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Sexual Risk Behavior Associated with Co-administration of Methamphetamine and Other Drugs in a Sample of HIV-positive Men Who Have Sex with Men

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Abstract

This study examined the association between sexual risk behavior and co-administration of methamphetamine with other drugs in a sample of 341 HIV-positive MSM. Those who reported methamphetamine co-administration in the past two months (65%) reported significantly more unprotected anal and oral sex and a greater number of casual, anonymous, and paid sex partners in this timeframe compared to men who used methamphetamine alone. Two primary patterns of co-administration were identified: 1) drug combinations motivated by sexual performance and enhancement (e.g., methamphetamine, poppers, sildenafil) and 2) "party drug" combinations (e.g., methamphetamine, GHB, ketamine). Implications for further research and possible applications to risk-reduction interventions are discussed.

Keywords

Methamphetamine; polydrug use; sexual risk; men who have sex with men; HIV-positive

INTRODUCTION

Several studies have documented an association between polydrug use (i.e., regular use of more than one drug during a specified period) and HIV risk behaviors, including sharing injection equipment and engaging in risky sexual behavior.[1–3] For example, Patterson et al.[2] reported that HIV-positive MSM who used methamphetamine with drugs such as cocaine or heroin (heavy polydrug users) over a two-month period had more unprotected sex compared to men who used methamphetamine with marijuana or poppers (light polydrug users).

A subset of polydrug users are those who co-administer two or more drugs simultaneously in one dose or "hit," which can have distinctive health-related and psychological outcomes. Co-administration of drugs can involve the combination of two or more illicit drugs using the same instrument (e.g., "speedballs," which are heroin and cocaine injected together in the same syringe) or the combination of licit and illicit substances (e.g., "blunts," which are nicotine and cannabis combined in a cigarette). Co-administration can also involve the

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consecutive use of more than one drug in the same sitting (e.g., smoking a cannabis "joint" followed by injecting heroin).

To date, studies of polydrug use among MSM have not focused on co-administration or concurrent use of methamphetamine and other drugs. Existing studies typically report the type of drugs that have been used in addition to methamphetamine within a specific timeframe. For example, Halkitis et al.[4] reported that methamphetamine use was related to the use of ecstasy and GHB over a 12-month period. Fernandez et al.[5] reported that among Hispanic MSM in Miami, FL, lifetime and three-month rates of polydrug use were 36% and 20%, respectively. Not only is there a paucity of studies focusing on concurrent use of methamphetamine and other drugs, but studies are also lacking which explore reasons why individuals co-use drugs in a particular sequence or order.

The consequences of multiple drug ingestion are varied and depend upon the types of drug that are administered together, the route(s) of administration, and questions of dosage, purity, and types and amounts of adulterants. Co-administration can have various medical outcomes including overdose mortality, non-fatal overdose, hypothermia, coma, marked anxiety, and panic reactions.[6–8] Emergency department data show that drug overdoses often involve the ingestion of more than one drug simultaneously.[7, 9] In a study of ecstasy use, 71.1% of overdose patients had ingested ecstasy with other drugs.[7] Similarly, in a cohort of injection drug users, 64.9% had co-administered another drug at the time of overdosing.[6] Liechti et al. described how the clinical picture of intoxication changed in relation to specific drug combinations.[7] For example, ecstasy combined with cocaine resulted in more panic attacks, whereas ecstasy and GHB or ecstasy and opiates resulted in more comas.[7] Animal studies have also shown increased adverse outcomes as a result of co-administration. For example, in one study, co-administration of methamphetamine and morphine in mice increased lethal overdose by 70 percent.[10] In another study, the convulsive effects of cocaine in mice were significantly increased by the co-administration of methamphetamine.[11] In our review of the literature, we were unable to identify any human studies of the pharmacological and behavioral effects of co-administration of methamphetamine with other drugs.

