

Methamphetamine and Young Men Who Have Sex With Men

Understanding Patterns and Correlates of Use and the Association With HIV-Related Sexual Risk

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Objective: To examine patterns, consequences, and correlates of methamphetamine use among adolescent and young adult men who have sex with men (YMSM).

Design: Descriptive, bivariate, and hierarchical regression analyses of cross-sectional data.

Setting: Howard Brown Health Center, a community-based facility in Chicago, Ill, from August 2004 to September 2005.

Participants: Three hundred ten YMSM who completed an anonymous, computer-assisted survey.

Main Outcome Measure: Methamphetamine use in the past year.

Results: Participants ranged in age from 16 to 24 years (mean age, 20.3 years); 30% were white and 70% were of other race/ethnicity (African American, 33%; Hispanic, 26%; Asian or Pacific Islander, 3%; and other, 8%). Participants reported many high-risk sexual and substance use behaviors. Thirteen percent used methamphetamine in the past year. Methamphetamine use was more common among human immunodeficiency virus-

infected participants (odds ratio, 2.8; 95% confidence interval, 1.3-5.3) and varied by age and race/ethnicity; substantially higher prevalence was reported by older and non-African American YMSM ($P < .001$). Compared with other illicit substance users, methamphetamine users reported more memory difficulties, impairments in daily activities, and unintended risky sex resulting from substance use (all $P < .01$). Hierarchical regression identified sexual risk (unprotected intercourse and multiple partners), sexualized social context (eg, Internet sex, sex in a bathhouse or sex club, sex with older partners, and commercial sex), lower self-esteem, and psychological distress as correlated with methamphetamine use among participants ($P < .05$).

Conclusions: A substantial percentage of YMSM in this sample used methamphetamine. Methamphetamine use is a public health problem with significant implications for the health and well-being of YMSM. Methamphetamine use was associated with human immunodeficiency virus-related risk, and patterns of use were predicted by demographic data, sexualized social contexts, and psychological variables.

Arch Pediatr Adolesc Med. 2007;161:591-596

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CRYSTAL METHAMPHETAMINE is an addictive stimulant with use nationwide that has become a troubling epidemic.¹ Although methamphetamine use is widespread among a variety of populations, it is particularly prevalent and consequential among men who have sex with men (MSM).¹⁻³ Data from national and nonrepresentative samples have found annual prevalence rates of methamphetamine use in adult MSM ranging from 12% to 30%.⁴ The popularity of methamphetamine among MSM seems to stem from its association with sexual activity and its strategic use by gay and bisexual men in negotiating sexual encounters and increasing sexual pleasure.⁵ As a result, a strong

association has been described between methamphetamine use and high-risk sexual behaviors such as unprotected anal intercourse and sex with multiple sexual partners in both human immunodeficiency virus (HIV)-positive and HIV-negative adult MSM. The substance has emerged as a significant risk factor for the acquisition of HIV and other sexually transmitted infections.⁶⁻¹⁰ During the past decade, methamphetamine use and risky sex, particularly within the context of specific, highly charged sexual environments (eg, the Internet, circuit parties, bathhouses, and sex clubs), have been reported in adult MSM in multiple urban centers.^{2,7,11-13} In addition, individuals' psychological factors such as self-esteem, loneliness, or isolation have also been impli-

cated as correlates of methamphetamine use in adult MSM. For example, it has been reported that MSM may use methamphetamine as a means of escaping underlying psychological distress such as low self-esteem, loneliness, grief, or depression, each a factor with potential to exacerbate HIV risk in this vulnerable population.¹⁴⁻¹⁷

In response to growing concerns about methamphetamine use and sexual risk for HIV infection among MSM, in January 2005, the Centers for Disease Control and Prevention sponsored a consultative meeting to identify directions for much-needed methamphetamine-specific research and clinical practice.¹⁸ Suggestions for future research included exploring the natural history of methamphetamine use and its association with sexual risk behaviors; the social and sexual context of methamphetamine use in populations for whom use is associated with sexual risk behaviors; and the relationship between methamphetamine, sexual risk behaviors, and HIV infections in subpopulations of MSM.

