

ECSTASY USE AND ITS ASSOCIATION WITH SEXUAL BEHAVIORS AMONG DRUG USERS IN NEW YORK CITY

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ABSTRACT: In the past two decades, recreational use of ecstasy has become a growing concern in the United States, although most studies assessing ecstasy use have focused on white, middle-class adolescents who use ecstasy during raves and in clubs. We assessed the prevalence of recent ecstasy use among predominantly minority heroin, cocaine, and crack users in New York City and the association between ecstasy and sexual risk above and beyond that of the other drugs. Between 2002 and 2004, injection and non-injection heroin, crack and cocaine users ($N = 534$) completed a risk behavior questionnaire that included items on ecstasy use. Logistic regression was used to investigate the relation between current ecstasy use and sexual behaviors. Of 534 illicit drug users, 69.7% were aged 25 years or older, 65.2% were Hispanic, 27.9% Black and 77.4% male; 36.7% were injectors. 17.2% of respondents reported recent (last six months) ecstasy use. In a multivariable logistic regression model, current ecstasy use was associated both with initiating sex before age 14 (adjusted odds ratio (AOR) = 1.51) and having two or more partners in the past two months (AOR = 1.86) after adjusting for age at study entry, current cocaine and marijuana use and being an injection drug user. This study suggests that ecstasy use may be more prevalent among urban drug users. Ecstasy use in urban settings, beyond clubs and raves, should continue to be monitored.

KEY WORDS: ecstasy; injection drug use; noninjection drug use; sexual behavior.

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INTRODUCTION

In the past two decades, recreational use of 3,4-methylenedioxy-amphetamine (MDMA or "ecstasy") has become a growing concern in the United States. A derivative of amphetamines, ecstasy users report a sense of euphoria and increased wakefulness, energy, excitement, and sexual pleasure.^{1,2} In 2000, the Monitoring the Future (MTF) study found that 11% of 12th graders had used the drug at some point in their lives.³ Between 1997 and 1998, the prevalence of past-year ecstasy use among college students rose from 2.8% to 4.7% in a national sample of college students.⁴ A separate study of undergraduates in New England documented rates of lifetime ecstasy use increase from 4.1% in 1989 to 10.1% in 1998.⁵ Although emergency department mentions of MDMA declined from 5542 in 2001 to 4026 in 2002,⁶ it is still too early to tell if this decline represents a trend.

Currently available data suggests that ecstasy use in the United States is relatively common^{7,8} and national surveillance data have suggested that ecstasy use is declining among adolescents.⁹ However, these observations have been made from studies conducted among predominantly white populations, including national surveillance studies (e.g., MTF, National Household Survey on Drug Abuse), rave or circuit party attendees¹⁰⁻¹² and men who have sex with men.¹⁰⁻¹³ Previously reported to be used by rave (all night dance party) and night club attendees as a "club drug," ethnographic reports from the Community Epidemiology Working Group (CEWG)¹⁴ and a random digit dial phone survey of the general population in Chicago¹⁵ suggest that ecstasy has moved beyond the clubs and into other social venues. Though ecstasy has been linked to isolated cases of heat stroke, hyponatremia, kidney failure, rhabdomyolysis,¹⁶ hepatotoxicity¹⁷ and cardiovascular toxicity,^{18,19} a key public health concern about ecstasy use is the resulting impaired judgment of its users that may lead to behaviors that put individuals at risk for HIV and other sexually transmitted diseases.

In a study of college students, Boyd et al.²⁰ found that, compared to participants who reported no sexual partners, those with five or more partners were 4.6 times more likely to have used ecstasy in the past month, 5.4 times more likely to have used in the past year, and 9.3 times more likely to have ever used. However, the models did not control for other drugs used, an important limitation given that those reporting use of ecstasy users often do so with other drugs.²¹

The relationship between ecstasy use and sexual risk has been documented among men who have sex with men (MSM) and circuit party attendees.²² In a study of MSM nightclub attendees, ecstasy was associated with more incidents of unprotected anal sex, even after controlling for

ethnicity, age, and other forms of drug use.¹³ A later study by the same author found that young ecstasy users were also more likely to frequent bars, clubs, and bathhouses, to have more male partners, and to have more one night stands with men.²³ In young MSMs, ecstasy use was associated with unprotected anal intercourse²⁴, and Mattison et al.¹⁰ found frequent, but not lifetime use, of ecstasy to be associated with unprotected anal sex.

