

Relationship of Amphetamine and Other Substance Use to Unprotected Intercourse Among Young Men Who Have Sex With Men

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Objectives: To analyze temporal trends in drug use and the relationship between drug use before or during sex and unprotected intercourse among a sample of young gay and bisexual men.

Methods: Data were obtained from cross-sectional surveys of 9 annual cohorts. Respondents were 877 13- to 21-year-old gay and bisexual male volunteers. Trends in the use of substances before or during sex were analyzed. Univariate and multivariate measures of the association between substance use before or during sex and unprotected anal intercourse were calculated.

Results: Between 1994 and 1997, the use of marijuana, cocaine, amphetamines, and mean scores on a measure of overall drug use severity increased significantly in a

sample of young gay and bisexual men. Significant univariate associations were found between drug use before or during sex and unprotected anal intercourse for the following substances: alcohol, marijuana, cocaine, amphetamines, barbiturates, heroin, LSD, volatile nitrites, tranquilizers, and methaqualone. In multivariate analyses, however, only cocaine use predicted failure to use condoms during anal intercourse.

Conclusion: Although amphetamine and other drug use increased among young gay and bisexual men, only cocaine use was a significant, independent predictor of the failure to use condoms during anal intercourse.

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Editor's Note: So what is it about cocaine that prevents young men from using condoms during intercourse with other men? Does the same correlation exist with young men's use of condoms with female partners?

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A SUBSTANTIAL body of research has documented an association between the use of recreational drugs and high-risk sex among gay and bisexual men.¹⁻¹⁰ However, because some of these studies involved persons in drug use treatment,^{2,3,7} the extent to which their findings can be generalized to non-treatment populations is uncertain. The documented association between drug use and high-risk sex may be confined to gay and bisexual men with more severe substance use problems. Because this research has been based on samples of adults, little is known about the relationship between drug use and high-risk sex among gay and bisexual adolescents.

Since the early 1990s, amphetamine use, particularly methamphetamine (MA)

use, has been an increasing concern of health and criminal justice professionals. Data from a variety of sources document a substantial increase in MA use, especially in the western United States. According to data from the Treatment Episode Data Set, collected by the Substance Use and Mental Health Services Administration, the per capita rate of persons admitted for MA use in the West doubled between 1992 and 1994.¹¹ Data collected by the Drug Use Warning Network have revealed a dramatic increase in MA-related emergency department visits, from 5000 to 18 000, between 1991 and 1994. These data also have shown a 200% increase in MA-related deaths for the same period.¹¹ While the incidence of MA use is higher in the western United States, MA use has spread to other regions, including the Midwest. Minneapolis, Minn, the site of this study, ranks sixth in MA use among major cities.¹¹

Of special concern to health professionals is the increase in MA use among gay men and its potential link to human immunodeficiency virus (HIV) transmission (hereafter, "high-risk sex"), medi-

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PARTICIPANTS AND METHODS

RESPONDENTS

Eligible respondents were men between the ages of 13 and 21 years who self-identified as gay or bisexual and/or who had sex with men. Respondents were recruited from 1989 to 1997 through advertisements in gay publications and business venues, direct appeal at social groups and community events, and referrals from school and health professionals and previous participants. Because subject recruitment methods were similar from year to year, annual cohorts were expected to have similar sociodemographic characteristics. A total of 877 men were recruited across 9 annual cohorts. Cohorts ranged in size from 77 to 119, with a mean of 97 and a median of 99.

PROCEDURES

The instruments were administered at the respondents' convenience in private settings. All respondents completed a structured interview quantifying substance use and sexual behaviors and a self-administered survey of drug use severity. Afterward, HIV risk reduction information, group peer education, referral to other needed professional services, and a modest reimbursement for participation were provided. Participation was voluntary and confidential, with the option of anonymity. Parental consent for minors was not required. Respondents gave prior verbal and written consent to all procedures, as approved by the University of Minnesota committee on the use of human subjects.