For one understudied subpopulation, adolescent and young adult MSM (YMSM), methamphetamine use and HIV risk are of specific public health importance. Younger MSM may use methamphetamine more frequently than older MSM; preliminary data from the National HIV Behavioral Surveillance System show a 21% annual prevalence of methamphetamine use among YMSM aged 18 to 24 years compared with 12% in the overall adult MSM sample.⁵ In addition, YMSM represent one of the highest risk groups for the acquisition of HIV. The Centers for Disease Control and Prevention Young Men's Survey Study Group surveyed more than 4000 YMSM aged 15 to 22 years in 7 US cities and found 7.2% to be HIV-positive, a prevalence rate higher than for comparable samples of youth.¹⁹ Risky sex continues to be observed in YMSM samples and is often associated with alcohol and substance use.^{13,20-24} Although much has been written about YMSM, HIV risk, and substance use, there has been little research exploring the patterns, consequences, and social and psychological correlates of methamphetamine use in this adolescent and young adult subgroup at high risk for HIV infection.

This study explores methamphetamine use in an ethnically diverse sample of YMSM from the urban Midwest. Our main objectives were (1) to describe patterns and consequences of methamphetamine use and (2) to examine the relationship between methamphetamine use and sexual risk, individual-level psychological factors, and specific sexualized social contexts. These data will be useful in the design and development of HIV and substance use prevention interventions tailored to the unique determinants of risk of YMSM.

METHODS

PARTICIPANTS AND PROCEDURES

A community-based sample of 496 ethnically diverse, 16- to 24-year-old lesbian, gay, bisexual, and transgender (LGBT) youth in Chicago, Ill, participated in the study. For this analysis, biological females (n=153) and male-to-female transgender youth (n=33) were excluded, leaving a final sample size of 310 self-identified YMSM. Youth were recruited consecutively during

12 months from August 2004 to September 2005 by means of multiple sources including flyers posted in retail locations frequented by LGBT individuals (ie, stores, coffee shops, and restaurants) and in LGBT youth-serving agencies, e-mail advertisements posted on high school and college e-mail lists, palm cards distributed in LGBT-identified neighborhoods, and "snowball" sampling. No data were collected about the specific recruitment source for individual participants; however, recruitment venues specifically excluded traditionally high-risk settings such as bars, dance clubs, sex clubs, and bathhouses.

Before enrolling any participant, trained staff assessed the participant's decisional capacity to consent and reviewed study procedures and risks and benefits of participation. To maximize confidentiality, we obtained verbal rather than written consent. Parental consent was not required. The informed consent procedure highlighted that participation was voluntary and anonymous and that declining would have no effect on access to services. Surveys were administered in a private room at either a local youth center or a community-based health center providing primary care, sexually transmitted infection and HIV specialty care, and social services to the LGBT community. Participants completed a 90-minute Computer-Assisted Self-Interview that assessed sociodemographic data, psychological variables, alcohol and other drug use, and sexual behaviors. Participants received \$30.00 for participating. The institutional review boards of Children's Memorial Hospital and the Howard Brown Health Center approved all study procedures before data collection.

MEASURES

Demographic measures included age, self-reported race/ethnicity, sexual orientation, housing status, and socioeconomic status. Participants were also asked whether they had ever been diagnosed as having HIV or other sexually transmitted infections.

Our dependent variable, methamphetamine use, was determined with the following question, "Have you used methamphetamine (meth, tina, chalk, ice, crystal, or glass) anytime in the past year?" Participants responding in the affirmative were asked approximately how many times they used methamphetamine in the past year. Independent variables included sexual risk behaviors, social context variables, and psychological measures.

A version of the AIDS Risk Behavior Assessment adapted for sexual minority youth was used to assess sexual risk behaviors.²⁵ Participants reported their overall number of anal-receptive and anal-insertive sex partners during the previous year and the previous 3 months and the percentage of time they used condoms with their anal-sex partners during the previous 12 months using a Likert ordinal scale with options ranging from "always" to "never." They also described the age of their last 3 receptive and last 3 insertive partners. For these analyses, we focused on 2 variables: any unprotected anal sex during the previous 12 months and multiple partners during the previous 3 months. Unprotected anal sex was coded positive for individuals who reported anything less than 100% condom use for either receptive or insertive anal sex during the past 12 months. Multiple anal-sex partners was coded positive for individuals reporting more than 1 receptive or insertive anal-sex partner during the past 3 months.

