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Poly-club-drug Use among Gay & Bisexual Men: A Longitudinal Analysis

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Abstract

Objective— We sought to delineate patterns of poly-club-drug use among gay and bisexual men. Data were drawn from a large-scale twelve-month longitudinal investigation of club drug use and sexual behavior among 450 racially, ethnically, and geographically diverse sample of gay and bisexual men in New York City.

Methods— Using community-based sampling, we recruited the sample from numerous venues and assessed the self-reported use of five drugs and their relation to one another: cocaine, ecstasy, GHB, ketamine, and methamphetamine. Multivariate Hierarchical Linear Modeling (HLM) was utilized to examine associations of usage over the 12-month data collection period.

Results— Use of the five club drugs was highly related as noted by both parametric and non-parametric analyses of the cross-sectional data. Patterns of use over time also indicated significant longitudinal associations. Specifically, the use of methamphetamine over time was related to both the use of ecstasy and GHB.

Conclusions— The analyses suggest that usage patterns of individual club drugs such as methamphetamine, ecstasy, and GHB among gay and bisexual men are highly related across time. These findings hold implications for the treatment approaches that are utilized to address substance abuse in this segment of the population, and suggest that practitioners focus on the totality of the substance abuse behaviors and not necessarily individual drugs which are administered.

Keywords

club drugs; gay and bisexual men; poly-drug use; longitudinal

1.0 Introduction

In the last decade the use of “club drugs” such MDMA (“ecstasy”), ketamine, powdered cocaine, *gamma*-hydroxybutyrate (GHB) and methamphetamine (“crystal meth”) has become increasingly popular within many gay and bisexual male social circles (Halkitis et al., 2001; Schilder et al., 2005). Use of these substances initially was linked to dance clubs (Ross et al., 2003), but use has been documented to be more widespread and evidenced in numerous other contexts including but not limited to bars, commercial and public sex environments, and

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private residences (Gowing et al., 2002;Halkitis et al., 2005;Parks and Kennedy, 2004;Romanelli et al., 2003). This more pervasive use of club drugs among gay and bisexual men is perhaps explained by the sexual sociality engendered by the use of these substances (Green and Halkitis, 2006).

The majority of club drug using gay and bisexual men are “poly-club-drug users” (Halkitis et al., 2005;Lee et al., 2003;Patterson et al., 2005) indicating that within this population, use is characterized by the direct combination of multiple substances simultaneously or “in tandem,” as has been noted by Gorman et al. (2004), or the use of multiple drugs within a more extensive period of time, not necessarily concomitantly. Numerous other studies have documented the phenomenon of poly-club-drug use (Barrett et al., 2005;Degenhardt et al., 2002;Degenhardt et al., 2003;Halkitis et al., 2005;Palamar and Halkitis, 2006;Uys and Niesink, 2005), which has been shown to transgress ethnic and racial lines (Fernandez et al., 2005;Operario et al., 2006), as well as age/developmental stage (Lampinen et al., 2006;Patterson et al., 2005).

Club drug combinations are considered “favorable” by users to achieve a particular type of “high” or to balance stimulant and depressive effects of particular substances (Degenhardt et al., 2003;Palamar and Halkitis, 2006). However, in terms of public health considerations, the behavior of poly-club-drug use increases the health risks confronted by gay and bisexual men since the use of multiple drugs may increase the risk of overdose through drug synergism, may decrease cognitive function and inhibition, and may exacerbate associated risk behaviors such as unprotected sex, which could lead to the transmission of HIV and other bacterial and viral pathogens (Fernandez et al., 2005;Halkitis and Parsons, 2002;Mattison et al., 2001;Operario et al., 2006;Palamar and Halkitis, 2006;Patterson et al., 2005).

The patterns of poly-club-drug use are complex and most of the previously noted studies have relied on cross-sectional data to document the associations of use. For example, Patterson et al. (2005) as well as Operario et al. (2006) document the cross-sectional relations between usage variables in the previous six months; Fernandez et al. (2005) utilized a similar cross-sectional measures for data relating to a three-month period of assessment, while others have utilized a four-month (Halkitis et al., 2005; Palamar and Halkitis, 2005) or year-long period of assessment (Lampinen et al., 2006) to document associations. To this end, it is difficult to ascertain the extent to which the relations between usages of the substances covary over time or whether the associations are spurious in nature. For example, while Lee et al. (2003) suggests that the use of ecstasy is associated with use of ketamine, methamphetamine, and cocaine, these non-parametric associations were established using a cross-sectional sample of 173 men.