INSTRUMENTATION

The structured interview consisted of 184 multiple-choice, Likert-type, and open-ended questions regarding demographics,¹⁶ sexuality, health and psychosocial status,^{16,17} personal HIV risk factors, prior HIV antibody testing, acquaintance with persons with HIV infection or acquired immunodeficiency syndrome,¹⁸ and a sexual history.^{19,20} The sexual history included questions about respondents' sexual experiences with up to 3 sexual partners in the previous year. Responses to the items regarding condom use with recent partners have been found to be significantly associated with sexually transmitted disease detection in a school-based sample of adolescents.²¹

The self-administered survey of drug use severity included 21 questions about lifetime, annual, and quarterly substance use by Johnston et al,²² and the Personal Experience Screening Questionnaire (PESQ).²³ The PESQ provided a substance use severity score from 18 ordinal-scale questions about drug use behaviors, effects on relationships and finances, and physical and emotional symptoms

of dependence. The items in the problem severity scale "reflect several behavioral domains associated with adolescent drug use, the most prominent domains being drug use consequences, benefits of drug use, and dependence symptoms."²⁴ The psychometric properties of the PESQ for a sample of young gay and bisexual men have been assessed, revealing high levels of internal reliability ($\alpha = .92-.95$) and convergent and discriminant validity.²⁴ A continuous measure of drug use severity was constructed by adding the nonweighted scores of the 18 items of the PESQ problem severity scale.

ANALYSES

To assess trends in drug use, we examined changes in annual incidence of substance use across cross-sectional cohorts. The use of sequential cross-sectional data to monitor trends in substance use has its precedent in annual cross-sectional sentinel surveys of students, emergency department visits, and police records.²² Trend data were based on 13 measures of the frequency of substance use and 1 measure of the frequency of intravenous drug use during the last 3 months preceding the interview.

Collapsing the 9 annual cohorts into a single sample of 877 cases, we examined the univariate associations between the use of 15 different substances before or during sex and UAI. The dichotomous dependent variable, UAI, was coded yes if the respondent did not always use a condom during anal intercourse with any of their last 3 sexual partners during the preceding year and no if they always used a condom. The independent variables consisted of 15 measures of the frequency of the use of substances before or during sex with each of the respondent's last 3 sexual partners in the previous year. Substances included alcohol, marijuana, powder cocaine, amphetamines (including MA), barbiturates, "crack" cocaine, heroin, LSD, psychedelics other than LSD, over-the-counter stimulants, volatile nitrites ("poppers"), other inhalants (eg, glue, paint, or gasoline), tranquilizers (eg, Librium or Valium), methaqualone ("Quaaludes"), and other miscellaneous drugs. Dichotomous measures of substance use before or during sex were created by coding the variables yes if the respondent used a drug before or during sex with any of their last 3 sexual partners of the previous year and no if they did not.

Using a stepwise logistic regression procedure, UAI was regressed on each of the measures of substance use associated with UAI in the univariate analyses. Substance use severity was entered into the logistic regression equation as a covariate. Continuous measures of substance use before or during sex were obtained by adding the non-weighted items for each substance for the respondent's last 3 sexual partners during the preceding year.

ated by increased libido,¹²⁻¹⁴ sex with anonymous partners,¹⁴ prolonged intercourse with associated trauma,¹³ and a failure to use condoms.¹³⁻¹⁵ However, the extent to which the effect of MA use on high-risk sex is significantly different from that of other recreational drugs is unknown. In addition, little is known about either the prevalence of MA use or the relationship between MA use and high-risk sex among gay and bisexual adolescents.