Currently, data are sparse about sexual risk and ecstasy use among the urban poor, a group that have been disproportionately affected by HIV and sexually transmitted diseases.²⁵⁻²⁷ In a telephone survey of 627 randomly selected Chicago residents, those of lower socioeconomic background and minorities were less likely to use "club drugs" (defined by the National Institute on Drug Abuse as MDMA, GHB, ketamine, rohypnol, methamphetamine, LSD), but this was not disaggregated by drug.¹⁵ However, cities such as Atlanta, Baltimore, Dallas, and New York have reported an increases in availability of ecstasy in their minority communities.^{14,28} To date, quantitative data on ecstasy use in inner-city, predominantly minority communities are limited. To examine this issue, we assumed that sampling a subset that are known to use other illicit non-injection drugs would provide an efficient means to detect the presence of club drug use and possible associations. While detection in this subset cannot be generalized to the entire minority inner city community (especially if ecstasy and these other drugs do not overlap), this approach can provide a window into a population segment that otherwise might be at higher risk for sexual risk. Therefore the purpose of this study was to determine the prevalence of recent ecstasy use among heroin, cocaine and crack users in New York City and assess the association of ecstasy and sexual risk above and beyond that of the other drugs.

METHODS

Between October 2002 and February 2004, we interviewed substance users from two ongoing studies of NIDUs and IDUs^{29,30} using street outreach techniques. Areas of high drug traffic were identified in target communities. Working in pairs, outreach workers concentrated their time in these key locations at different times of the day and created rapport with potential study participants and the community at large. Outreach workers engaged drug users in conversations about ongoing research at the research storefronts and mobile van in the communities where drugs were bought and/or used. At each location, outreach workers explained the purpose of the study to potential participants. Individuals interested in

participating in a study were then given an appointment at a data collection site, either at one of two stationary storefronts in Central Harlem (Manhattan) and the South Bronx or at a mobile van that parked in Brooklyn, the Lower East Side of Manhattan and Queens, all in New York City.

Potential participants were screened to see if they were eligible for one of two studies. The Hepatitis C Study was a study of IDUs designed to examine correlates and predictors of hepatitis C infection and therefore targeted young, recently initiated IDUs at risk for HCV infection. Participants were eligible for the injector part of the study if they were age 15 to 40 years and reported injecting drug use of heroin or cocaine at least once in the last two months but for no longer than 5 years. The Harlem Outreach, Prevention and Education (HOPE) Study was a study of NIDUs aimed at investigating correlates and predictors of transition to injection drug use, and therefore recruited young NIDUs. Participants were eligible for the non-injector part of the study if they were age 15 to 40 years and reported non-injecting drug use of heroin or cocaine at least once per week in the last two months but for no longer than 10 years, and no history of injecting drug use. Participants were reimbursed \$20 for their participation. The study was approved by the institutional review board of the New York Academy of Medicine.

Data Collection

Trained interviewers administered to eligible and consenting individuals a standardized, detailed risk behavior questionnaire that included items for sociodemographic characteristics, type and frequency of drug use, sexual behaviors and sexual partnerships. Questionnaires were administered in both English and Spanish.

Sociodemographic characteristics considered included age, race, gender, education, recent homelessness, and main income source (e.g., employed, illegal, or public assistance). Drug use variables were ascertained and injection was confirmed using inspection for track marks during venipuncture. Recent ecstasy use was defined as any use in the last six months. Sexual partnerships were defined either by the sex partner's behavior (i.e. crack, use, injection drug use, etc.) or by their infection status (i.e. HIV or HCV positive, etc.).