Thus, the overriding purpose of our analyses was to consider patterns of club drug use over a year-long period of time using a panel cohort. Specifically, we assessed the usage of five club drugs over this period of assessment, and sought to determine the extent to which the patterns of use were longitudinally related. In this paper, we describe the patterns of usage for ecstasy, ketamine, powdered cocaine, GHB and methamphetamine, and consider the extent to which poly-club-drug use is evidenced in a sample of 450 gay and bisexual men.

2.0 Methods

2.1. Design & Procedure

Project BUMPS (Boys Using Multiple Party Substances) was a mixed methodology longitudinal investigation of 450 club drug using men in New York City. Four waves of data were collected over the course of a year, which consisted of quantitative and qualitative assessments (at baseline, 4, 8, and 12 months post baseline). Participants were compensated for time and travel at the end of each assessment: \$30, \$35, \$40, and \$50, respectively. The aims of the study were (1) to investigate the individual differences and changes in club drug

use among gay and bisexual men in New York City over the course of one year, (2) to determine the extent to which antecedent personal, contextual, and coping factors may explain differences in year-long club drug use trajectories, and (3) to determine how individual changes in club drug use over the course of a year, in combination with antecedent personal, contextual, and coping factors, might explain differences in sexual risk-taking patterns.

Participants were recruited throughout the five boroughs of New York City from February 2001 through October 2002 by trained staff. Recruitment methods consisted of active methodologies, which included the distribution of palm cards at gay venues including bars, dance clubs, bathhouses, and other mainstream gay venues such as coffee houses. In addition, passive recruitment was conducted through the posting of flyers in venues such as local community-based organizations as well as through bulletin boards maintained in retail locations frequented by gay and bisexual men. Recruitment materials contained a telephone number, which phone respondents called to be screened. To meet eligibility criteria, phone respondents (1) had to be at least 18 years of age, (2) self-identify as gay or bisexual, and (3) self-report at least six instances of club drug use within a year prior to phone screening, with a minimum of one instance of use in combination with sex in the three months prior to screening. Based on previous literature on club drug use in New York City, six instances of usage represented consistent patterns of use with this population (Halkitis and Parsons, 2002; Klitzman et al., 2000). For the purposes of this study, club drugs included powdered ecstasy, powdered cocaine, GHB, ketamine, and methamphetamine. While the term “club drug” tends to exclude cocaine, this investigation considered cocaine a club drug because of its high association with gay social venues in New York City (Halkitis and Parsons, 2002). Screened individuals who reported use of heroin or crack-cocaine on more than five occasions in the year prior to phone screening were excluded because these substances are less associated with “party” settings and more associated with social exclusion (Nabben and Korf, 1999). Those who met eligibility requirements were scheduled for baseline assessment, which included informed consent, the initial assessment, and confirmation of HIV status. Participants who reported positive HIV serostatus were asked to provide proof through documentation, and those who reported negative or unknown serostatus were tested for HIV antibodies through the OraSure® system (OraSure Technologies, Bethlehem, PA) and were scheduled to return two weeks later for antibody results. All participants who were tested were pre- and post-test counseled in accordance with the guidelines set by the New York State AIDS Institute and outlined by the New York State HIV Confidentiality Law. Results of identified seroconversions are described elsewhere (Halkitis et al., 2006; McElrath et al., 1994). During each assessment, qualitative and quantitative assessments were administered to each participant in a private room. Quantitative measures were delivered via Audio Computer Administered Self-Interview (ACASI). The ACASI program contains voice recordings, which read the survey questions through headphones, while participants can simultaneously read the questions on the screen. The Institutional Review Boards of authors’ institution approved the study protocol, and a federal certificate of confidentiality was obtained.

2.2. Measures

For the purposes of the presented analyses, we utilized quantitative data from each of the four time points.

Sociodemographic Characteristics—We assessed self-reported race/ethnicity, education level, age, annual income, sexual orientation, and confirmed HIV status.

Club Drug Use—Frequency of use of each of the five club drugs (ecstasy, ketamine, powdered cocaine, GHB, and methamphetamine) was assessed using a single ordinal scaled item “In the last four months, how often have you used [substance name]?” with anchors 0 =

“Never,” 1 = “Less than once a month,” 2 = “One to two times a month,” 3 = “One to two times a week,” and 4 = “More than twice a week”). Those who responded to option 1 through 4, were then asked, “On how many days have you used the substance in the previous four months?” The latter was ascertained in order to obtain count data and as a means for assessing the validity of our items. We utilized a four-month window as this period of recall as this period is recommended to obtain accurate self-reports about drug use (Samuels et al., 1992).