The purpose of this study was to examine trends in substance use from 1989 to 1997 among young men who have sex with men and the relationship between specific drugs and risky sexual behavior. This study was guided by 3 important questions. The first was whether the use of amphetamines and other substances had increased in recent years among young men who have sex with men. The second question was whether amphetamine and other drug use before or during sex was associated with unpro-

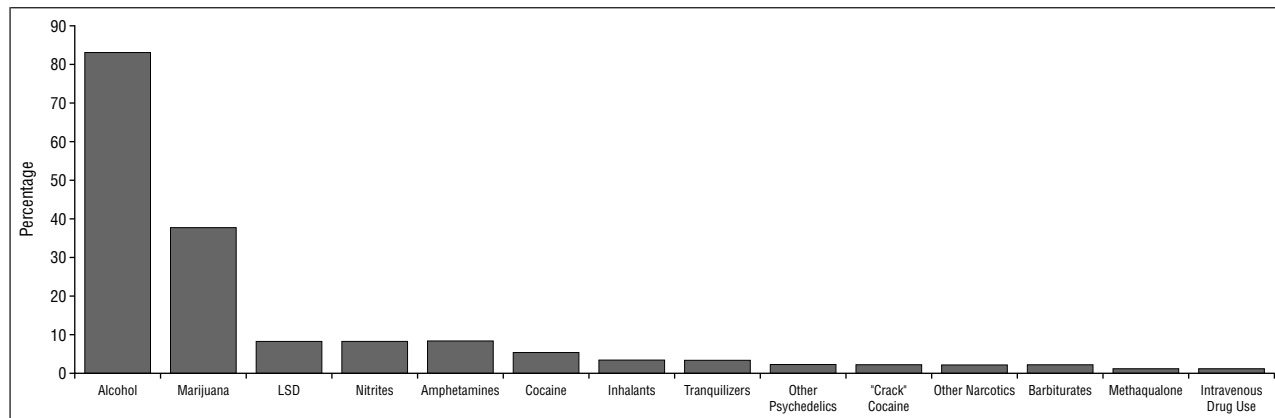


Figure 1. Percentage of respondents (N = 877) using substances in the 3 months preceding the initial interview, 1989-1997.

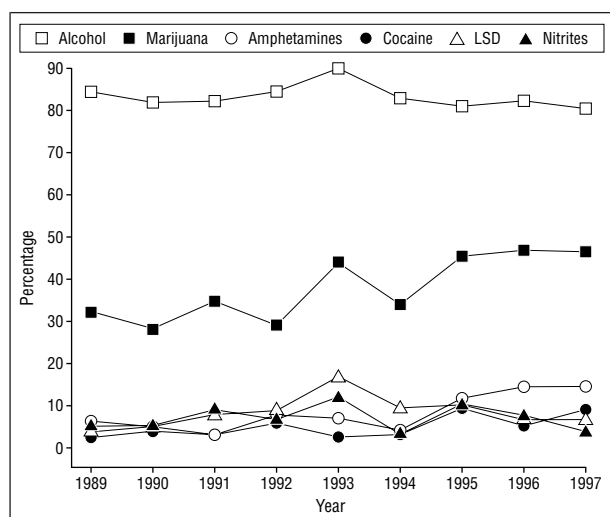


Figure 2. Percentage of respondents (N = 877) using substances in the 3 months preceding the initial interview, 1989-1997.

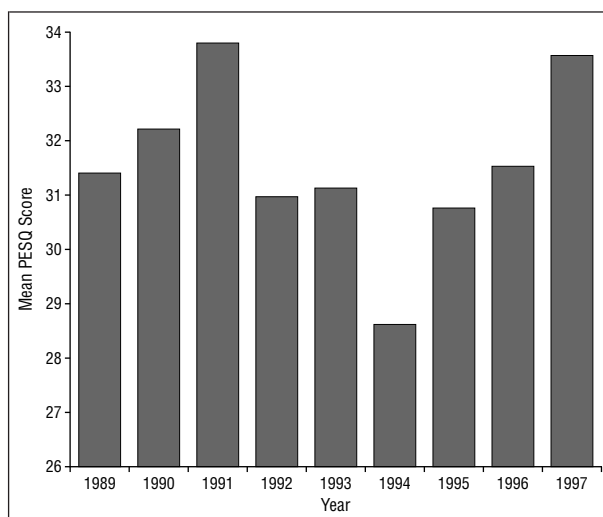


Figure 3. Mean Personal Experience Screening Questionnaire (PESQ)²³ scores, 1989-1997 (N = 877).

tected anal intercourse (UAI). The final question was whether substance use before or during sex was related to UAI after drug use severity was controlled.