Statistical Methods

We compared current (within the last six months) ecstasy users to non-current users in terms of sociodemographic characteristics, drug use

(including types, frequency and route of administration), sexual behaviors, and sexual partnerships. Polysubstance use was defined as the mean number of drugs used out of a list of 13, which included heroin, crack, cocaine, marijuana, LSD, PCP, ecstasy, methamphetamine, amphetamine, ketamine, tranquilizers, inhalants, and GHB. Bivariate analyses were conducted to examine demographic and risk behavior variables by current ecstasy use using χ^2 statistics for categorical variables and *t* tests for continuous variables. Variables that were significantly associated with ecstasy use ($p < 0.10$) in the bivariate analysis were entered into a final multivariable logistic model and only those that were significant at $p < 0.05$ were retained in the model. We used generalized estimating equations (GEE) to control for clustering effects at our three recruitment sites. All analyses were conducted using SAS version 8.02 (SAS Institute, Cary, North Carolina).

RESULTS

In our sample of 534 drug users, the proportion reporting recent use (last six months) of ecstasy was 17.2%. Table 1 presents the demographic characteristics for the total sample and by current use of ecstasy (yes, no). Overall, the sample was predominantly male (77.4%) and largely composed of racial/ethnic minorities, with 65.2% identifying as Hispanic and 27.9% as Black. The sample was predominantly heterosexual (87.1%). Over half (56.9%) had less than a high school education, and 61.7% had been homeless at some point in the 6 months prior to their participation. Compared to current non-users, current users were significantly more likely to be under 25 years of age ($p < 0.01$). Hispanics were somewhat more likely than blacks or whites to have used ecstasy, but these results were not statistically significant ($p = 0.21$).

Table 2 shows the drug-using and sexual characteristics of the sample. Current drug use was defined as use of the drug via any route of administration in the last 6 months. In terms of legal drug use, 91.2% had used cigarettes on a daily basis and 16.9% has used alcohol on a daily basis. Turning to illegal drug use, 66.9% had used heroin, 70.6% used cocaine, 50.2% used crack, and 68.5% used marijuana over the past 6 months. Over one-third (37%) reported lifetime injection drug use. The mean number of drugs used over the last 6 months was 2.1 (Standard Deviation (SD) = 1) out of a possible 13. In bivariate analysis, current ecstasy use was associated with both current cocaine and current marijuana use ($p < 0.0001$), but not with crack or heroin ($p = 0.85, 0.71$ respectively).

TABLE 1

Demographic Characteristics of 534 Illicit Drug Users in New York City,
by Current (Past Six Month) Ecstasy Use

<i>Characteristics</i>	<i>Total N = 534 N (%)</i>	<i>Ecstasy (+) n = 92 (17.2)</i>	<i>Ecstasy (-) n = 442 (82.8)</i>	<i>p-value</i>
Sex				
Male	408 (77.4)	75 (18.4)	333 (81.6)	0.09
Female	119 (22.6)	14 (11.8)	105 (88.2)	
Race				
Hispanic	348 (65.2)	67 (19.3)	281 (80.7)	0.21
Black	149 (27.9)	21 (14.1)	128 (85.9)	
White	37 (6.9)	4 (10.8)	33 (89.2)	
Age				
<25	162 (30.3)	50 (30.9)	112 (69.1)	<0.01
≥25	372 (69.7)	42 (11.3)	330 (88.7)	
Sexual identity				
Heterosexual	453 (87.1)	78 (17.2)	375 (82.8)	0.79
Homosexual/Lesbian	28 (5.4)	4 (14.3)	24 (85.7)	
Bisexual	39 (7.5)	8 (20.5)	31 (79.5)	
Education				
<High school	303 (56.9)	59 (19.5)	244 (80.5)	0.12
≥Highschool/GED	230 (43.2)	33 (14.4)	197 (85.7)	
Homelessness in last 6 months				
No	204 (38.3)	30 (14.7)	174 (85.3)	0.21
Yes	329 (61.7)	62 (18.8)	267 (81.2)	
Employment type				
Employed	41 (7.8)	5 (12.2)	36 (87.8)	0.02
Illegal	246 (46.7)	54 (22.0)	192 (78.1)	
Public assistance	117 (22.2)	11 (9.4)	106 (90.6)	
Others	123 (23.3)	22 (17.9)	101 (82.1)	
Site				
Bronx	221 (41.4)	33 (14.9)	188 (85.1)	0.03
Harlem	182 (34.1)	42 (23.1)	140 (76.9)	
Van	131 (24.5)	17 (13.0)	114 (87.0)	