Co-administration of drugs has also been associated with adverse social and psychological outcomes, including depression, anxiety, and poor treatment outcomes.[7, 12] In one study, individuals who co-used opiates and benzodiazepines were significantly more likely to have previous episodes of depression and self-harm compared to controls.[13] In another study, a high level of cocaine use among heroin-dependent polydrug users was associated with increased likelihood of dropout from treatment and relapse behavior.[12] Human studies have also documented an association between co-administration of drugs and memory impairment.[14, 15] Parrott et al. reported that chronic users of ecstasy and cannabis display cumulative neurobiological impairments.[15] Similarly, Croft et al. found that individuals who combined cannabis and ecstasy had worse performance on neuropsychological tests (e.g., memory, learning, word fluency) compared to controls.[16] In an animal study, Young, McGregor, and Mallet reported that co-administration of ecstasy (MDMA) with cannabis resulted in impaired working memory in mice.[17] Although both drugs independently impaired memory, ecstasy in combination with cannabis was found to have a synergistic effect on memory impairment.

Methamphetamine use is common among men who have sex with men (MSM)[18], and is associated with increased risk for HIV infection and other sexually transmitted infections (STI).[18–20] In 2005, MSM accounted for 71 percent of all HIV infections among male adults and adolescents in the United States.[18] The national prevalence of methamphetamine use among HIV-positive MSM is unknown. However, in a survey of 196 adult gay men in

San Diego County, 77 percent reported current or past use of methamphetamine. Current and former users of methamphetamine were 3.8 times more likely to be HIV-positive compared to those who never used this drug.[21]

Several studies of gay and bisexual men have identified enhancement of sexual pleasure as a primary motivation for methamphetamine use.[22–25] Other motivations include avoidance of unpleasant emotions, avoidance of physical discomfort, social pressures, and self-medication of negative affect.[22–25] There is also evidence that motivations for methamphetamine use are influenced by a variety of factors, including age, ethnicity, and HIV serostatus.[23, 25] Qualitative data suggest a link between sexual motivations for methamphetamine use and sexual risk behavior. In one study, methamphetamine use reportedly facilitated sexual experimentation in the form of high-risk activities, such as multiple successive partners, sexual marathons, group sex, and the exchange of body fluids.[25]

Recent studies suggest that it is not uncommon for methamphetamine to be co-administered with other licit or illicit drugs.[3, 8, 22–24, 26, 27] For example, researchers in Tijuana, Mexico reported that methamphetamine and heroin were commonly injected together in the same syringe ("speedball").[26] Other studies have reported co-use of methamphetamine with cocaine,[26] ecstasy,[3] ketamine,[23, 24] sildenafil (Viagra®),[22, 27] heroin,[24] and morphine.[8] Data on the motivations for combining methamphetamine with other drugs are limited. A possible reason why some methamphetamine users combine methamphetamine with an opiate can be derived from animal studies. Pereira et al. reported that co-administration of methamphetamine and morphine resulted in prolonged dopamine outflow in rats compared to methamphetamine alone. These researchers proposed that the potentiating effects on dopaminergic mechanisms could motivate methamphetamine users to use other drugs to enhance pleasure (i.e., rewarding effects).[28] In humans, it is also likely that co-use of methamphetamine and other drugs is motivated by social needs, pressures, and rewards. Indeed, studies of methamphetamine initiation suggest that the majority of gay and bisexual users initiate methamphetamine use for non-sexual, social reasons.[29]

Since the motivations and behavioral effects associated with co-administration of methamphetamine with other drugs have received little attention, we explored these issues in a sample of HIV-positive MSM. Four research questions were posed: 1) Which drugs are most often co-administered with methamphetamine?; 2) What are the reasons for co-administration of methamphetamine, and do the reasons vary by drug choice?; 3) What temporal patterns are associated with methamphetamine co-administration?; and 4) Is co-administration of methamphetamine associated with elevated levels of sexual risk behavior? We hypothesized that co-administration of methamphetamine and other drugs would be motivated by a desire for enhanced sexual pleasure, since methamphetamine alone is known to be used for that reason. We also hypothesized that high-risk sexual behaviors would be greater among those who co-administer methamphetamine and other drugs as compared to those who use methamphetamine alone, since polydrug use in general has been associated with riskier practices, including needle sharing, unprotected sex, multiple partners, and sex while under the influence of drugs.[1, 2, 5] If our hypotheses are supported, the findings would have implications for the design and implementation of interventions to reduce HIV/STI risks among *methamphetamine-using MSM.*