RESULTS

SAMPLE DESCRIPTION

Respondents were 877 men between the ages of 13 and 21 years (mean age, 19.23 years; SD, 1.73 years) enrolled between 1989 and 1997. The ethnic/racial composition of the sample was 79% white, 7.6% African American, 3.4% Hispanic/Latino, 3.1% Asian, 2.2% Native American, and 4.7% mixed ethnicity. Thirty-four percent of respondents reported engaging in UAI with any of their last 3 sexual partners of the preceding year.

TRENDS IN DRUG USE

The percentages of subjects who used different substances and/or engaged in intravenous drug use in the 3 months preceding the interview are presented in **Figure 1**. Note that amphetamines were the fifth most frequently used class of substances. Temporal trends in

the use of the 6 most popular drugs (alcohol, marijuana, LSD, volatile nitrites, amphetamines, and cocaine) are presented in **Figure 2**. Focusing first on amphetamine use, the temporal data reveal that, from 1989 to 1993, between 3% and 8% of the sample used this substance in the 3 months preceding the interview. Between 1994 and 1997, use increased to between 12% and 15% of the sample. Thus, 1994 represented the first year of an upward annual trend in amphetamine use. Compared with 1994, the use of marijuana, cocaine, and amphetamines was significantly greater in 1997. The quarterly prevalence of marijuana use increased from 34% to 47% ($\chi^2 = 2.83, P < .10$), cocaine use from 3% to 15% ($\chi^2 = 3.01, P < .10$), and amphetamine use from 4% to 15% ($\chi^2 = 5.90, P < .05$). Overall severity of drug use also increased between 1994 and 1997. **Figure 3** shows that, after peaking in 1991, mean annual PESQ scores fell until 1994 and then rose significantly between 1994 and 1997 ($t = -2.91, P < .01$).

To explore the possibility that drug use patterns varied across racial and ethnic groups, we conducted analyses comparing the rates of substance use among whites (n = 692) vs people of color (n = 184) and among whites vs African Americans (n = 67). Our results showed that

whites consumed more alcohol in the 3 months preceding the interview than people of color (85% vs 78%; $\chi^2 = 4.34, P < .05$) and African Americans (85% vs 73%; $\chi^2 = 5.29, P < .05$). Whites also used more alcohol before or during sex than did people of color (61% vs 53%; $\chi^2 = 4.11, P < .05$). Finally, the mean PESQ score for whites was higher than that for African Americans (31.80 vs 27.50; $t = 2.99, P < .01$), but not different from that for people of color overall. No other significant differences in substance use were found.

COMPARABILITY OF ANNUAL COHORTS

To ensure that changes in drug use between 1994 and 1997 were not caused by changes in the annual cohorts, we compared the demographic characteristics of the 1994 and 1997 cohorts (**Table 1**). No significant differences between the cohorts were found in ethnicity, sexual orientation, or father's educational level (as an indicator of social background).²⁵ However, differences in mean ages were found. In 1994, the mean age of respondents was 19.24 years, compared with 18.61 years in 1997 ($t = 2.20, P < .05$). To test the hypothesis that age was unrelated to levels of drug use, a correlation coefficient for age and PESQ scores was computed and found to be nonsignificant. The comparability of annual cohorts from 1989 to 1994 was analyzed and no significant differences were found for mean age, race, sexual risk behavior, living situation, location of permanent residence, sexual orientation, or religious affiliation.²⁶

DRUG USE BEFORE OR DURING SEX

The proportions of the full sample of 877 respondents using drugs before or during sex with any of their last 3

Table 1. Demographic Characteristics of 1994 and 1997 Cohorts

	1994	1997	Test Statistic	P
Mean age, y	19.24	18.61	$t = 2.20$.03
People of color, %	17.30	19.00	$\chi^2 = 0.08$.78
Gay-identified, %	80.40	73.00	$\chi^2 = 1.32$.25
Fathers with some college, %	68.40	74.70	$\chi^2 = 0.85$.36

partners in the prior year are presented in **Figure 4**. In the context of sex, as with overall drug use, amphetamines were the fifth most frequently used substance. Analyses of the univariate associations revealed that 10 of the 15 substances used before or during sex were associated with UAI (**Table 2**), including alcohol, marijuana, cocaine, amphetamines, barbiturates, heroin, LSD, volatile nitrites, tranquilizers, and methaqualone.

