some studies (e.g., McCarty-Caplan et al. (11.2%)) but lower than others; for instance, Fernandez et al. found that 36% of their community sample used club drugs in the past 3 months [18, 19]. These findings suggest that early

adolescence may be a critical time to implement HIV prevention programs, before adolescents initiate risk-taking behavior.

We observed associations between substance misuse and sexual risk similar to those that have been found among adult MSM [12, 17]. Previous studies among adult MSM reported positive associations between

Table 5 Associations between substance misuse and sexual risk behaviors among 16–18-year-old adolescent sexual minority males—National HIV Behavioral Surveillance for young men who have sex with men, 3 US cities, 2015.

	Condomless anal intercourse with a casual male partner, past 12 months PR ^a (95% CI)	Had multiple partners, past 12 months PR ^a (95% CI)
Binge drinking, past 30 days	Model 1 (<i>n</i> = 453 ^b)	Model 2 (<i>n</i> = 445 ^b)
No	Ref	Ref
Yes	1.50 (1.04–2.26)	1.40 (1.09–1.76)
Any non-injection drug use, past 12 months	Model 3	Model 4
No	Ref	Ref
Yes	1.70 (1.09–2.50)	1.40 (1.06–1.80)

^a Unadjusted prevalence ratio

^b Sample sizes are less than 488 because heterosexuals and other/mixed race participants were excluded from analyses in Tables 2, 3, 4, and 5

binge drinking and condomless anal intercourse, more lifetime sex partners, and having sex with both women and men [5, 6]. Similarly, studies among adult MSM report a positive association between drug use and sexual risk [6, 11, 13, 19, 20]. Within the ASMM population, we observed differences in substance misuse and sexual risk by age, with higher percentages of 16–18-year-olds reporting binge drinking and non-injection drug use compared with 13–15-year-olds. Due to small sample size, we were unable to fully explore HIV risk behaviors of 13–15-year-old ASMM, including the association between substance misuse and sexual risk. These findings highlight the need for further HIV prevention research among ASMM transitioning from early adolescence into young adulthood. Similarly, while we observed differences in substance use by race, we were unable to report on any meaningful associations due to small sample sizes; future research is needed to assess differences in substance use and sexual risk by race.

Among 16–18-year-olds, one quarter were experiencing housing instability, meaning that they were not living with parents, guardians, or other relatives. The prevalence of binge drinking, non-injection drug use, and having multiple partners among ASMM experiencing housing instability in our study was higher than for those living in traditional living situations, which is similar to other

findings among MSM [21, 22]. Further research is needed to understand the determinants of housing instability among ASMM. Additionally, risk reduction programs tailored to ASMM experiencing a range of living situations may be beneficial in supporting their unique emotional and developmental needs.

The US Food and Drug Administration recently approved Truvada® for pre-exposure prophylaxis (PrEP) in adolescents, a much-needed HIV prevention tool for ASMM given the scarcity of HIV prevention programs focused on this population [23, 24]. Going forward, it is crucial for healthcare providers and HIV prevention and education programs to incorporate PrEP into conversations with ASMM clients and to encourage use of PrEP in this population through campaigns and outreach materials. A forthcoming update to the PrEP use guidelines will include important information for delivery considerations specific to the ASMM population [25].

Existing evidence-based strategies regarding substance misuse are not specific to ASMM, and HIV prevention interventions tend to focus on young men aged 18 years or older. An existing evidence-based risk reduction intervention that focuses on adolescents that may be adapted to suit the needs of ASMM is “Reducing the Risk Plus (RTR+)” and could be delivered in ASMM appropriate settings, for instance lesbian, gay, bisexual, transgender, and queer (LGBTQ) centers or schools [26]. RTR+ is a group-level intervention with content focused on both cumulative risks of repeated risky behavior as well as per-event, using messaging on abstinence and prophylaxis measures to promote sexual risk reduction and avoid sexually transmitted diseases. Evaluation results of RTR+ revealed that intervention participants reported a more favorable attitude toward prophylaxis ($P < .001$), more favorable perception of whether or not peers use condoms ($P < .05$), and greater control over use of condoms ($P < .01$) [26]. Interventions that more directly address substance misuse and its relationship with sexual risk among ASMM may also be needed. The Young Men’s Health Project (for MSM ages 18–29), which aims to reduce unprotected anal intercourse and substance misuse, could also potentially be adapted for ASMM [27]. The Young Men’s Health Project is an individual-level intervention that provides information about club drugs and risk of condomless sex through motivational interview sessions with young gay and bisexual men. Evaluation results of the Young Men’s Health Project found that among intervention participants, both the number of days of condomless anal intercourse with a casual partner

and the number of days of drug use (in the past 30 days) decreased significantly compared with controls [27].

This study has several limitations. First, the study used a convenience sample from three cities and may not be generalizable to all ASMM aged 13–18 years. Second, the analysis used a cross-sectional sample, and therefore causality cannot be inferred from results. Third, data were self-reported and may be subjected to social desirability bias or recall error. Fourth, small sample sizes prevented meaningful statistical comparisons between the younger and older age categories. Fifth, we may have underestimated prescription opioid misuse because we asked about use of painkillers (such as “Oxycontin, Vidodin, or Percocet”), and participants may not have considered other drugs they were taking as “painkillers.” Last, it is possible there is residual, unmeasured confounding of the relationship between substance misuse and sexual risk.

Conclusion

Young MSM aged 13–18 years have substantial risk for HIV infection. This study’s findings validated those from previous studies of older MSM that found a relationship between substance misuse and HIV risk. This study also provided insight about a subpopulation of adolescent males at high risk for HIV for which current data are limited. Compared with their heterosexual peers, ASMM are at higher risk for HIV and more likely to misuse substances. HIV prevention efforts should consider this, along with the other unique needs of ASMM, when designing programs for this population.

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Data Availability The datasets generated and/or analyzed during the current study are not publicly available due to the sensitive and anonymous nature of NHBS-YMSM but are available from the corresponding author on reasonable request.

Compliance with Ethical Standards

Research Involving Human Subjects Study activities were approved by local institutional review boards in each participating city (Chicago, New York, Philadelphia) and reviewed and approved by CDC.

Informed Consent A waiver of documentation of informed consent was requested and received for all three locations. In addition, a waiver of parental permission for participants under 18 years of age was requested and received in New York City (approved for 13 to 17 years of age), Philadelphia (14 to 17 years of age), and Chicago (16 and 17 years of age).

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