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IT'S A RAVE NEW WORLD: ESTIMATING THE PREVALENCE AND PERCEIVED HARM OF ECSTASY AND OTHER DRUG USE AMONG CLUB RAVE ATTENDEES*

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ABSTRACT

The use of 3,4-methylenedioxymethamphetamine (MDMA or "ecstasy") appears to be increasing worldwide, with "rave" attendees being one high-risk population. To date, however, only one study has collected ecstasy use information from rave attendees in the United States. To address this limitation, we collected self-report drug use information from 70 adult "club rave" attendees within the Baltimore-Washington corridor in April and May 2002. Data collection was scheduled between 12 A.M. and 5 A.M. Participation rates were high, with 85 percent of the club rave attendees completing the interview. Eighty-six percent of the respondents reported lifetime ecstasy use, 51 percent reported 30-day use, and 30 percent reported using ecstasy within the two days preceding the interview. While past-year ecstasy users were comparable to non-users with respect to a host of demographic and drug use

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variables, non-ecstasy users were significantly more likely than past-year users to perceive risks associated with the regular use of alcohol and ecstasy. Not surprisingly, non-ecstasy users were significantly more likely than past-year users to perceive harmful long-term physical and psychological effects associated with ecstasy ingestion. These findings suggest that rave attendees may be an important population for ecstasy-related prevention efforts.

INTRODUCTION

The "rave" phenomenon—a culture of loud music, flashing lights, wild flowing colors, and frenzied all-night dancing—has been a major element in the resurgence of psychedelic drug use in Western society [1]. Purportedly central to raves is the use of "club drugs," such as lysergic acid diethylamide (LSD), phencyclidine (PCP), methamphetamine, and 3,4-methylenedioxymethamphetamine (MDMA or "ecstasy") [1]. To date, however, only eight social science studies have examined the use of ecstasy among rave attendees [2-9].

Forsyth, for example, examined the use of ecstasy and other drugs among a sample of 135 former rave attendees in Glasgow, Scotland, between December 1993 and August 1994 [7]. Forsyth reported that, ". . . there was a clear distinction between drugs which were most often used at a dance event setting and those which were not" [7, p. 514]. The primary dance drugs, for example, were amphetamines, nitrites, and ecstasy, while alcohol, tobacco, and marijuana were secondary dance drugs [7]. Wijngaart et al. used a multi-method approach to examine ecstasy use in the Netherlands between the fall of 1995 and the fall of 1996 [9]. Among 764 partygoers, 64 percent reported using ecstasy that evening [9]. Most recently, Arria et al. collected self-report drug use information and oral fluid specimens from 96 "club rave" attendees within the Baltimore-Washington corridor between August and October 2000 [3]. Twenty percent of the sample reported using ecstasy within the two days preceding the interview, and 21 percent tested positive for ecstasy by oral fluid analysis [3].

These previous studies suffer from two methodological limitations. First, with the exception of Arria et al. [3], no studies have focused on rave attendees in the United States. Second, no studies on rave attendees have focused on the perceived harm of ecstasy and other drugs and the perceived physical and psychological effects of ecstasy. To address these limitations, we collected self-report drug use information from "club rave" attendees within the Baltimore-Washington corridor. The purpose of our study is twofold. First, we estimated the prevalence of ecstasy and other drug use among club rave attendees by examining self-report drug use information. Second, we compared past-year ecstasy users to non-users with respect to demographic characteristics, alcohol and other drug use, perceptions of drug use harm, and perceived physical and psychological effects of ecstasy. With this preliminary framework, project methods are described below.

METHODS

While anecdotal reports have suggested that the use of ecstasy is more prevalent at underground raves, we sampled only those raves held at nightclubs—club raves. During April and May 2002, data were collected from adult attendees at two club raves in the Baltimore-Washington corridor. These raves were advertised on the Internet or through flyers and other announcements. Two undergraduate students were recruited and trained as interviewers.