METHOD

Sample Selection—Analyses are based on data from 341 HIV-positive, methamphetamine-using MSM who were enrolled in the EDGE research project at the University of California, San Diego (UCSD). The EDGE project was designed to test the

efficacy of a sexual risk reduction intervention for HIV-positive, methamphetamine-using MSM. Primary results for the EDGE project have been published.[30] The intervention protocol involved eight individual counseling sessions, during which motivational interviewing and social cognitive strategies were used to promote positive sexual behavior change.[31, 32] The sample was restricted to men who were at least 18 years old, self-identified as MSM, and reported having unprotected anal or oral sex with at least one male partner during the previous two months. Participants were also required to have used methamphetamine at least twice in the past two months and once in the past 30 days. Data for the present analyses were collected between November, 1999 and August, 2004. Participants were paid $40 for their baseline assessment and first counseling session. The EDGE study protocol was reviewed and approved by the institutional review board at the University of California, San Diego (#990579 dated 6-3-99).

Recruitment—The EDGE project was advertised as a university-affiliated research program that offered HIV-positive, methamphetamine-using MSM the opportunity to learn more about condom use, negotiation of safer sex practices, and disclosure of HIV seropositivity. Recruitment efforts were focused in geographic areas and social venues known to have high concentrations of methamphetamine users and MSM. Participants were recruited through referrals from enrolled participants, friends, family members, and service providers (62.0%), a poster and media campaign (35.5%), and outreach workers (2.5%).

Procedures—All study participants completed a baseline interview, five weekly counseling sessions (90 minutes each), three booster sessions at monthly intervals (90 minutes each), and follow-up assessments at 4, 8, and 12 months post-baseline. Participants in the experimental condition received counseling focused on the contexts of methamphetamine use and unsafe sex, condom use, negotiation of safer sex, disclosure of HIV-positive serostatus to sex partners, and enhancement of social supports. Participants in the control condition received counseling focused on health promotion (e.g., diet, exercise) as related to HIV seropositivity. The baseline interview queried participants about their background characteristics, past and current patterns of methamphetamine use, use of alcohol and other substances, sexual risk behavior, partner types, attitudes, intentions, social norms, and social support. The present analyses used baseline interview data from 341 participants.

Measures

Background Characteristics—Age was coded as a continuous variable. Ethnicity, education, marital status, and living arrangement were coded as categorical variables. Income was represented by a dummy-coded variable (<= $19,999, > $19,999). Psychiatric diagnosis was determined by participant response to the following question: “Have you ever received a psychiatric diagnosis?” The Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) was used to determine the severity of participants’ use of substances.[33, 34] The SSAGA-II, Section G, was used to determine dependence and abuse in relation to participants’ current use of methamphetamine.

Amount of Methamphetamine Used—Participants were asked the following question: “During the past 30 days, how much methamphetamine did you use?” All units of measurement (e.g., lines, eightball) were converted to grams of methamphetamine used in the past 30 days.

Use of Other Drugs—Use of other licit and illicit drugs was measured with a 14-item scale developed by Temoshok and Nannis.[35] Participants were asked how often during the previous two months they had taken the following drugs: marijuana or hashish, powder

cocaine, crack cocaine, amyl or butylnitrates (poppers), ecstasy, hallucinogens, barbiturates, heroin, Special K, GHB, steroids, inhalants, sildenafil (Viagra®), and "other" with an instruction to specify the drug name. Response categories ranged from 0 (Never) to 3 (Very Often).

Reasons and Patterns of Co-administration—Participants were asked the following two questions regarding co-administration of methamphetamine: 1) "In the past 2 months, did you mix methamphetamine with a drug other than alcohol? For example, did you take methamphetamine and ecstasy at the same time? Or maybe methamphetamine and marijuana at the same time?"; and 2) "Why do you mix other drugs with methamphetamine?" Responses were recorded as open-ended. Participants were also asked to describe their pattern of drug use: "Please describe your method of mixing methamphetamine with other drugs. For example, do you mix drugs together at the same time or do you take one before or after the other?"