Separate items addressed the social context of participants' sexual activity. Participants were asked if they had ever (lifetime) had sex in venues such as sex clubs or bathhouses, had any (oral or anal) sex with a partner met via the Internet, or had sex in exchange for money or drugs. In addition to these binary items, participants indicated the approximate age of their last 3 receptive and last 3 insertive anal-sex partners. We coded

any participant who reported any anal sex with a partner 10 years older than themselves as having had sex with an "older partner." The Internet sex question was not added until after the first 22 participants had completed the assessment; thus, this item had a higher rate of missing data, although it was missing completely at random as defined by Little and Rubin.²⁶ Psychological factors (psychological distress, self-esteem, and loneliness) were measured with validated instruments previously used with adolescents or populations at risk for HIV.

Psychological Distress

The Brief Symptom Inventory-18^{27,28} is an 18-item measure commonly used to screen for psychological distress and psychiatric disorders in medical and community populations. Responses were recorded on a 5-point scale from "not at all" to "extremely." The Global Symptom Inventory of the Brief Symptom Inventory-18 was used to measure psychological distress among participants; higher scores indicated increased distress. The Global Symptom Inventory has a reported α coefficient of 0.89; our sample α level was .92.

Self-esteem

The Rosenberg Self-Esteem Scale²⁹ is a 10-item global measure of self-esteem with responses recorded on a 4-point scale from "strongly disagree" (1) to "strongly agree" (4). For this study, higher scores indicated lower self-esteem. This scale has been widely used with adolescents, with α coefficients greater than 0.70; our sample α level was .87.

Loneliness

The Social and Emotional Loneliness Scale for Adults³⁰ is a multidimensional measure of emotional and social loneliness and connectedness. This scale has a 12-item romantic loneliness subscale with responses scored on a 7-point scale from "very strongly disagree" to "very strongly agree." For this study, higher scores indicated more loneliness. The romantic subscale of the Social and Emotional Loneliness Scale for Adults has a reported α coefficient of 0.89; our sample α level was .90.

Other Measures

Consequences and other negative patterns of methamphetamine use were assessed with 5 items, as follows: (1) "During the past year, how often have you failed to do your regular activities or take care of your responsibilities (eg, taking medications, completing school work, going to work, etc) because of using drugs other than alcohol?" (2) "How often during the past year have you been unable to remember what happened the night before because you had been using drugs other than alcohol?" (3) "In the past year, how often have you had receptive anal sex while high?" (4) "After using drugs other than alcohol, have you ever done something sexually that you had not intended to do (eg, had unplanned sex or did not use a condom, etc)?" (5) "Have you ever used drugs other than alcohol only because a date or sexual partner wanted you to?" For each item, participants were coded positive if they reported any drug-related activity.

STATISTICAL ANALYSES

Statistical analyses were conducted in 4 steps using SPSS software (version 13.0; SPSS Inc, Chicago, Ill). Listwise deletion was used for participants with missing data, which included the 22 participants who were missing data on the Internet sex question

and 2 participants who were missing data on other variables. In step 1, we examined frequency of the demographic data, methamphetamine use, and sexual and substance use risk behaviors for descriptive purposes. In step 2, we used the χ^2 test to test the association of methamphetamine use with the demographic characteristics of age, race/ethnicity, and HIV serological status and to test the association of methamphetamine use negative drug-related consequences and patterns of use. The latter analyses included only participants who reported recreational substance use (eg, street drugs and marijuana) other than alcohol in the previous 12 months ($n=172$, or 55.5% of the original sample). We compared participants who reported any methamphetamine use ($n=39$) with those who reported using any drug other than methamphetamine ($n=133$). Effects were considered statistically significant at $P<.05$. In step 3, the effect of each independent variable on methamphetamine use was assessed with separate hierarchical regression analyses, using age, race/ethnicity, and HIV serological status as covariates in an initial step followed by the independent variable. Race/ethnicity was dummy coded with white as the reference group. In step 4, multiple hierarchical logistic regression modeling was used to determine the variables most highly correlated with methamphetamine use after adjusting for the effects of the other variables in the model. Correlations between independent variables were initially computed to screen for multicollinearity before inclusion in the regression analyses. The correlation between self-esteem and depression was 0.64; most of the other correlations were less than 0.30, and the highest was 0.39 (between multiple anal-sex partners and history of unprotected anal sex). To minimize the number of independent variables in the model, only those significant from the initial bivariate analyses were included in the multiple regression analysis. We entered the covariates as a block in an initial step followed by the complete set of independent variables in a second step. To adjust for multiple statistical tests we set the α level at $P<.025$ for this analysis.