TABLE 2

Drug Use and Sexual Risk Among Illicit Drug Users in New York City, by
Current (Past Six Month) Ecstasy Use

	<i>Total N = 534</i> <i>N (%)</i>	<i>Ecstasy (+)</i> <i>N = 92 (17.2)</i>	<i>Ecstasy (-)</i> <i>N = 442 (82.8)</i>	<i>p-value</i>
Current cigarette use				
None	10 (2.1)	0 (0.0)	10 (100.0)	0.12
<Daily	32 (6.7)	3 (9.4)	29 (90.6)	
Daily	436 (91.2)	86 (19.7)	350 (80.3)	
Current alcohol				
None	108 (20.2)	11 (10.2)	97 (89.8)	0.09
<Daily	336 (62.9)	64 (19.1)	272 (80.9)	
Daily	90 (16.9)	17 (18.9)	73 (81.1)	
Current marijuana use				
No	168 (31.5)	6 (3.6)	162 (96.4)	<0.01
Yes	366 (68.5)	86 (23.5)	280 (76.4)	
Current heroin use				
No	177 (33.2)	32 (18.08)	145 (81.9)	0.71
Yes	357 (66.9)	60 (16.81)	297 (83.2)	
Current cocaine use				
No	157 (29.4)	7 (4.5)	150 (95.5)	<0.01
Yes	377 (70.6)	85 (22.6)	292 (77.5)	
Current Crack use				
No	266 (49.8)	45 (16.9)	221 (83.1)	0.85
Yes	268 (50.2)	47 (17.5)	221 (82.5)	
Polysubstance use in last 6 months*	2.1 (1.0)	2.3 (1.0)	2.0 (1.0)	<0.01
IDU				
No	338 (63.3)	66 (71.7)	272 (61.5)	0.06
Yes	196 (36.7)	26 (28.3)	170 (38.5)	
Sexual behaviors				
Mean age at first intercourse	14.2 (2.5)	13.8 (2.5)	14.3 (2.5)	0.16
Mean number of partners in last months	2.8 (5.2)	3.5 (4.4)	2.7 (5.4)	0.12

TABLE 2 (Continued)

	Total N = 534 N(%)	Ecstasy (+) N = 92 (17.2)	Ecstasy (-) N = 442 (82.8)	p-value
Traded sex for money or drugs				
No	462 (86.5)	74 (16.0)	388 (84.0)	0.06
Yes	72 (13.5)	18 (25.0)	54 (75.0)	
Sex before getting high				
No	164 (31.1)	17 (10.4)	147 (89.6)	<0.01
Yes	364 (68.9)	73 (20.1)	291 (80.0)	
Sex after getting high				
No	96 (18.1)	7 (7.3)	89 (92.7)	<0.01
Yes	435 (81.9)	85 (19.5)	350 (80.5)	
Partners who smoke crack				
No	388 (73.1)	68 (17.5)	320 (82.5)	0.56
Yes	143 (36.9)	22 (15.4)	121 (84.6)	
Partners who use heroin				
No	408 (76.4)	72 (17.7)	336 (82.4)	0.64
Yes	126 (23.6)	20 (15.9)	106 (84.1)	
Partners who inject				
No	449 (87.0)	75 (16.7)	374 (83.3)	0.81
Yes	67 (13.0)	12 (17.9)	55 (82.1)	
Partners who snort/sniff cocaine				
No	384 (71.9)	54 (14.1)	330 (85.9)	<0.01
Yes	150 (28.1)	38 (25.3)	112 (74.7)	
Partners who are hepatitis positive				
No	505 (94.8)	91 (18.0)	414 (82.0)	0.08
Yes	28 (5.3)	1 (3.6)	27 (96.4)	
Partners who are HIV/AIDS infected				
No	512 (96.2)	89 (17.4)	423 (82.6)	0.78
Yes	20 (3.8)	3 (15.0)	17 (85.0)	

*Mean number of drugs used out of list of 13: heroin, crack, cocaine, marijuana, LSD, PCP, ecstasy, methamphetamine, amphetamine, ketamine, tranquilizers, inhalants, GHB.