Sexual Risk Behavior—Sexual risk behavior was defined as unprotected anal, oral, or vaginal sex with an opposite- or same-sex partner. Four categories of partner type were assessed: steady (e.g., spouse, boyfriend); casual (e.g., one-night stand); and anonymous (e.g., someone in the park) and paid partners (e.g., male prostitute). Four summary variables were created to capture the total number of steady, casual, anonymous, and paid partners, respectively. For each category of partner type, participants were asked how many times during the past two months they engaged in receptive anal sex, insertive anal sex, receptive oral sex, insertive (giving) oral sex, and insertive vaginal sex. For each type of sex, participants were asked how many times a condom or dental dam had been used. Three summary variables were created to represent total number of unprotected anal, oral, and vaginal sex acts in the past 2 months, respectively. Total number of unprotected vaginal sex acts was not examined in this research due to the small number of MSM (N=17) who reported this behavior.

Statistical Analysis

The dichotomous outcome was defined as co-administration of methamphetamine with at least one other substance, either at the same moment (e.g. injecting methamphetamine and heroin together in the same syringe) or in the same sitting (e.g., smoking a cannabis "joint" followed by immediate use of methamphetamine), in no particular order. Participants who engaged in co-administration were coded one, and those who did not report this behavior were coded zero. T-tests were used to compare group means for all continuous variables, and contingency table analysis was used to examine group differences in categorical variables. To correct for skewness in variable distributions, log 10 transformations were performed for all sexual risk variables and the number of grams of methamphetamine used in the past 30 days.

RESULTS

Sample Description—By design, all 341 participants were males who self-identified as MSM. Their average age was 37.3 years (SD = 7.5). The majority were Caucasian (57.0%), while 21.9% were African American, 12.3% were Latino, and 8.9% were "Other." Eighty-two percent of the sample had never married, 78% had a high school diploma or some college, and 80% reported an annual income of less than $19,999. The majority of participants either lived alone or lived with other adults in a non-sexual relationship (30.1% and 32.4%, respectively). Ninety-two percent met SSAGA criteria for methamphetamine dependence, and 52% reported having a psychiatric diagnosis. There were no significant

sociodemographic differences between MSM who co-administered methamphetamine and those who did not.

Which drugs are most often co-administered with methamphetamine?—Sixty-five percent of the sample (N=222) reported co-administration of methamphetamine and a drug other than alcohol in the past two months. Drugs most frequently used with methamphetamine were (in rank order): marijuana (43.7%); gamma hydroxybutyric acid (GHB) (14.0%); amyl nitrates (poppers) (10.8%); powder cocaine (8.6%); and MDMA (ecstasy) (8.6%). Less frequently used drugs co-administered with methamphetamine included: ketamine (Special K) (3.2%); heroin (2.7%); sildenafil (Viagra®) (2.7%); tranquilizers (2.7%); crack cocaine (2.3%); mushrooms (0.5%); and methylenedioxyamphetamine (MDA) (0.5%).

Among those who co-administered methamphetamine with another drug in the previous two months, 50% (N=111) reported using methamphetamine with only one other drug, 23% (N=51) used methamphetamine with two other drugs, and 27% (N=60) used methamphetamine with three other drugs. For purposes of this study, if a participant named only one drug in combination with methamphetamine, we counted it as “co-administration” only if the the two drugs were used concurrently. If a participant reported using two or more other drugs with methamphetamine, we deemed him to have “co-administered” if he engaged in concurrent use of any one of the other drugs with methamphetamine during the past two months. In such a case, for example, the “co-administration” of methamphetamine, marijuana, and poppers could have involved co-use of methamphetamine and marijuana on one occasion and methamphetamine and poppers on another occasion; it could also have involved concurrent use of all three drugs. Among participants who combined methamphetamine with two other drugs in the previous two months, the most frequently reported combinations were: poppers and marijuana (56.9%); GHB and marijuana (37.3%); and Special K and GHB (27.5%). Among participants who combined methamphetamine with three other drugs in the previous two months, the most frequently reported combinations were: ecstasy, GHB, Special K (8.2%); GHB, Special K, and marijuana (8.2%); and poppers, Viagra®, marijuana (8.2%).