RESULTS

DEMOGRAPHIC DATA, SEXUAL BEHAVIOR, AND DRUG USE

Table 1 gives the demographic characteristics, sexual behavior, and substance use risks of the sample ($N=310$). Participants ranged in age from 16 to 24 years (mean [SD] age, 20.3[2.4] years); 54% were younger than 21 years. Eighty-two percent self-identified as gay, 70% were non-white, and 70% classified their background as middle class. Participants endorsed a number of high-risk sexual and substance use behaviors: 25% had ever had sex in exchange for resources (ie, money or drugs), 26% had ever had sex in either a sex club or bathhouse, and 44% reported unprotected anal intercourse. Fourteen percent of the sample reported a known HIV-positive serological status. Fifty-one percent reported using marijuana in the past 12 months, and 13% ($n=39$) reported methamphetamine use in the past year. Greater than 70% of methamphetamine users reported using the substance more than twice in the past year.

OBJECTIVE 1: PATTERNS AND CONSEQUENCES OF METHAMPHETAMINE USE

Methamphetamine use was associated with the age of participants; annual methamphetamine use was reported by

Table 1. Demographic Data, Sexual Behavior, and Drug Use in 310 Participants

Variable	No. (%)
Sexual identity	
Gay	254 (82)
Bisexual	49 (16)
Other/questioning	7 (2)
Race/ethnicity	
White	94 (30)
African American	102 (33)
Hispanic	80 (26)
Asian/Pacific Islander	10 (3)
Other	24 (8)
Age, y	
16-18	83 (27)
19-21	128 (41)
22-24	99 (32)
Housing status	
Living with parents	131 (42)
Living independently	139 (45)
Living with romantic/sex partner	24 (8)
Homeless	13 (4)
Socioeconomic status	
Lower class	57 (18)
Middle class	217 (70)
Upper class	35 (11)
HIV-seropositive, HIV-positive	43 (14)
Ever arrested	97 (31)
Ever incarcerated	53 (17)
Sexual risk behaviors in past 12 mo	
Any unprotected anal intercourse	1 (44)
Unprotected anal intercourse, receptive	36 (34)
Unprotected anal intercourse, insertive	106 (32)
Anal sex while high	178 (50)
Sexual risk behaviors in past 3 mo	
Multiple anal sex partners	124 (40)
Sex in bathhouse or sex club	79 (26)
Sex with Internet partner	130 (42)
Commercial sexual activity	76 (25)
Sex with older partners	95 (31)
Substance use in past 12 mo	
Marijuana	158 (51)
Any street drug	72 (51)
Ecstasy (3,4-methylenedioxymethamphetamine)	35 (23)
GHB (gamma hydroxybutyrate)	20 (11)
Cocaine, not crack	51 (7)
Heroin	19 (17)
Benzodiazepines	22 (6)
Crack cocaine	10 (7)
Hallucinogens	29 (3)
Viagra (sildenafil citrate)	20 (6)
Recreational over-the-counter medications	47 (7)
Methamphetamine	39 (13)

Abbreviation: HIV, human immunodeficiency virus.