In terms of sexual behavior, the mean number of partners in the last 2 months was 2.8 (SD = 5.2), and the mean age at first sexual intercourse was 14.2 (SD = 2.5). The majority of participants reported having sex before and after getting high (69% and 82%, respectively). Overall, 13.5% had traded sex for money or drugs in the prior two months, and only 20 people (3.8%) reported having sex with an HIV-seropositive partner. In the bivariate analysis, current ecstasy use was associated with having sex before getting high, having sex after getting high, and having partners who sniffed or snorted cocaine ($p < 0.01$).

In the final model (Table 3), current ecstasy use associated both with initiating sex before age 14 (adjusted odds ratio (AOR): 1.51) and with

TABLE 3

Crude and Adjusted Odds Ratios for Recent (Past Six Month) Ecstasy Use

	<i>Crude OR</i> <i>95% CI</i>	<i>Adjusted</i> <i>OR 95% CI</i>	<i>p-value</i>
Age			
>25	1.00	1.00	<0.01
≤ 25	3.51 (2.21, 5.58)	3.61 (3.48, 3.75)	
Current cocaine use			
No	1.00	1.00	<0.01
Yes	6.24 (2.82, 13.82)	3.58 (2.07, 6.20)	
Current marijuana use			
No	1.00	1.00	<0.01
Yes	8.29 (3.54, 19.40)	5.25 (3.53, 7.82)	
Injection drug user			
No	1.00	1.00	0.01
Yes	0.67 (0.42, 1.09)	0.46 (0.25, 0.83)	
Age at sexual initiation			
≥14	1.00	1.00	<0.01
<14	1.76 (1.11, 2.78)	1.51 (1.36, 1.68)	
Number of sex partners			
<2	1.00	1.00	<0.01
≥2	2.42 (1.52, 3.86)	1.86 (1.40, 2.45)	

having two or more partners in the past two months (OR = 1.86) after adjusting for age at study entry, current cocaine and marijuana use and being an injection drug user. In terms of goodness-of-fit, the Pearson chi-square value was 1.096 indicating that the model fits the empirical data well.

DISCUSSION

We showed that use of ecstasy is not uncommon among those reporting other illicit drugs within disadvantaged communities in New York and that ecstasy use is independently associated with greater levels of sexual risk behaviors. In particular, ecstasy users were more likely than their peers to have multiple sexual partners. Multiple partnerships, particularly concurrent ones, have been linked to greater sexual risk and increased HIV transmission.³¹ Furthermore, having sex before the age of fourteen was more frequent among those who reported recent ecstasy use. Although not a direct marker for HIV risk, early sexual debut has been associated with irregular condom use, and among females, with sexually transmitted infections.³²

In the absence of published studies for comparison on ecstasy use and sexual risk among heterosexual drug users, we observed a concordance with the literature on ecstasy use and sexual risk in other populations. Our findings are consistent with those of Boyd et al.²⁰ who studied undergraduates at a Midwestern university and found that ecstasy use was associated with having multiple sex partners. Similarly, Klitzman²³ also found that ecstasy use was associated with having more partners in their sample of MSM.

We observed no significant association between current ecstasy use and race or ethnicity. This differs from population-based studies like MTF³¹ or Fendrich and colleagues' study of adults in Chicago¹⁵ which both noted that whites were more likely than other groups to report ecstasy use. This discrepancy may be due to the small number of whites in our study (6.9%) and to our focus on characteristics of a sample drawn from the inner city drug-using community. In either case, the relatively high rates of recent ecstasy use among Hispanics and blacks suggest that, at least among this population, ecstasy is not an exclusively "white suburban" phenomenon.

Several study limitations should be noted. Although we observed an association between ecstasy and having more sex partners, the cross-sectional design used here cannot distinguish whether ecstasy increases partnering or whether persons predisposed to multiple partners are also

more likely to use ecstasy, i.e., this association might simply indicate a predisposition to risk caused by some other underlying, unmeasured factor. Selection bias is also a potential limitation. Given the substance-use criteria for participation, our findings regarding ecstasy use cannot be generalized to urban minority communities or to the general population. Even within the substance-using population, the strict selection criteria excluded older drug users, long-term IDUs, and former IDUs and the street-based recruitment strategy may have missed individuals that did not participate in the drug economy at the times during which we recruited. In addition, because we relied on self-reported ecstasy use, we cannot know for certain that the “ecstasy” reportedly used was truly ecstasy. The purity of tablets sold as “ecstasy” varies by country and time period, but a recent review suggested that the purity of these tablets has risen dramatically since the mid 1990s, and has approached 100% in several of the most recent studies.³⁴