2.3. Participants

Our sample of 450 men was recruited over a 21-month-period. In total, 1393 men were screened for our study, of which 692 were eligible; 450 of these participated in the study.

The mean age of screened men was 32.5 (median = 32). Most (43.0%) of the screened males were White, with 21.8% African-American, and 20.4% Latino. Nearly three-quarters self-identified as gay, and approximately a third (31.4%) self-reported being HIV-seropositive. Overall, approximately 58% of males screened reported using powdered cocaine in the past year, 53% using ecstasy, 40% using methamphetamine, 38% using ketamine, and 19% using GHB. Over three-quarters of screened males reported using at least one club drug in the past 3 months, and 67% reported using a club drug before or during sex in the past three months, both of which were eligibility criteria. The largest proportion of men screened were identified through street outreach (31%), referral through a friend (14%), bar and club recruitment (13%). Over half of those screened (62%) were resided in Manhattan, 16% in Brooklyn, 8% in the Bronx, 8% in Queens, and 6% in other places including Staten Island.

The geographic distribution of screened and eligible men indicated that they were from all parts of New York City as shown in Fig. 1. The characteristics of the participants further demonstrate the ethnic and racial diversity of our study sample, with 48.9% ($n = 220$) identifying as men of color. In terms of HIV status, 63.1% ($n = 284$) were confirmed to be HIV-negative at baseline. Mean age of the participants was 32.80 ($SD = 7.93$) with a range of 18 to 67-years-old. Further descriptions of the sample are shown in Table 1. Of the 450 who completed the baseline assessment, we retained 358 at Month 4, 336 at Month 8, and 311 at Month 12. Planned analyses indicated no difference in the key demographic variables of the original sample and those retained at the 4th assessment point.

2.4. Analytic Plan

We utilized standard exploratory data analysis techniques to investigate distributional characteristics and temporal variation the drug use variables at each of the four time points, as well as the distributional characteristics of the key sociodemographic factors. Thereafter, given the nature of our club drug use data, as counts, we conducted bivariate assessments of these relations using non-parametric tests (Spearman rank order correlations and chi-square tests of independence) to determine levels of association between usage of each of the five club drugs; repeated measures analyses were utilized to further examine patterns of usage for each of the drugs over time. These initial analyses were undertaken to describe the sample and the associated drug using behaviors. For the core of our analyses, we utilized multivariate conditional hierarchical linear modeling using Poisson distributions (Bryk and Raudenbush, 1987) to determine the longitudinal associations of club drug use.

3.0 Results

3.1. Patterns of Club Drug Use: Bivariate Relations

Table 2 provides a summary of use of each of the five club drugs (ecstasy, ketamine, powdered cocaine, GHB, and methamphetamine) at each of the four assessment points in terms of percentage of the sample which indicated at least one instance of usage in the 4-month period

of assessment, as well as the mean and median days of use for those who indicated usage. As can be noted, the significant number of “zero-counts” suggest non-normal distributions of the drug usage variables. Despite the relatively large means and standard deviations, analyses of the median values suggest occasional usage of each of the substances by the majority of the participants in the sample, with a smaller subset of participants indicating more consistent or chronic use.

We first examined usage patterns in terms of bivariate non-parametric associations. Non-parametric analyses of associations of the baseline data examining usage of ecstasy, powdered cocaine, ketamine and GHB in relation to usage of methamphetamine indicated high levels of association. Specifically 53.3% of the sample reported use of both methamphetamine and ecstasy at the baseline assessment ($\chi^2(1) = 22.52, p < .001$). Similar patterns were noted for the use of methamphetamine and cocaine (49.1% usage of both drugs; $\chi^2(1) = 6.05, p = .01$); methamphetamine and ketamine (42.2% usage of both drugs; $\chi^2(1) = 32.17, p < .001$), and methamphetamine and GHB (25.6% usage of both drugs; $\chi^2(1) = 41.83, p < .001$). Spearman rank order correlations confirm these associations for all combinations other than methamphetamine and cocaine as follows: methamphetamine and ecstasy ($r = .21, p < .001$); methamphetamine and ketamine ($r = .32, p < .001$); methamphetamine and GHB ($r = .36, p < .001$). However, there was negative association between methamphetamine and cocaine use ($r = -.19, p < .001$).