3.6% (3/83) of 16- to 18-year-old participants compared with 11.7% (15/128) of participants aged 19 to 21 years and 21.2% (21/99) of participants aged 22 to 24 years. Participants aged 21 to 24 years were almost 3 times more likely than those aged 16 to 20 years to have used methamphetamine in the past year (χ^2 test [1, N=310], 7.6; $P<.01$; odds ratio [OR], 2.6; 95% confidence interval [CI], 1.3-5.3). While age-related differences in annual prevalence rates were noted with other illicit substances (eg, ecstasy [3,4-methylenedioxymethamphetamine] and cocaine); no sig-

Table 2. Contextual and Psychological Correlates of Methamphetamine Use*

Variable	OR (95% CI)	P Value
Unprotected anal sex in past 12 mo	6.5 (2.7-15.9)	<.001
Multiple anal sex partners in past 3 mo	4.6 (1.7-12.6)	.003
Bathhouse or sex club	4.74 (2.2-10.3)	<.001
Internet sex	2.35 (1.0-5.5)	.05
Commercial sex	5.07 (2.3-11.2)	<.001
Older sex partners	3.79 (1.8-8.0)	<.001
Global Symptom Inventory	1.03 (1.00-1.06)	.02
Romantic loneliness	1.25 (0.95-1.62)	.11
Self-esteem	2.05 (1.08-3.89)	.03

Abbreviations: CI, confidence interval; OR, odds ratio.

*All analyses adjust for the effects of age, race/ethnicity, and human immunodeficiency virus status.

nificant age-related differences were seen with marijuana use. Methamphetamine use was substantially more common among white (20.2%) and Latino/Hispanic (16.3%) youth than among African American (2.9%) participants (χ^2 test [3, n=310], 14.6, $P<.01$) and was more common among HIV-positive participants (23.3% vs 10.9%; $\chi^2=5$ [n=308]; $P=.02$; OR, 2.8; 95% CI, 1.1-5.5).

In comparison with other participants who used illicit substances (n=172), methamphetamine users were more likely to report failure to remember what happened the previous night ($\chi^2=10.4$ [n=172]; $P<.01$; OR, 3.4; 95% CI, 1.6-7.2), failure to do regular day-to-day activities ($\chi^2=19.0$ [n=172]; $P<.001$; OR, 5.0; 95% CI, 2.4-10.7), and doing something sexually unintended such as not using a condom ($\chi^2=28.7$ [n=172]; $P<.001$; OR, 7.3; 95% CI, 3.4-16.1). Methamphetamine users were more likely than other substance-using participants to report receptive anal sex while high ($\chi^2=30.1$ [n=172]; $P<.001$; OR, 7.7; 95% CI, 3.4-17.4) and to report using drugs because a romantic or sexual partner encouraged them to ($\chi^2=20.7$ [n=172]; $P<.001$; OR, 5.8; 95% CI, 2.6-13.1).

OBJECTIVE 2: CORRELATES OF METHAMPHETAMINE USE

Table 2 gives results of the initial multivariate analyses of individual correlates of methamphetamine use. All analyses controlled for age, race/ethnicity, and HIV serological status. Methamphetamine use was associated with risky sex as well as each individual social context variable ($P<.05$). Young MSM who used methamphetamine were more than 6 times more likely than their peers to report unprotected anal intercourse in the past 12 months, more than 4 times more likely to report multiple anal-sex partners in the past 3 months, and substantially more likely to report sex in a bathhouse or sex club, with a partner met via the Internet, in exchange for resources, or with older partners. Methamphetamine use was modestly associated with lower self-esteem and increased psychological distress ($P<.05$ for both) but not with romantic loneliness.

Table 3 gives the results of our final hierarchical logistic regression model. This model entered all the independent variables found to be statistically significant

in our initial analysis. In this combined model, methamphetamine use was strongly related to the set of psychosocial and context variables: the Nagelkerke R^2 approximation of variance in methamphetamine use explained by the block of psychosocial and context variables was 27% beyond the effect of the demographic data. Significant independent correlates of methamphetamine use consisted of increasing age, non-African American race/ethnicity, having unprotected anal intercourse, and history of commercial sexual activity (all $P < .025$).