This study was a post hoc analysis of data collected for the purpose of examining HCV and transition to injection drug use among injection and non-injection drug users. Thus, we were not able to assess other risk factors hypothesized to be associated with ecstasy use such as familial factors, social networks and environmental factors. Finally, questions about sexual behaviors are sensitive and rates may be under or overestimated. However, we do not expect that the reporting of sexual behaviors would be differential between ecstasy users and non-users.

With limitations acknowledged, our study suggests a relatively high prevalence of ecstasy use in an understudied population, and shows an association between ecstasy use and risky sexual behavior. Ecstasy use in urban settings, beyond clubs and raves, should continue to be monitored. Further research is required to determine the directionality of the association and the effects of ecstasy on condom usage, but our findings, together with the other reports on the prevalence of ecstasy use and the already-high prevalence of HIV in urban communities, hold troubling implications for the future of the HIV epidemic in this population.

ACKNOWLEDGMENTS

This study was partly funded by grants DA13146 and DA12801 from the National Institute on Drug Abuse. We wish to thank the study participants for sharing their stories with us.

REFERENCES

1. Zemishlany Z, Aizenberg D, Weizman A. Subjective effects of MDMA ('Ecstasy') on human sexual function. *Eur Psychiatry* 2001; 16:127-130.
2. Davison D, Parrott AC. Ecstasy (MDMA) in Recreational Users: Self-Reported Psychological and Physiological Effects. *Hum Psychopharmacol* 1997; 12:221-226.
3. Johnston LD, O'Malley PM, Bachman JG. Rise in ecstasy use among American teens begins to slow. University of Michigan News and Information Services 2001; Available from: www.monitoringthefuture.org.
4. Strote J, Lee JE, Wechsler H. Increasing MDMA use among college students: results of a national survey. *J Adolesc Health* 2002; 30:64-72.
5. Pope HG Jr., Ionescu-Pioggia M, Pope KW. Drug use and life style among college undergraduates: a 30-year longitudinal study. *Am J Psychiatry* 2001; 158:1519-1521.
6. Substance Abuse and Mental Health Services Administration (SAMHSA), Office of Applied Studies. Drug abuse warning network report. 2003.
7. Arria AM, Yacoubian GS Jr, Fost E, Wish ED. The pediatric forum: ecstasy use among club rave attendees. *Arch Pediatr Adolesc Med* 2002; 156:295-296.
8. Yacoubian GS Jr.. Assessing the temporal relationship between race and ecstasy use among high school seniors. *J Drug Educ* 2002; 32:213-225.
9. Johnston LD, O'Malley PM, Bachman JG. Ecstasy use among American teens drops for the first time in recent years, and overall drug and alcohol use also decline in the year after 9/11. University of Michigan News and Information Services 2002. Available from: http://www.monitoringthefuture.org/pressreleases/02drugpr_complete.pdf.
10. Mattison AM, Ross MW, Wolfson T, Franklin D. San Diego HIV Neurobehavioral Research Center Group. Circuit party attendance, club drug use, and unsafe sex in gay men. *J Subst Abuse* 2001; 13:119-126.
11. Mansergh G, Colfax GN, Marks G, Rader M, Guzman R, Buchbinder S. The Circuit Party Men's Health Survey: findings and implications for gay and bisexual men. *Am J Public Health* 2001; 91:953-958.
12. Colfax GN, Mansergh G, Guzman R, et al. Drug use and sexual risk behavior among gay and bisexual men who attend circuit parties: a venue-based comparison. *J Acquir Immune Defic Syndr* 2001; 28:373-379.
13. Klitzman RL, Pope HG Jr., Hudson JI. MDMA ("Ecstasy") abuse and high-risk sexual behaviors among 169 gay and bisexual men. *Am J Psychiatry* 2000; 157:1162-1164.
14. Community Epidemiology Work Group. Epidemiologic trends in drug abuse, Volume I: Highlights and executive summary. National Institute on Drug Abuse; 2003. Report No.: NIH Publication No. 04-5364.
15. Fendrich M, Wislar JS, Johnson TP, Hubbell A. A contextual profile of club drug use among adults in Chicago. *Addiction* 2003; 98:1693-1703.
16. Kalant H. The pharmacology and toxicology of "ecstasy" (MDMA) and related drugs. *CMAJ* 2001; 165:917-928.
17. Jones AL, Simpson KJ. Mechanisms and management of hepatotoxicity in ecstasy (MDMA) and amphetamine intoxications. *Aliment Pharmacol Ther* 1999; 13:129-133.
18. Badon LA, Hicks A, Lord K, Ogden BA, Meleg-Smith S, Varner KJ. Changes in cardiovascular responsiveness and cardiotoxicity elicited during binge administration of Ecstasy. *J Pharmacol Exp Ther* 2002; 302:898-907.
19. Schifano F. A bitter pill. Overview of ecstasy (MDMA, MDA) related fatalities. *Psychopharmacology (Berl)* 2004; 173:242-248.
20. Boyd CJ, McCabe SE, d'Arcy H. Ecstasy use among college undergraduates: gender, race and sexual identity. *J Subst Abuse Treat* 2003; 24:209-215.
21. Parrott AC, Buchanan T, Scholey AB, Hefferman T, Ling J, Rodgers J. Ecstasy/MDMA attributed problems reported by novice, moderate and heavy recreational users. *Hum Psychopharmacol* 2002; 17:309-312.
22. 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.
23. Klitzman RL, Greenberg JD, Pollack LM, Dolezal C. MDMA ('ecstasy') use, and its association with high risk behaviors, mental health, and other factors among gay/bisexual men in New York City. *Drug Alcohol Depend* 2002; 66:115-125.