3.2. Longitudinal Modeling

To further consider the relation of the club drug use variables over time, we developed a multivariate growth curve model using the principles of Hierarchical Linear Modeling (HLM). As such we sought to determine the relations between methamphetamine use over time (the criterion variable) from use of ecstasy, ketamine, cocaine, and GHB. The analyses were run using a Poisson distribution, assuming constant exposure. Each of the models and fit indices are shown in Table 3.

We ran three iterations of our model using elimination procedures to determine the most parsimonious model in explaining methamphetamine use over time. In the first model, we sought to explain methamphetamine use from use of ecstasy, ketamine, cocaine and GHB. Based on these results ketamine was removed from the model because it was not significant; Model 2 was used to explain methamphetamine use from ecstasy, cocaine, and GHB use over time. Finally, we eliminated cocaine from Model 3 and sought to explain methamphetamine use from ecstasy and GHB use over time.

The final parsimonious model for explaining methamphetamine use over time was achieved in Model 3. The model indicates that methamphetamine use over the course of the year is significantly related to both ecstasy and GHB use. Specifically, there is a positive relation between ecstasy and methamphetamine use over time ($\beta = .04, S.E. = .01$) as well as GHB and methamphetamine use over time ($\beta = .14, S.E. = .03$). These relations are also shown in Fig. 2 and 3. The final estimation of random effects variance components suggest that even in light of both the ecstasy and GHB use variables, there still remains an unexplained variance of methamphetamine use over time ($p < .001$).

4.0 Discussion

We undertook an analysis of a longitudinal data set of club drug use based on a sample of 450 gay and bisexual men in New York City. Our work examined patterns of use for five specific club drugs that are highly prevalent in this metropolitan area: cocaine, ecstasy, GHB, ketamine, and methamphetamine (Goldsamt et al., 2005; National Institute on Drug Abuse, 2004; Ompad et al., 2004). In recent years, this class of drugs has garnered increased attention in the media

and in academic research (Gowing et al., 2002; Green and Halkitis, 2006; Halkitis et al., 2001; Halkitis et al., 2005; Lee et al., 2003; Parks and Kennedy, 2004; Patterson et al., 2005; Romanelli et al., 2003; Ross et al., 2003; Schilder et al., 2005), especially with regard to the use of methamphetamine and its role in exacerbating the HIV epidemic in this segment of the population (Mansergh et al., 2006; McElrath et al., 1994). Moreover, the behavior of poly-drug use has been linked to numerous other health struggles faced by gay and bisexual men including depression and partner violence (Stall et al., 2003). Finally, the pharmaceutical interactions of mixing club drugs do place a burden on the physiological system of these men (Degenhardt et al., 2002; Miotto et al., 2001; Palamar and Halkitis, 2006) which can lead to harmful and deadly outcomes (Landry, 2002; Miotto et al., 2001; Nutt, 2006).

Our findings suggest that the men in our study were using multiple substances over the 12-month period of assessment. Analyses of our baseline data indicate the high levels of association between the use of cocaine, ecstasy, GHB, ketamine, and methamphetamine. These cross-sectional analyses confirm similar cross-sectional relations established by others (Fernandez et al., 2005; Lampinen et al., 2006; Operario et al., 2006; Patterson et al., 2005), although this previous work, as well as our own analyses as presented here and elsewhere (Halkitis et al., 2005; Halkitis and Palamar, 2006; Halkitis et al., in press), fail to capture the nuances related to this poly-club-drug-using behavior (i.e., simultaneous use), that might be better captured using calendar-based techniques such as the Timeline Follow-back Method (Irwin et al., 2006) to determine the actual drug use combinations, and timing of drug administration.

However, our work does build and expand upon these cross-sectional associations through the analysis of our longitudinal data set. Modeling using HLM provides a greater level of confidence in the proposed associations by examining relations over time (Bryk and Raudenbush, 1987), and thus reducing the threat to validity inherent in simple cross-sectional associations. Our longitudinal analyses also support the idea that gay and bisexual men are using more than one club drug at a time, with our fully loaded model indicating significance in the relation between methamphetamine use over time with use of ecstasy, GHB, and cocaine over time, and our most parsimonious model indicating a strong association in the use of methamphetamine over time with the use of both ecstasy and GHB over time. Other studies have noted similar associations between the use of methamphetamine and ecstasy/GHB (Degenhardt et al., 2002; Lee et al., 2003), and reports have described the popularity and favorability of ecstasy/GHB combinations (Uys and Niesink, 2005). The effects of GHB in combination with other depressants or tranquilizers (i.e., alcohol, ketamine) has been described as “unfavorable” by users, making users more likely to combine it with stimulants such as ecstasy and/or methamphetamine (Halkitis and Palamar, 2006; Palamar and Halkitis, 2006). Also, reports suggest that users sometimes attempt to reverse GHB overdose with stimulants such as methamphetamine, thus making this an adequate combination to balance the stimulant and depressant effects of each drug (Kohrs et al., 2004; Palamar and Halkitis, 2006).