COMMENT

This study underscores the significant and potentially devastating effects of methamphetamine use among YMSM, particularly as it pertains to HIV-related sexual risk. The 13% annual prevalence rate for methamphetamine use among our 16- to 24-year-old sample is higher than national representative samples of youth but is consistent with use patterns described in studies of older MSM.⁴ Our findings are also consistent with previous research showing that white and Latino/Hispanic YMSM report more methamphetamine use than do African American YMSM. Consistent with research findings in adult MSM, our data show increased methamphetamine use among HIV-positive YMSM and a strong link between methamphetamine and several indicators of sexual risk among both HIV-positive and HIV-negative YMSM. Thus, methamphetamine use among YMSM has clear implications for both primary and secondary HIV prevention. Finally, although cross-sectional data do not allow for testing of developmental effects, the dramatic age-related increase in methamphetamine use in this sample calls for additional research geared toward gaining better understanding of both initiation patterns and the natural history of methamphetamine use among this population of YMSM. In particular, these data indicate that understanding the broader social and psychological context of methamphetamine use and initiation may be crucial for developing targeted substance use and HIV prevention efforts in YMSM.

Specifically, prevention efforts may need to address the social and psychological context of sexuality for these young men because our data suggest that, similar to adult MSM, these factors (ie, the Internet, older partners, commercial sex venues, and exchanging sex for resources) and psychological distress and self-esteem have an important role in contributing to methamphetamine-related sexual risk in this YMSM population. However, unlike adult MSM, YMSM may not be developmentally mature enough to navigate the challenges and stressors associated with their sexual minority identity or the perceived stigma associated with same-sex activity. They may find it difficult to identify friends or age-appropriate romantic partners because peers with similar experiences may not be readily available in their daily lives.^{31,32} These processes may contribute vulnerability to depression or social isolation, substance use, or seeking sexual partners within traditionally adult social settings where casual sexual exchanges are anticipated or desired.³² Within these contexts, YMSM may partner with older men or may experiment with substances such as methamphetamine

Table 3. Hierarchical Multiple Regression Results, Overall Model: Methamphetamine Use in Past 12 Months in 310 Participants

Variable	Nagelkerke R^2	OR (95% CI)	P Value
Step 1	.16		
Age		1.28 (1.08-1.52)	.005
Race/ethnicity, white as reference			
African American		0.19 (0.05-0.69)	.01*
Hispanic		0.95 (0.40-2.26)	.91
Other		0.67 (0.20-2.25)	.52
HIV-seropositive		1.97 (0.76-5.07)	.16
Step 2	.43		
Unprotected anal sex in past 12 mo		3.9 (1.32-11.30)	.01*
Multiple anal sex partners in past 3 mo		1.52 (0.47-4.95)	.47
Bathhouse or sex club		3.20 (0.99-7.02)	.05
Internet sex		0.90 (0.32-2.59)	.91
Commercial sex		3.35 (1.32-8.49)	.01*
Older sex partners		2.15 (0.85-5.44)	.11
Global Symptom Inventory		1.02 (0.98-1.06)	.42
Self-esteem		1.16 (0.46-2.93)	.76

Abbreviations: CI, confidence interval; HIV, human immunodeficiency virus; OR, odds ratio.

*Indicates statistical significance at $P < .025$.

because of partner pressure or because drug use is more prevalent in these settings. For example, the YMSM methamphetamine users in our sample were substantially more likely than their substance-using peers to report sex with older partners, sex while high, or drug use in response to pressure from a sex partner.

For YMSM struggling with self-identity, self-expression, loneliness, or isolation, methamphetamine use may also serve as an escape mechanism to self-medicate underlying psychological distress or low self-esteem. Methamphetamine used for self-medication or in contexts in which imbalance in social power constrains the adolescent's decision making may adversely affect both impulse control and sexual decisions. Appreciating the complex social milieu in which YMSM develop and the interrelations among contextual and psychological factors in their decision making is critical to fully comprehending the link between methamphetamine use and HIV risk in this vulnerable subgroup. Our results suggest that sexual risk or highly charged sexual contexts such as commercial sex work or sex in public venues may be stronger predictors of methamphetamine use among this population of youth than individual-level psychological predictors. However, further examination with a larger, more diverse sample will be needed to fully delineate mediators and moderators of these behaviors and relationships.