All of the raves were held between 10 P.M. and 5 A.M. Operating under the assumption that most attendees would likely spend at least several hours at the rave, data collection was scheduled between 12 A.M. and 5 A.M. Interviewers dressed casually and were instructed to begin collection at 12 A.M. and approach every other person who exited the club. Unfortunately, persons exiting the club tended to leave in large groups and then break into smaller groups before interviewing staff could approach them. As such, sampling became a difficult endeavor. Interviewers ultimately approached all groups and offered participation to every other person within the groups.

The introduction by the interviewer included the purpose and sponsorship of the study and informed consent provisions. Potential respondents were told that investigators from the University of Maryland were conducting a drug use study. Respondents were assured that their participation was voluntary, that their responses were anonymous, and that they would receive bottled water as an incentive for participation. Interviews lasted approximately 15 minutes and were conducted out of hearing range of club security or other rave attendees. The University of Maryland Institutional Review Board (IRB) for the protection of human subjects approved the data collection protocol.

Demographic information was collected for gender, age, race, employment status, and school enrollment. Respondents were then asked to report whether they had *ever* used alcohol, marijuana, powder cocaine, crack cocaine, methamphetamine, heroin, PCP, or ecstasy. For those drugs respondents reported having *ever* tried, they were asked to indicate age of first use, whether they had used the drug within the past 12 months and 90 days, the number of days used within the past 30 days, and whether they had used the drug within the past two days. Respondents who reported 90-day ecstasy use were asked if they typically used ecstasy with the other drugs, if they used ecstasy cut with other drugs, how many raves they had attended during the 90 days preceding the interview, where they usually procured and used their ecstasy, how many pills were typically purchased at one time, and the cost of a typical ecstasy purchase. In addition, respondents were asked several open-ended questions about how they were first introduced to ecstasy and the positive and negative effects they experienced after using ecstasy.

A module of questions also focused on perceived harm caused by the use of illicit drugs. Respondents were asked the extent to which they thought people risked harming themselves (physically or in other ways) if they used each of the

drugs once or twice and regularly. Responses were coded on a Likert scale—no risk, slight risk, moderate risk, and great risk. Respondents were then asked their opinions regarding the short- and long-term physical and psychological effects of ecstasy and the positive physical and psychological effects associated with ecstasy ingestion. Responses were again coded on a Likert scale—strongly agree, agree, disagree, and strongly disagree.

DATA ANALYSIS AND FINDINGS

Data analysis was accomplished in three phases. First, participation rates were calculated. Second, descriptive statistics were computed. Third, the sample was divided into recent ecstasy users and non-users based upon self-reported use during the 12 months preceding the interview. To allow for a more accurate comparison, individuals who reported lifetime use, but no use in the past 12 months (n = 4), were excluded from the non-user group. Chi-square statistics were used to compare 12-month ecstasy users to non-users with respect to demographic characteristics and other drug use. Independent sample t-tests were used to compare 12-month ecstasy users to non-users with respect to perceived harm caused by ecstasy and other drugs and the perceived effects of ecstasy.

Participation Rates

A total of 82 club rave attendees were approached for interviewing. Of these, 85 percent agreed to and completed the interview. The following results are therefore based on the 70 individuals who completed the interview.

Descriptive Statistics

As shown in Table 1, a majority of the sample was male (53 percent) and white (82 percent). The mean age of the sample was approximately 19 years old. Sixty-nine percent were employed at least part-time, while 80 percent had completed at least 12th grade.

Self-Reported Ecstasy Use

Figure 1 displays self-reported use of ecstasy in the sample. As shown, 86 percent reported ecstasy use at least once during their lifetime. Eighty percent of the sample reported using ecstasy within the past 12 months, 63 percent within the previous 90 days, and 51 percent within the past 30 days. Thirty-percent of the sample reported having used ecstasy within the two days preceding the interview. The estimates of two-day ecstasy use were second only to alcohol (63 percent) and far exceeded estimates of two-day marijuana (11 percent) and two-day powder cocaine (9 percent) use (results not shown).