Despite the fact that our data are still limited with regard to the actual timing and administration of the substances in relation to each, the fact that the associations are significant over a year-long period of assessment provides a higher level of confidence in the fact that poly-club-drug-use is an actual and consistent behavior in this sample of gay and bisexual men. Moreover, the diversity of our sample in terms of age, racial/ethnic identification, and geographic distribution suggests that this behavior is not confined to one specific segment of this population.

4.1. Limitations

Perhaps the greatest limitation in our study is our inability to fully explain the downward trend of substance use which is demonstrated in our data both in terms of the proportion of the men

reporting use of the five substances and less so in the number of days of use of each substance across the 12-months. Previously we have examined these patterns with regard to the methamphetamine users in the study and can confidently say that the trend is not due to attrition (Halkitis et al., in press) as there were no substantive differences in the person or drug use characteristics of the men in the study at baseline as compared to the ones whom we retained at Month 12. While age at onset of use may be a factor in explaining this pattern, this too is an unlikely and insufficient variable. In fact, it is likely, as we have shown elsewhere that at least for methamphetamine use, onset of use of this substance was initiated in the recent past for most users (Halkitis and Parsons, 2002). Also lack of availability of the drugs was unlikely given that there were no substantive changes in structural/environmental factors in NYC during the period of assessment that could have affected this change in access. What is more likely is that our investigation had “intervention-like” qualities. Anecdotal data has demonstrated a resistance to formal treatment for most men who are occasional users of club drugs. However, our study which was not advertised as an intervention study, likely captured the attention of those unwilling to attend a treatment but who may have been contemplating their own drug use. The effect of the study on usage is more fully noted in the qualitative data we gathered at each time point.

As is the case with many studies, our data depended on self-report mechanisms and as a result were subject to issues of recall and social desirability. However our use of the ACASI system as well as limiting our periods of recall to 4 months are elements that help to strengthen this potential weakness. ACASI has been found to be an effective interview method for people of diverse educational backgrounds, and studies have shown that ACASI increases the proportion of individuals admitting illicit drug use (Tourangeau and Smith, 1996; Turner et al., 1998). As is recommended with any behavioral self-report measure of sensitive information (McElrath et al., 1994; Samuels et al., 1992) we limited our measurement to a period of 4 months prior to the assessment. Additionally, our “global” assessments of the use of each of the five club drugs could not delineate the exact combinations that were used, nor whether these substances were administered simultaneously. We recognize the limitation of this analysis and many of the previously published studies on poly-drug use, yet feel confident that the longitudinal analyses we have undertaken build upon the knowledge generated in the previously published work which is based on cross-sectional surveys. Nonetheless, we recommend that future investigation implement more micro-level assessment to consider actual combinations of drugs used.

4.2. Implications & Conclusions

These analyses and previous work in this domain indicate that poly-club-drug use among gay and bisexual men is common. These poly-drug use patterns hold implications for this population as well for society at large as these results are reflected in studies in other segments of the population such as emergent adults with regard to club drugs (Simons et al., 2005) as well as adolescents with regard to more “traditional” substances such as alcohol, marijuana, and nicotine (National Center on Addiction and Substance Abuse at Columbia University, 2005). Nonetheless, the specific cultural realities of gay culture suggest that our results may reflect nuances that are present in this culture, and thus studies such as ours should be undertaken to more clearly determine if the patterns we present here are relevant to other societal groups. Within such future studies, designs to capture these data must reflect the sociological states of each group.

Our findings also suggest an approach to treatment that looks beyond the specific substance that is being abused. These poly-club-drug-use patterns suggest that first and foremost, at the knowledge level, individuals must be informed about the potentially harmful synergies engendered by combining multiple substances. Simultaneously, intervention approaches

should consider the drug use behavior as a whole rather than addressing specific substances that are being abused. In this regard, treatment programs should consider the totality of substance abuse within individuals rather than targeting their most frequently used substance, as it is likely that such individuals are administering a variety of substances whether concomitantly or within specified periods of their lives. Consideration should thus be given to the factors, which may predispose the individual to the use of substances.