Because polysubstance abuse and drug use severity may obscure the relationship between the use of individual drugs and risky behavior, we performed a logistic

Table 2. Bivariate Associations of Drug Use During Sex and Unprotected Anal Intercourse Among 817 Young Men Who Have Sex With Men

Variable	Low Risk, % (n = 520)	High Risk, % (n = 297)	χ^2_1	P
Alcohol				
No	75	25	19.27	<.001
Yes	60	40		
Marijuana				
No	69	31	10.69	<.01
Yes	57	43		
Cocaine				
No	68	32	22.79	<.001
Yes	31	69		
Amphetamines				
No	67	33	8.12	<.01
Yes	45	55		
Barbiturates				
No	67	33	4.37	<.05
Yes	33	67		
Heroin				
No	67	33	4.41	<.05
Yes	36	64		
LSD				
No	67	33	10.90	<.01
Yes	43	57		
Nitrites ("poppers")				
No	68	32	18.59	<.001
Yes	38	62		
Tranquilizers				
No	67	33	4.37	<.05
Yes	33	67		
Methaqualone				
No	66	34	4.78	<.05
Yes	20	80		

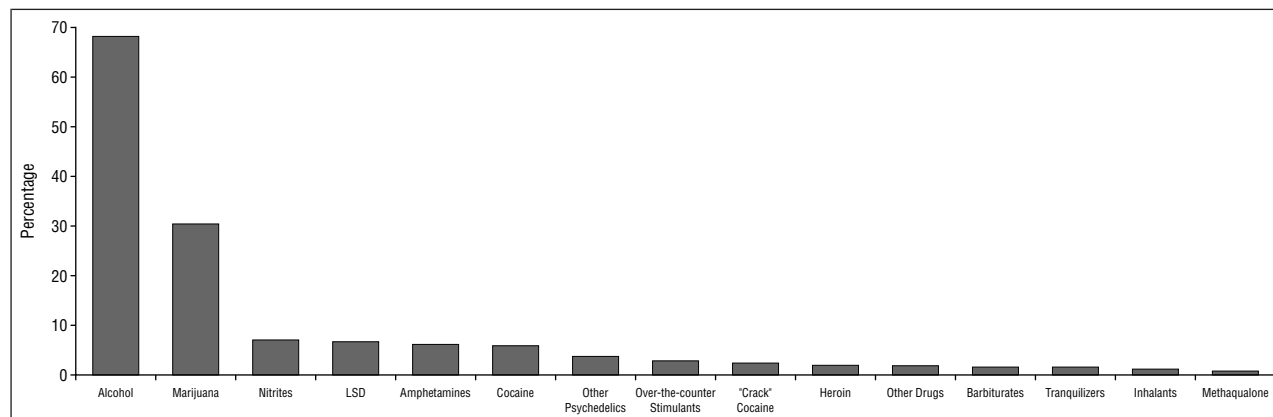


Figure 4. Percentage of subjects (N = 877) using drugs before or during sex with any of their last 3 sexual partners, 1989-1997.

regression analysis in which UAI was regressed on each of the 10 measures of substance use associated with UAI in the univariate analyses. To ensure that multicollinearity among the independent variables was not a problem, univariate correlation coefficients were calculated for 105 pairs of substance use variables. All but 6 correlation coefficients were less than 0.40. Of the 6 correlation coefficients greater than 0.40, 5 were less than 0.80, signifying that multicollinearity was not a substantial problem for this set of variables. To control for drug use severity, the PESQ problem severity scale was entered as a covariate. Following a stepwise likelihood-ratio logistic regression procedure in the Statistical Program for the Social Sciences (SPSS, Chicago, Ill), only the coefficient for cocaine use before or during sex met the criterion for inclusion in the model. By itself, cocaine use before or during sex increased the likelihood of engaging in UAI by a factor of 1.28 (95% confidence interval, 1.09-1.50).