Table 1. Demographic Characteristics
(n = 70)

Variable	Frequency	
Sex		
Male	53%	
Female	47%	
Race/Ethnicity		
White	82%	
Hispanic	7%	
Asian	7%	
African American	4%	
Age		
18-20	89%	
21 and over	11%	
Mean age (in years)	18.9	
Employment status		
Employed full-time	38%	
Employed part-time	31%	69%
Unemployed	31%	
Educational level		
Completed at least 12th grade	80%	

Chi-Square Statistics

Table 2 contains a comparison between self-reported 12-month ecstasy users (n = 56) and those rave attendees who reported no lifetime ecstasy use (n = 10). As shown, there were no statistically significant differences between the two groups with respect to demographic characteristics and the 12-month drug use variables.

Independent Sample *T*-Test

The independent-sample *t*-test procedure compares means for two groups of cases. For the current study, *t*-tests were used to compare the 12-month ecstasy users to non-users with respect to perceived harm caused by ecstasy and other drugs and the perceived effects of ecstasy. As discussed earlier, respondents were

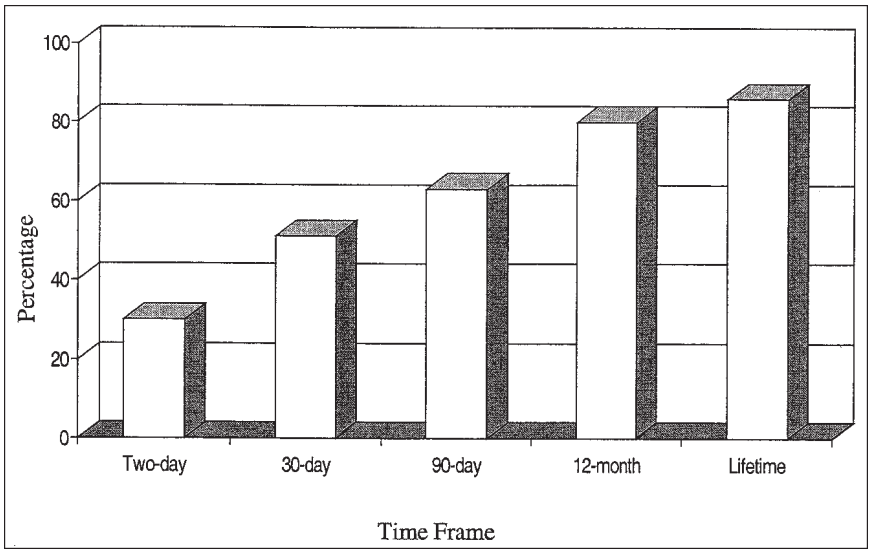

Figure 1. Self-reported ecstasy use among club rave attendees (n = 70)

asked the extent to which they thought people risked harming themselves if they used each of the drugs once or twice and regularly. Responses were coded on a Likert scale—no risk (1), slight risk (2), moderate risk (3), and great risk (4). Respondents were then asked their opinions regarding the short- and long-term physical and psychological effects of ecstasy and the positive physical and psychological effects associated with ecstasy ingestion. Responses were again coded on a Likert scale—strongly agree (1), agree (2), disagree (3), and strongly disagree (4).

As shown in Table 3, non-ecstasy users were significantly more likely than past-year ecstasy users to perceive risks associated with the use of ecstasy once or twice (3.30 v. 2.73, $p < 0.05$), to perceive risks associated with the regular use of alcohol (3.90 v. 3.67, $p < 0.05$), and to perceive risks associated with the regular use of ecstasy (4.00 v. 3.85, $p < 0.01$). Moreover, non-ecstasy users were significantly more likely than past-year users to perceive harmful long-term physical (1.00 v. 2.13, $p < 0.01$) and psychological (1.20 v. 2.14, $p < 0.01$) effects associated with ecstasy ingestion.