Finally, as has been stated earlier, methodological approaches should seek to ascertain data regarding substances that are combined concomitantly. While our data indicates that relations exist over a period of time, and this builds on previously cross-sectional studies, our future work should consider patterns of substance use that occur within the context of a day and in relation to each other, and moreover to disentangle the psychological, social, and pharmacological factors which may drive individuals to these combinations.

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References

- Barrett SP, Gross SR, Garand I, Pihl RO. Patterns of simultaneous polysubstance use in Canadian rave attendees. *Subst Use Misuse* 2005;40:1525–1537. [PubMed: 16048831]
- Bryk SW, Raudenbush AS. Examining correlates of diversity. *J Educ Stat* 1987;12:241–269.
- Cole JC, Sumnall HR, Smith GW, Rostami-Hodjegan A. Preliminary evidence of the cardiovascular effects of polysubstance misuse in nightclubs. *J Psychopharmacol* 2005;19:67–70. [PubMed: 15671131]
- Degenhardt L, Darke S, Dillon P. GHB use among Australians: characteristics use patterns and associated harm. *Drug Alcohol Depend* 2002;67:89–94. [PubMed: 12062782]
- Degenhardt L, Topp L. ‘Crystal meth’ use among polydrug users in Sydney’s dance party subculture: characteristics use patterns and associated harms. *Int J Drug Policy* 2003;14:17–24.
- Fernandez MI, Bowen GS, Varga LM, Collazo JB, Hernandez N, Perrino T, Rehbein A. High rates of club drug use and risky sexual practices among Hispanic men who have sex with men in Miami, Florida. *Subst Use Misuse* 2005;40:1347–1362. [PubMed: 16048821]
- Goldsamt LA, O’Brien J, Clatts MC, McGuire LS. The relationship between club drug use and other drug use: a survey of New York City middle school students. *Subst Use Misuse* 2005;40:1539–1555. [PubMed: 16048832]
- Gorman EM, Nelson KR, Applegate T, Scrol A. Club drug and poly- substance abuse and HIV among gay/bisexual men: lessons gleaned from a community study. *J Gay Lesbian Social Services* 2004;16:1–17.
- Gowing LR, Henry-Edwards SM, Irvine RJ, Ali RL. The health effects of ecstasy: a literature review. *Drug Alcohol Rev* 2002;21:53–63. [PubMed: 12189005]
- Green IA, Halkitis PN. Crystal methamphetamine and sexual sociality in an urban gay subculture: an elective affinity. *Cult Health Sex* 2006;8:317–333. [PubMed: 16846941]
- Halkitis PN, Green K, Carragher D. Methamphetamine use, sexual behavior and HIV seroconversion. *J Gay Lesbian Psychother* 2006;10:95–109.
- 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):i18–i25. [PubMed: 15738324]
- Halkitis PN, Palamar JJ. GHB use among gay and bisexual men. *Addict Behav* 2006;31:2135–2139. [PubMed: 16472932]
- Halkitis PN, Pandey Mukherjee P, Palamar JJ. Multilevel modeling to explain methamphetamine use among gay & bisexual men. *Addiction*. in press