What are the reasons for co-administration of methamphetamine?—Primary reasons for co-administration varied by type of drug: marijuana, tranquilizers, and heroin (“to take the edge off/to come down/to balance out the methamphetamine”); poppers, sildenafil, and MDA (“to enhance sexual experience”); powder cocaine, crack cocaine, ecstasy, Special K, mushrooms (“to achieve a better high”); and GHB (“to experiment”). Table 1 reports all reasons for combining methamphetamine with each drug of co-use.

What temporal patterns are associated with methamphetamine co-administration?—The majority of participants (61.3%) reported that they used methamphetamine first and another drug second. The primary explanation for this pattern was that the second drug helped the user to “come down from or take the edge off” the methamphetamine. The second most frequently reported pattern of co-administration was simultaneous use of methamphetamine and a second drug (21.3%). This pattern primarily involved either smoking or injecting and was motivated by the desire “to achieve a better high.” A third pattern involved using methamphetamine after taking another drug (12.6%). In our sample, this pattern typically involved using sildenafil or poppers before having sex, followed by methamphetamine to enhance the sexual experience. The remainder of the sample (4.8%) reported no particular order to co-administration.

Univariate comparisons of HIV-positive MSM who co-administered methamphetamine and those who did not

Sexual Risk Behaviors—MSM who co-administered methamphetamine and another drug in the past two months were compared with their counterparts who used methamphetamine alone. As shown in Table 2, MSM who co-administered methamphetamine with at least one other drug reported significantly larger numbers of unprotected anal and oral sex acts. Further analyses revealed that the two groups did not differ in mean number of insertive or receptive anal sex acts or insertive (give) oral sex acts. However, MSM who co-administered methamphetamine reported significantly more receptive oral sex acts compared to their counterparts who did not co-administer methamphetamine (14.3 versus 9.3, $t = 3.2$, $p < 0.01$). In terms of partner types, men who co-administered methamphetamine reported a significantly larger number of casual, anonymous, and paid sexual partners in the past two months compared to MSM who did not co-administer drugs. Group differences in mean number of steady partners were not identified.

DISCUSSION

The present findings indicate that co-administration of methamphetamine is a multi-factorial behavior that involves drug preferences, differential motivations and triggers, and varying patterns of consumption. In this sample of HIV-positive MSM, methamphetamine was co-administered with a variety of drugs, spanning a range of pharmacological classifications from opiates (e.g., heroin) and depressants (e.g., ketamine) to stimulants (e.g., cocaine, ecstasy). Participants' reasons for combining methamphetamine with another drug varied according to their drug of co-use. Three broad motivational categories associated with co-administration of methamphetamine were identified: 1) pleasure-motivated/rewarding effects ("a better high"); 2) controlling undesirable after-effects of methamphetamine; and 3) enhancing sexual pleasure. In terms of drug treatment, this finding suggests that among individuals who co-administer methamphetamine, understanding the link between motivations and drug choices may be important in terms of developing risk reduction or abstinence-oriented goals. For example, users who are motivated by pleasure and reward effects might benefit most from self-regulation strategies (e.g., delaying actions),[36] whereas individuals who combine drugs to lessen the undesirable after-effects of methamphetamine might benefit from the decisional balance approach used in motivational interviewing, which promotes positive behavior change by helping the individual to see how negative aspects of drug use (e.g., after-effects) outweigh the positive ones.[32]

Pharmacological interactions between methamphetamine and the various drugs reported in this research have not been well documented. A key question is whether methamphetamine has a greater number of adverse consequences when combined with other drugs, and if so, what the additional consequences are. Future studies should address how combining methamphetamine with other drugs affects a broad range of outcomes, including physical, mental, cognitive, neuropsychological, and social functioning. Additional studies that investigate the relationship between co-administration of methamphetamine and HIV risk behaviors are also warranted. In particular, future studies should examine a more extensive range of sexual risk outcomes.