DISCUSSION

The current study is only the second research effort to collect ecstasy use data from rave attendees in the United States, and the first to collect information from

Table 2. Comparison between 12-Month Ecstasy Users and Non-Users (n = 66)

Variable	12-Month ecstasy users (n = 56)	Non-ecstasy users (n = 10)
Sex		
Male	57%	40%
Race/Ethnicity		
White	80%	80%
Age		
20 and under	88%	90%
Employment status		
Employed at least part-time	71%	60%
Educational level		
Completed at least 12th grade	80%	80%
Drug use		
12-Month alcohol use	96%	100%
12-Month marijuana use	45%	30%
12-Month powder cocaine use	32%	40%
12-Month crack cocaine use	0%	0%
12-Month methamphetamine use	4%	10%
12-Month heroin use	2%	0%
12-Month PCP use	2%	0%

this population about the perceived harm of ecstasy and other drugs and the perceived effects of ecstasy. Data were collected from 70 adult club rave attendees within the Baltimore-Washington corridor in April and May 2002. Our high rates of participation (84 percent) bode well for researchers interested in gathering sensitive information from this hidden population.

Eighty-six percent of the respondents reported lifetime ecstasy use, 51 percent reported 30-day use, and 30 percent reported using ecstasy within the two days preceding the interview. These high prevalence rates are consistent with Arria et al. [3] and reinforce the notion that serious ecstasy use is concentrated within several distinct subpopulations. Likely due to our small sample, the current findings were inconsistent with a body of previous research [3, 10-14] that detected significant differences between ecstasy users and non-users. While past-year ecstasy users in the current study were comparable to non-users with

Table 3. Comparison of Means between 12-Month Ecstasy Users and Non-Users ($n = 66$)

Variable	12-Month ecstasy users ($n = 56$)	Non-ecstasy users ($n = 10$)
Risk associated with use once or twice		
Alcohol	2.30	2.20
Marijuana	2.23	2.30
Powder cocaine	2.93	3.00
Crack cocaine	3.70	3.80
Methamphetamine	3.25	3.50
Heroin	3.96	3.90
PCP	3.50	3.70
Ecstasy	2.73*	3.30*
Risk associated with regular use		
Alcohol	3.67*	3.90*
Marijuana	3.60	3.80
Powder cocaine	3.91	3.90
Crack cocaine	4.00	4.00
Methamphetamine	3.98	4.00
Heroin	3.98	4.00
PCP	3.89	4.00
Ecstasy	3.85**	4.00**
Perceived effects of ecstasy		
Harmful short-term physical effects	2.20	1.40
Harmful long-term physical effects	2.13**	1.00**
Harmful short-term psychological effects	2.16	1.40
Harmful long-term psychological effects	2.14*	1.20*
Positive physical effects of ecstasy	1.75	2.60
Positive psychological effects of ecstasy	1.57	1.60

*Significant at the $p < 0.05$ level. **Significant at the $p < 0.01$ level.

respect to a host of demographic and drug use variables, non-ecstasy users were significantly more likely than past-year ecstasy users to perceive risks associated with the regular use of alcohol and ecstasy. Moreover, non-users were significantly more likely than past-year ecstasy users to perceive harmful long-term physical and psychological effects associated with ecstasy ingestion. Not surprisingly, rave attendees who perceived less harm with the use of ecstasy were those respondents who reported its use within the 12 months preceding the interview.

One methodological limitation of the current study should be noted. The generalizability of our findings is unknown because we used a relatively small,

non-random sample of rave attendees from one area of the country. This caveat aside, the current findings suggest that rave attendees can be accessed with a high degree of success. Our results should encourage other investigators to study rave attendees in the United States.