- Halkitis PN, Parsons JT. Recreational drug use and HIV-risk sexual behavior among men frequenting gay social venues. *J Gay Lesbian Social Services* 2002;14:19–38.
- Halkitis PN, Parsons JT, Stirratt MJ. A double epidemic: crystal methamphetamine drug use in relation to HIV transmission among gay men. *J Homosex* 2001;41:17–35. [PubMed: 11482426]
- Irwin TW, Morgenstern J, Parsons JT, Wainberg M, Labouvie E. Alcohol and sexual HIV risk behavior among problem drinking men who have sex with men: an event level analysis of timeline followback data. *AIDS Behav* 2006;10:299–307. [PubMed: 16482407]
- Klitzman RL, Pope HG, Hudson JI. MDMA (“Ecstasy”) abuse and high-risk sexual behaviors among 169 gay and bisexual men. *Am J Psychiatry* 2000;157:1162–1164. [PubMed: 10873928]
- Kohrs FP, Mann C, Greenberg R. The use of amphetamine in gamma-hydroxybutyrate overdose: A case report. *J Psychoactive Drugs* 2004;26:401–402. [PubMed: 15559687]
- Lampinen TM, McGhee D, Martin I. Increased risk of “club” drug use among gay and bisexual high school students in British Columbia. *J Adolesc Health* 2006;38:458–461. [PubMed: 16549313]
- Landry MJ. MDMA: A review of epidemiologic data. *J Psychoactive Drugs* 2002;34:163–169. [PubMed: 12691206]
- Lee SJ, Galanter M, Dermatis H, McDowell D. Circuit parties and patterns of drug use in a subset of gay men. *J Addict Dis* 2003;22:47–60. [PubMed: 14723477]
- Mansergh G, Shouse RL, Marks G, Guzman R, Rader M, Buchbinder S, Colfax GN. 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. *Sexually Transm Infect* 2006;82:131–134.
- Mattison AM, Ross MW, Wolfson T, Franklin D. Circuit party attendance, club drug use, and unsafe sex in gay men. *J Substance Abuse* 2001;13:119–126.
- McElrath K, Chitwood DD, Griffin DK, Comerford M. The consistency of self-reported HIV risk behavior among injection drug users. *Am J Public Health* 1994;84:1965–1970. [PubMed: 7998638]
- Miotto K, Darakjian J, Basch J, Murray S, Zogg J, Rawson R. Gamma-hydroxybutyric acid: Patterns of use, effects and withdrawal. *Am J Addict* 2001;10:232–241. [PubMed: 11579621]
- Nabben T, Korf DJ. Cocaine and crack in Amsterdam: diverging subcultures. *J Drug Issues* 1999;29:627–652.
- National Center on Addiction and Substance Abuse at Columbia University. National Survey of American Attitudes on Substance Abuse X: Teens and Parents. 2005 [accessed on November 25, 2006]. http://www.casacolumbia.org/pdshopprov/files/august_2004_casa_teen_survey.pdf
- National Institute on Drug Abuse. NIDA Community Drug Alert Bulletin - Club Drugs. May2004 [accessed on November 25, 2006]. <http://www.nida.nih.gov/ClubAlert/ClubDrugAlert.html>
- Nutt D. A tale of two Es. *J Psychopharmacol* 2006;20:315–317. [PubMed: 16574702]
- Ompad DC, Galena S, Fuller CM, Phelan D, Vlahov D. Club drug use among minority substance users in New York City. *J Psychoactive Drugs* 2004;36:397–399. [PubMed: 15559686]
- Operario D, Choi KH, Chu PL, McFarland W, Secura GM, Behel S, MacKellar D, Valleroy L. Prevalence and correlates of substance use among young Asian Pacific Islander men who have sex with men. *Prev Sci* 2006;7:19–29. [PubMed: 16435077]
- Palamar JJ, Halkitis PN. A qualitative analysis of GHB use among gay men in NYC: reasons for use despite potential adverse outcomes. *Int J Drug Policy* 2006;17:23–28.
- Parks KA, Kennedy CL. Club drugs: reasons for and consequences of use. *J Psychoactive Drugs* 2004;36:295–302. [PubMed: 15559677]
- Patterson TL, Semple SJ, Zians JK, Strathdee SA. Methamphetamine-using HIV-positive men who have sex with men: correlates of polydrug use. *J Urban Health* 2005;82(Suppl 1):i120–i126. [PubMed: 15738313]
- Romanelli F, Smith KM, Pomeroy C. Use of club drugs by HIV-seropositive and HIV-seronegative gay and bisexual men. *Top HIV Med* 2003;11:25–32. [PubMed: 12717048]
- Ross MW, Mattison AM, Franklin DR. Club drugs and sex on drugs are associated with different motivations for gay circuit party attendees in men. *Subst Use Misuse* 2003;38:1173–1183. [PubMed: 12901454]
- Samuels JF, Vlahov D, Anthony JC, Chaisson RE. Measurement of HIV risk behaviors among intravenous drug users. *Br J Addict* 1992;87:417–428. [PubMed: 1559040]