This study has several important limitations. Because the data are cross-sectional, we cannot draw conclusions about causality. For example, we cannot determine whether sexual risk or psychological distress was a consequence of methamphetamine use or whether YMSM who generally engage in high-risk behaviors or experience psychological distress use methamphet-

amine. All data were collected by self-report and were subject to social desirability biases in reporting, for example, risk behaviors. However, research suggests that self-reports of sensitive data collected via computer self-interviews are subject to less bias.^{33,34} The sample was derived from 1 city, and interviews were administered at a community-based site offering HIV specialty services in addition to primary care and social support services. Thus, our findings may not be generalizable to other samples of YMSM. In addition, the survey instrument asked only about general sexual activity and did not allow us to examine unprotected sexual behaviors within specific social contexts. Nevertheless, to our knowledge, this study is among the first to examine patterns and consequences of methamphetamine use in a young, ethnically diverse sample of YMSM, a high-risk group that relatively little is known about.

Methamphetamine use is a public health problem with important implications for the overall health and well-being of YMSM. These data complement and add to the growing body of literature on HIV risk and methamphetamine conducted in older MSM samples and indicate clearly that additional research is needed to understand the social and psychological context of substance use and sexual risk among these men.

Accepted for Publication: December 17, 2006.

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Funding/Support: Data collection for this project was supported by the National Institutes of Health through grants R03MH070812 and K12RR01777 to Dr Garofalo.

Acknowledgment: We thank the Youth Services Department at the Howard Brown Health Center for their assistance with this project.