This research identified two primary patterns of drug combinations. The use of methamphetamine in combination with poppers, sildenafil, and MDA is consistent with motivations related to sexual performance and the enhancement of sexual pleasure. The second pattern involves combining methamphetamine with "party drugs" such as ketamine, GHB, and cocaine. Motivations for choosing these particular substances, particularly in the context of circuit parties, include the mood-elevating, energy-lifting, and sexually enhancing

effects of methamphetamine coupled with the socially disinhibiting and anxiety-reducing effects of a drug such as ecstasy.[3] Future studies should seek to identify additional patterns and probable motivations for co-administration.

We found that MSM who co-administered methamphetamine had significantly more casual, anonymous, and paid sex partners in the past two months. As suggested by Klee et al., individuals who mix drugs may be more likely to take risks with their health, including engaging in sexual risk behaviors and injection drug use.[1] Anonymous and paid sex, by definition, are among the riskiest forms of sexual behavior and may reflect a general disposition toward risky behavior or sensation-seeking.[37] It is also plausible that risky behaviors are a consequence of mixing methamphetamine with certain drugs, particularly drugs that potentiate the dopamine release evoked by methamphetamine, since some studies have suggested that methamphetamine and other stimulants increase sexual desire. [38] Future studies should gather longitudinal, prospective data to identify mechanisms that might underlie the relationship between co-administration of methamphetamine and high-risk sexual practices, such as casual, anonymous, and paid sex. In addition, future research should examine which specific drug combinations and motivations are associated with risky sex.

It is interesting that not a single participant mentioned his HIV seropositivity as an explanation for co-using methamphetamine and other drugs. This is an area that should be investigated in future studies since our previous work with the same population identified "coping psychologically with HIV illness" as a common motivation for methamphetamine use.[25] Studies comparing HIV-positive and HIV-negative co-users of methamphetamine could yield differences in motivations based on serostatus, with implications for the development of treatment programs. For example, understanding the association between HIV-seropositivity and co-administration of methamphetamine could inform counseling protocols that help HIV-positive individuals to develop more healthful strategies for coping with negative emotions and attitudes related to their serostatus.

This study has several limitations. Because participants were volunteers in an intervention with specific eligibility criteria, our sample may not be representative. Patterns of co-administration, drug preferences, and sexual risk behaviors may differ between participants and their non-participating counterparts. These data should therefore not be used to draw any general conclusions regarding the relationship between co-administration of methamphetamine and sexual risk behavior in the broader population of HIV-positive, methamphetamine-using MSM.

This study also used self-report measures of drug use and sexual risk behaviors. Because of the socially sensitive nature of these behaviors, we must consider the possibility that participants underreported their risk behaviors.[39] In particular, men who co-administer drugs might have underreported this behavior because of the stigma associated with the use of methamphetamine and other drugs of co-use such as heroin and cocaine.[40, 41]

Another limitation of this research is its cross-sectional design. Longitudinal data are needed to assess causation and bi-directionality of causation between co-administration of methamphetamine and sexual risk behavior. In addition, temporal ordering of factors—the relationship in time between two variables—cannot be addressed with cross-sectional data. Future studies should use prospective data and longitudinal analyses to establish whether co-administration of methamphetamine precedes sexual risk behavior or vice versa. The establishment of temporal sequence is important because drug use behaviors (if identifiable as a causal factor) are potentially modifiable, and effective treatments are widely available.

Improved measures of drug use behaviors should also be included in future research. For example, there are multiple challenges associated with defining "co-administration" of drugs, including the definition timeframe (simultaneous versus serial), the number of drugs used in combination, sequencing or ordering of drugs used, the mode of administration, and the pattern of use (e.g., chronic versus binge). Moreover, the measurement of sexual risk behavior could be strengthened by using measures that permit us to determine whether the sexual risk behavior actually occurred under the influence of the co-administered drugs. Future studies should also gather more detailed data on triggers and motivations associated with co-administration of methamphetamine, the social contexts in which it occurs (where and with whom), and the perceived psychological and physical benefits associated with this activity. Self-report measures might also be supplemented with evidence obtained from observers or case records.