- Schilder AJ, Lampinen TM, Miller ML, Hogg RS. Crystal methamphetamine and ecstasy differ in relation to unsafe sex among young gay people. *Can J Public Health* 2005;96:340–343. [PubMed: 16238150]
- Simons JS, Gaher RM, Correia CJ, Bush JA. Club drug use among college students. *Addict Behav* 2005;30:1619–1624. [PubMed: 16122624]
- Stall R, Mills TC, Williamson J, Hart T, Greenwood G, Paul J, Pollack L, Binson D, Osmond D, Catania JA. Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. *Am J Public Health* 2003;93:939–942. [PubMed: 12773359]
- Tourangeau R, Smith TW. Asking sensitive questions: The impact of data collection mode, question format, and question context. *Public Opin Q* 1996;60:275–304.
- Turner CF, Ku L, Rogers SM, Lindberg LD, Pleck JH. Adolescent sexual behavior, drug use, and violence: Increased reporting with computer survey technology. *Science* 1998;280:867–873. [PubMed: 9572724]
- Uys JDK, Niesink RJM. Pharmacological aspects of the combined use of 3, 4-methylenedioxymethamphetamine (MDMA, ecstasy) and gamma-hydroxybutric acid (GHB): a review of the literature. *Drug Alcohol Rev* 2005;24:359–368. [PubMed: 16234132]

Fig 1.
The geographic distribution of eligible men recruited for Project BUMPS

Fig 2.
Days of methamphetamine use in relation to days of ecstasy use

Fig 3.
Days of methamphetamine use in relation to days of GHB use

Table 1
Participant characteristics at baseline assessment (N = 450)

	%	n
Race/Ethnicity		
African American/Black	14.7%	66
Asian/Pacific Islander	5.3%	24
Hispanic/Latino	19.8%	89
Mixed Race	9.1%	41
White	51.1%	230
Confirmed HIV Status		
HIV-positive	36.9%	166
HIV-negative	63.1%	284
Sexual Orientation		
Gay/Queer/Homosexual	88%	396
Bisexual	12%	54
Educational Attainment		
High School or Less	14.2%	64
Some College or Associate's	34.4%	155
Bachelor's Degree	36.7%	165
Graduate Degree	14.7%	66
Employment Status		
Full-Time Work	37.8%	170
Part-Time Work	23.1%	104
Disability	11.3%	51
Unemployed	27.6%	124
Missing	< 1%	1

Table 2

Usage of club drug at baseline, 4 months, 8 months, and 12 months

	Baseline (N = 450)	M4 (N = 358)	M8 (N = 336)	M12 (N = 311)
Ecstasy				
% Usage	74.7%	48.4%	35.1%	28.7%
Mean Days Use	9.57	6.89	7.35	7.91
SD	12.99	11.91	14.24	16.35
Median Days Use	5.00	4.00	3.00	3.00
Ketamine				
% Usage	55.1%	30.7%	22.0%	19.3%
Mean Days Use	10.15	7.63	9.18	7.77
SD	14.40	11.28	14.09	14.34
Median Days Use	5.00	4.00	4.00	3.00
Cocaine				
% Usage	78.9%	51.6%	44.9%	37.3%
Mean Days Use	17.73	15.36	17.56	15.29
SD	22.57	21.67	23.54	20.64
Median Days Use	8.00	6.00	8.00	7.50
GHB				
% Usage	29.1%	13.6%	10.0%	8.9%
Mean Days Use	6.19	5.93	4.91	4.98
SD	12.44	9.03	7.36	8.17
Median Days Use	2.00	2.00	2.00	3.00
Methamphetamine				
% Usage	65.1%	42.4%	37.1%	31.6%
Mean Days Use	11.76	11.30	10.45	11.72
SD	19.24	18.37	17.41	17.26
Median Days Use	5.00	5.00	5.00	5.50

Table 3
Longitudinal models to explain methamphetamine use from ecstasy, GHB, ketamine and cocaine use over time (N = 450)

Effect	Linear Model 1		Linear Model 2		Linear Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
<i>Fixed effects</i>						
Intercept	0.204 [*]	0.103	0.309 ^{**}	0.103	0.328 ^{***}	0.100
Ecstasy	0.028 [*]	0.013	0.033 ^{***}	0.009	0.037 ^{**}	0.011
GHB	0.127 ^{***}	0.027	0.146 ^{***}	0.032	0.139 ^{***}	0.034
Cocaine	0.010 ^{***}	0.001	<-0.001	0.010		
Ketamine	0.006	0.015				
<i>Random effects</i>						
Intercept	Variance Components 3.500 ^{***}		Variance Components 3.357 ^{***}		Variance Components 3.432 ^{***}	
Ecstasy	0.023 ^{***}		0.008 ^{***}		0.016 ^{***}	
GHB	0.054 ^{***}		0.079 ^{***}		0.104 ^{***}	
Cocaine	±		0.003			
Ketamine	0.263 ^{***}					

* p<.05;
** p<.01;
*** p<.001

± held constant for the purposes of convergence