REFERENCES

- National Institute of Drug Abuse. NIDA InfoFacts: Methamphetamine. www.drugabuse.gov/infofacts/methamphetamine.html. Accessed June 12, 2006.
- Halkitis PN, Parsons JT, Storratt MJ. A double epidemic: crystal methamphetamine drug use in relation to HIV transmission among gay men. *J Homosex*. 2001;41:17-35.
- Yen CF. Relationship between methamphetamine use and risky sexual behavior in adolescents. *Kaohsiung J Med Sci*. 2004;20:160-165.
- Mansergh G. MSM methamphetamine use and sexual risk behaviors for STD/HIV infection. Presented at: First National Conference on Methamphetamine, HIV and Hepatitis; August 20, 2005; Salt Lake City, Utah.
- Diaz RM, Heckert AL, Sanchez J. Reasons for stimulant use among Latino gay men in San Francisco: a comparison between methamphetamine and cocaine users. *J Urban Health*. 2005;82(suppl 1):i71-i78.
- Purcell DW, Moss S, Remien RH, Woods WJ, Parsons JT. Illicit substance use, sexual risk, and HIV-positive gay and bisexual men: differences by serostatus of casual partners. *AIDS*. 2005;19:S37-S47.
- Colfax G, Coates TJ, Husnik MJ, et al; EXPLORE Study Team. Longitudinal patterns of methamphetamine, popper (amyl nitrite), and cocaine use and high-risk sexual behavior among a cohort of San Francisco men who have sex with men. *J Urban Health*. 2005;82(suppl 1):i62-i70.
- Mansergh G, Shouse RL, Marks G, et al. Methamphetamine and sildenafil (Viagra) use are linked to unprotected receptive and insertive anal sex, respectively, in a sample of men who have sex with men. *Sex Transm Infect*. 2006;82:131-134.
- Plankey MW, Ostrow DG, Stall R, et al. The relationship between methamphetamine and popper use and risk of HIV seroconversion in the Multicenter AIDS Cohort study [published online ahead of print February 22, 2007]. *J Acquir Immune Defic Syndr*. http://www.jaids.com. Accessed March 2, 2007. .17325605.
- Wong W, Chaw JK, Kent CK, Klausner JD. Risk factors for early syphilis among gay and bisexual men seen in an STD clinic: San Francisco, 2002-2003. *Sex Transm Dis*. 2005;32:458-463.
- Halkitis PN, Green KA, Mourgues P. Longitudinal investigation of methamphetamine use among gay and bisexual men in New York City: findings from Project BUMPS. *J Urban Health*. 2005;82(suppl 1):i18-i25.
- Mansergh G, Colfax GN, Marks G, Rader M, Guzman R, Buchbinder S. The Circuit Party Men's Health Survey: findings and implications for gay and bisexual men. *Am J Public Health*. 2001;91:953-958.
- Gorman EM, Carroll RT. Substance abuse and HIV: considerations with regard to methamphetamines and other recreational drugs for nursing practice and research. *J Assoc Nurses AIDS Care*. 2000;11:51-62.
- McKirnan DJ, Ostrow DG, Hope B. Sex, drugs and escape: a psychological model of HIV-risk sexual behaviours. *AIDS Care*. 1996;8:655-669.
- Semple SJ, Patterson TL, Grant I. Motivations associated with methamphetamine use among HIV+ men who have sex with men. *J Subst Abuse Treat*. 2002;22:149-156.
- Shoptaw S, Peck J, Reback CJ, Rotheram-Fuller E. Psychiatric and substance dependence comorbidities, sexually transmitted diseases, and risk behaviors among methamphetamine-dependent gay and bisexual men seeking outpatient drug abuse treatment. *J Psychoactive Drugs*. 2003;35(suppl 1):161-168.
- Reback CJ. *The Social Construction of a Gay Drug: Methamphetamine Use Among Gay and Bisexual Males in Los Angeles*. Los Angeles, Calif: City of Los Angeles, AIDS Coordinator's Office; 1997.
- Mansergh G, Purcell DW, Stall R, et al. CDC consultation on methamphetamine use and sexual risk behavior for HIV/STD infection: summary and suggestions. *Public Health Rep*. 2006;121:127-132.
- Valleroy LA, MacKellar DA, Karon JM, et al; Young Men's Survey Study Group. HIV prevalence and associated risks in young men who have sex with men. *JAMA*. 2000;284:198-204.
- Waldo CR, McFarland W, Katz MH, MacKellar D, Valleroy LA. Very young gay and bisexual men are at risk for HIV infection: the San Francisco Bay Area Young Men's Survey II. *J Acquir Immune Defic Syndr*. 2000;24:168-174.
- Clatts MC, Goldsamt LA, Yi H. Club drug use among young men who have sex with men in NYC: a preliminary epidemiological profile. *Subst Use Misuse*. 2005;40:1317-1330.
- Clatts MC, Goldsamt LA, Yi H. Drug and sexual risk in four men who have sex with men populations: evidence for a sustained HIV epidemic in New York City. *J Urban Health*. 2005;82(Suppl 1):i9-i17.
- Stueve A, O'Donnell L, Duran R, San Doval A, Geier J; Community Intervention Trial for Youth Study Team. Being high and taking sexual risks: findings from a multisite survey of urban young men who have sex with men. *AIDS Educ Prev*. 2002;14:482-495.
- Celentano DD, Valleroy LA, Sifakis F, et al; for the Young Men's Survey Study Group. Associations between substance use and sexual risk among very young men who have sex with men. *Sex Transm Dis*. 2006;33:265-271.
- Donenberg GR, Emerson E, Bryant FB, Wilson H, Weber-Shifrin E. Understanding AIDS-risk behavior among adolescents in psychiatric care: links to psychopathology and peer relationships. *J Am Acad Child Adolesc Psychiatry*. 2001;40:642-653.
- Little RJA, Rubin DB. *Statistical Analysis With Missing Data*. New York, NY: John Wiley & Sons; 1987.
- Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. *Psychol Med*. 1983;13:595-605.
- Derogatis LR. *Brief Symptom Inventory-18: Administration, Scoring, and Procedure Manual*. Minneapolis, Minn: National Computer Systems Inc; 2000.
- Rosenberg M. *Society and the Adolescent Self-image*. Revised ed. Middletown, Conn: Wesleyan University Press; 1989.
- DiTommaso E, Spinner B. The development and initial validation of the Social and Emotional Loneliness Scale for Adults (SELSA). *Pers Individual Differences*. 1993;14:127-134.
- Garofalo R, Herrick A, Mustanski B, Donenberg GR. Tip of the iceberg: young men who have sex with men, the Internet, and HIV risk. *Am J Public Health*. In press.
- Garofalo R, Harper GW. Not all adolescents are the same: addressing the unique needs of gay and bisexual male youth. *Adolesc Med*. 2003;14:595-611.
- Morrison-Beedy D, Carey M, Tu X. Accuracy of audio computer-assisted self-interviewing (ACASI) and self-administered questionnaires for the assessment of sexual behavior. *AIDS Behav*. 2006;10:1-12.
- Kissinger P, Rice J, Farley T, et al. Application of computer-assisted interviews to sexual behavior research. *Am J Epidemiol*. 1999;149:950-954.