We hope to resolve some of these limitations in future research. However, the present study contributes to our understanding of co-administration of methamphetamine and HIV risk behaviors in a sample of HIV-positive MSM. As methamphetamine use increases in the general population,[42, 43] the number of individuals who combine methamphetamine with another drug is also likely to increase. Additional research is needed to identify characteristics and behaviors of this population so that effective prevention and intervention programs can be developed to reduce the risk of HIV/STI infection associated with co-administration of methamphetamine.

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Table 1

Co-administration of methamphetamine and other drugs: Combinations and motivations

Drug co-administered with meth	N (%) reporting co-administration of drug	Main reasons for co-administering meth and other drug (% endorsing)
Marijuana	117 (52.7%)	• Take edge off/balance out meth (33.0%) • Better high (17.5%) • Drug was available (14.4%)
Poppers (amyl nitrates)	62 (27.9%)	• Other drug enhanced sexual experience (52.2%) • Better high (21.7%) • Partner persuaded participant (13.0%)
GHB	57 (25.7%)	• Better high (29.0%) • To experiment (19.4%) • Other drug enhanced sexual experience (9.7%) • Drug was available (9.7%)
Ecstasy (MDMA)	32 (14.4%)	• Better high (50.0%) • To experiment (12.6%) • Drug was available (6.3%)
Cocaine	29 (13.1%)	• Better high (42.1%) • Drug was available (21.1%) • To experiment (10.5%)
Sildenafil (Viagra®)	29 (13.1%)	• Other drug prevents erection problems (100.0%)
Special K (ketamine)	23 (10.4%)	• Better high (42.9%) • Drug available (28.6%) • To take edge off/balance out meth (14.3%)
Tranquilizers	13 (5.9%)	• To come down (50%) • Better high (20%) • To sleep (20%) • To take edge off/balance out meth (20%)
Crack cocaine	10 (4.5%)	• Better high (20%) • Drug available (20%) • To experiment (20%) • Extend the high (20%)
Heroin	9 (4.1%)	• Drug available (50%) • Better high (33.3%) • Take edge off/balance out meth (33.3%)
LSD	2 (0.9%)	• Drug was available (100%)

Drug co-administered with meth	N (%) reporting co-administration of drug	Main reasons for co-administering meth and other drug (% endorsing)
Mushrooms	2 (0.9%)	• Better high (100%)
Inhalants	2 (0.9%)	• Drug was available (100%)
Painkillers	2 (0.9%)	• To come down (100%)
MDA	1 (0.5%)	• Other drug enhanced sexual experience (100%)
Angel dust (PCP)	1 (0.5%)	• Partner persuaded participant (100%)

Table 2

Sexual and drug use behaviors[a] of MSM who did and did not co-administer methamphetamine with another drug in the past 2 months

Sexual and Drug Behaviors [Mean (SD)]	Co-use (N = 222)	No co-use (N = 119)	Test Statistic	p-value
Number of grams of methamphetamine used in the past 30 days	5.9 (12.3)	4.5 (10.1)	t = 1.4	p > .05
Number of steady sex partners	1.6 (2.8)	1.4 (2.9)	t = 1.4	p > .05
Number of casual sex partners	4.6 (8.5)	3.3 (7.0)	t = 2.1	p < .05
Number of anonymous sex partners	6.8 (13.4)	5.5 (18.2)	t = 3.0	p < .01
Number of paid sex partners	1.7 (5.4)	1.1 (6.8)	t = 1.9	p < .05
Number of unprotected anal sex acts	11.6 (18.5)	8.1 (13.9)	t = 1.6	p < .05
Number of unprotected oral sex acts	27.9 (35.6)	19.1 (26.4)	t = 2.9	p < .01

[a] All variables log 10 transformed.