There are several possibilities for future research. First, no studies have been conducted with "underground" rave attendees. Given that underground raves are illegal by definition, it is reasonable to suspect that more illicit drug use occurs at these venues than in legally established clubs. Second, no studies have explored ecstasy dependence among rave attendees. To date, only one study has attempted to diagnose MDMA dependence using clinical criteria [15]. While none of the rave attendees surveyed in the current study perceived ecstasy dependence, there are serious implications for drug prevention and drug treatment efforts should ecstasy dependence evolve from casual use. Finally, no studies have undertaken ecstasy prevention or interdiction initiatives with rave populations. Given that more than half of our sample self-reported 30-day ecstasy use, the development of harm reduction practices for rave attendees may be a worthwhile investment for prevention specialist, law enforcement authorities, and jurisdictional policymakers.

REFERENCES

1. E. Weir, Raves: A Review of the Culture, the Drugs and the Prevention of Harm, *Canadian Medical Association Journal, 162,* pp. 1843-1848, 2000.
2. E. M. Adlaf and R. G. Smart, Party Subculture or Dens of Doom? An Epidemiological Study of Rave Attendance and Drug Use Patterns Among Adolescent Students, *Journal of Psychoactive Drugs, 29,* pp. 193-198, 1997.
3. A. Arria, G. Yacoubian, E. Fost, and E. D. Wish, Ecstasy Use among Club Rave Attendees, *Archives of Pediatrics and Adolescent Medicine, 156,* pp. 295-296, 2002.
4. A. Boys, S. Lenton, and K. Norcross, Polydrug Use at Raves by a Western Australian Sample, *Drug and Alcohol Review, 16,* pp. 227-234, 1997.
5. E. R. S. Brown, D. R. Jarvie, and D. Simpson, Use of Drugs at "Raves," *Scottish Medical Journal, 40,* pp. 168-171, 1995.
6. G. A. Cooper, D. L. Allen, K. S. Scott, J. S. Oliver, J. Ditton, and I. D. Smith, Hair Analysis: Self-Reported Use of "Speed" and "Ecstasy" Compared with Laboratory Findings, *Journal of Forensic Sciences, 45,* pp. 400-406, 2000.
7. A. J. M. Forsyth, Places and Patterns of Drug Use in the Scottish Dance Scene. *Addiction, 91,* pp. 511-521, 1996.
8. P. Tossman, S. Boldt, and M. D. Tensil, The Use of Drugs Within the Techno Party Scene in European Metropolitan Cities, *European Addiction Research, 7,* pp. 2-23, 2001.
9. V. Wijngaart, R. Braam, D. Bruin, M. Fris, N. J. M. Maalsté, and H. T. Verbraeck, Ecstasy Use at Large-Scale Dance Events in the Netherlands, *Journal of Drug Issues, 29,* pp. 679-702, 1999.

10. B. J. Urbach, K. M. Reynolds, and G. Yacoubian, Exploring the Relationship between Race and Ecstasy Involvement among a Sample of Arrestees, *Journal of Ethnicity in Substance Abuse,* in press.
11. G. Yacoubian, Assessing the Temporal Relationship between Race and Ecstasy Use among High School Seniors, *Journal of Drug Education, 32*:3, pp. 213-225, 2002.
12. G. Yacoubian, Correlates of Ecstasy Use among High School Seniors Surveyed through Monitoring the Future, *Drugs: Education, Prevention & Policy, 10*:1, pp. 65-72, 2002.
13. G. Yacoubian, Correlates of Ecstasy Use among 10th Graders Surveyed through Monitoring the Future, *Journal of Psychoactive Drugs, 34*:2, pp. 222-230, 2000.
14. G. Yacoubian, A. Arria, E. Fost, and E. D. Wish, Estimating the Prevalence of Ecstasy Use among Juvenile Offenders, *Journal of Psychoactive Drug, 34*:2, pp. 209-213, 2002.
15. K. L. R. Jansen, Ecstasy (MDMA) Dependence, *Drug and Alcohol Dependence, 53,* pp. 121-124, 1999.

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