COMMENT

These findings provide unique information about temporal changes in substance use and their relationship to high-risk sexual behavior in a large sample of young men who have sex with men. From 1994 to 1997, there were significant increments in quarterly rates of amphetamine, cocaine, and marijuana use, accompanied by increasing mean severity of substance use as measured by the PESQ. These data are consistent with studies that have found a sharp resurgence in general adolescent drug use in recent years.²⁷ The observed trends could not be attributed to changes in the composition of the annual cohorts, since the methods of sample recruitment and pertinent demographic characteristics, with the exception of age, were stable throughout the period of study. Because age was not associated with drug use severity, it is unlikely that the decline in the mean age of respondents accounted for changes in drug use between 1994 and 1997.

This database is different from other surveillance programs that monitor only drug use prevalence,¹¹ in that it contains measures of risky sexual behavior and substance use severity that permit examination of their interrelationships. Significant univariate associations were found between the use of 10 different types of substances and UAI with recent partners. However, only cocaine use was independently associated with risky sexual behavior. The powerful connection between cocaine use, risky sex, and HIV transmission has been well described in prior studies of adults.^{1,2} The current study replicates this finding in a large, nonclinical sample of young men who have sex with men. Furthermore, the results indicate that cocaine use before or during sex is a more powerful predictor of UAI than other substances or overall drug use severity in this population. Hence, cocaine use before or during sex may serve as an important marker for risky sex among young men who have sex with men.

An obvious question arising from the finding that, out of the 10 substances found to be associated with UAI in univariate analyses, only cocaine use predicted UAI

in a multivariate analysis, is why the effect for cocaine use overwhelmed the effects of other drugs. While we do not have a definitive answer to this question, we offer a hypothesis that might be tested in future research. Cluster analyses of substance use in our sample (analyses not reported here) revealed 3 distinct clusters of substance users: those who primarily use alcohol, those who use mostly alcohol and marijuana, and those who use cocaine, alcohol, marijuana, and a variety of other substances. These findings suggest that cocaine use may be a marker for polydrug use and may be indicative of more severe substance abuse problems, which may be associated with risky sexual behavior. Future research might explore more deeply the connections between clusters of substance use, severity of substance use, and risky sexual behaviors.

In the study's sample, patterns of substance use among whites and people of color were similar, suggesting that the findings are generalizable to diverse subpopulations of young men who have sex with men. Monitoring trends of substance use in different localities and subpopulations is important to detect differences in drug availability, norms, and consequences. Special consideration should be given to the routine inclusion of sexual orientation items in population-based health surveys of adolescents and adults to provide locally representative data on drug use, risky sexual behavior, and other urgent health concerns of young men who have sex with men.

The current study indicates that amphetamine use increased in a sample of young gay and bisexual men between 1994 and 1997. In univariate analyses, a significant association was found between amphetamine use before or during sex and UAI. Although the effect of amphetamine use on risky sex was overshadowed by the effect of cocaine use, its growing use and negative consequences for health remain important concerns that warrant continued monitoring. Methamphetamine is a potent stimulant and drug of abuse.²⁸ Its acute adverse effects can include paranoid ideation and hallucinations,²⁹ cardiomyopathy, myocardial infarction, cardiogenic shock,³⁰ intracerebral hemorrhage,³¹ and death.²⁹ Methamphetamine users who receive emergency psychiatric services have been noted to have a unique propensity for violence, often with clear histories of aggression toward others.²⁸ Chronic MA use has been associated with unusual sensitivity to psychosocial stressors³² and a lasting vulnerability to paranoid delusional psychosis with hallucinations, similar to schizophrenia.³³

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