24. Waldo CR, McFarland W, Katz MH, MacKellar D, Valleroy LA. Very young gay and bisexual men are at risk for HIV infection: the San Francisco Bay Area Young Men's Survey II. *J Acquir Immune Defic Syndr* 2000; June 1; 24(2):168-174.
25. Williams PB. HIV/AIDS case profile of African Americans: guidelines for ethnic-specific health promotion, education, and risk reduction activities for African Americans. *Fam Commun Health* 2003; 26:289-306.
26. Karon JM, Fleming PL, Steketee RW, De Cock KM. HIV in the United States at the turn of the century: an epidemic in transition. *Am J Public Health* 2001; 91:1060-1068.
27. Hahn RA, Magder LS, Aral SO, Johnson RE, Larsen SA. Race and the prevalence of syphilis seroreactivity in the United States population: a national sero-epidemiologic study. *Am J Public Health* 1989; 79:467-470.
28. Community Epidemiology Work Group. Epidemiologic trends in drug abuse, Volume II: Proceedings from the Community Epidemiology Work Group. National Institute on Drug Abuse; 2003. Report No.: NIH Report No. 04-5365.
29. Koblin BA, Factor SH, Wu Y, Vlahov D. Hepatitis C virus infection among non-injecting drug users in New York City. *J Med Virol* 2003; 70:387-390.
30. Ompad DC, Galea S, Fuller CM, Phelan D, Vlahov D. Club drug use among minority substance users in New York City. *J Psycho Drugs* 2004; 36:397-399.
31. Gorbach PM, Holmes KK. Transmission of STIs/HIV at the partnership level: beyond individual-level analyses. *J Urban Health* 2003; 80:iii15-iii25.
32. Coker AL, Richter DL, Valois RF, McKeown RE, Garrison CZ, Vincent ML. Correlates and consequences of early initiation of sexual intercourse. *J Sch Health* 1994; 64:372-377.
33. Yacoubian GS Jr. Correlates of ecstasy use among students surveyed through the 1997 College Alcohol Study. *J Drug Educ* 2003; 33:61-69.
34. Parrott AC. Is ecstasy MDMA? A review of the proportion of ecstasy tablets containing MDMA, their dosage levels, and the changing perceptions of purity. *Psychopharmacology (Berl)* 2004; 173:234-241.