

TOWARD AN ECSTASY AND OTHER CLUB DRUG (EOCD) PREVENTION INTERVENTION FOR RAVE ATTENDEES

GEORGE S. YACOUBIAN, JR. PH.D.

*Pacific Institute for Research Evaluation (PIRE),
University of Maryland, Catholic University, and
Criminal Justice Institute of Nova Southeastern University*

SARAH MILLER

SELWYN PIANIM

MICHAEL KUNZ

ERIN ORRICK

University of Maryland

TANJA LINK, M.A.

University of Georgia

WILSON R. PALACIOS, PH.D.

University of South Florida

RONALD J. PETERS, DR. P.H.

The University of Texas Health Science Center at Houston

ABSTRACT

A growing body of recent research has identified that "rave" attendees are at high risk for the use of "club drugs," such as 3,4-methylenedioxymethamphetamine (MDMA or "ecstasy"). Rave attendees, however, comprise only one of several club-going populations. In the current study, we explore the prevalence of ecstasy and other club drug (EOCD) use among a sample of club attendees in Washington, DC. Data were collected from adult, primarily homosexual, club attendees during the summer of 2003. Data collection was scheduled between 11 p.m. and 3 a.m. Participation rates were high. Of

the 211 club attendees approached, 88% ($n = 186$) completed the interview. Drug use prevalence rates were low. With the exception of alcohol and marijuana, 2-day self-reports were less than 1% for each drug. These findings, amalgamated with results from other EOCD-related studies involving several distinct populations, offer considerable insight into the state of ecstasy in American society. Based on a meta-analysis of this literature, we offer a community-level prevention intervention for the population *at highest risk* for EOCD use—rave attendees.

INTRODUCTION

The rave phenomenon—a culture of loud music, flashing lights, wild flowing colors, and frenzied all-night dancing—surfaced in Europe and Australia during the mid-1980s [1, 2]. Raves quickly became associated with large numbers of youth dancing through the night in arcane social locations, like deserted warehouses and open fields. By the early 1990s, raves had circled the globe and entered the milieu of mainstream promotionalism (e.g., nightclubs) as promoters sought legal venues to accommodate the growing number of interested patrons.

One defining characteristic of the rave culture is the use of illicit drugs, including lysergic acid diethylamide (LSD), Ketamine hydrochloride (Ketamine), Flunitrazepam (Rohypnol), Gamma hydroxybutyrate (GHB), and 3,4-methylenedioxymethamphetamine (MDMA or “ecstasy”) [2-6]. Leinwand and Fields, for example, described how easily ecstasy could be smuggled into raves and how attendees relished the atmosphere of illegal drug acceptance [4]. This attention has prompted an increasingly healthy body of scholarly literature addressing illicit drug use among rave attendees [7-31].

Most of these studies have focused on international rave populations. Brown et al. collected self-report personal drug use information and urine specimens from 30 rave attendees in Scotland [12]. Urinalysis detected MDMA in 40% ($n = 12$) of the 30 specimens. Lenton et al. investigated patterns of drug use among a sample ($n = 83$) of rave attendees in Western Australia [27]. Eighty-six percent of the respondents had used ecstasy in a rave setting in the 12 months preceding the interview. Wijngaart et al. used a multimethod approach to examine ecstasy use in the Netherlands between the fall of 1995 and the fall of 1996 [29]. The various methods included observations at 28 “house parties” and 24 clubs and discotheques, interviews with former ecstasy users, and interviews with attendees at the beginning and end of 10 house parties. Of 764 partygoers, 64% reported using ecstasy that evening [29].

Studies of rave attendees in the United States are sparse. Arria et al. collected self-report personal drug use information and oral fluid (OF) specimens from 96 rave attendees along the Baltimore-Washington corridor between August and October 2000 [7]. Forty-nine percent reported 30-day use, and 20% reported using ecstasy within the two days preceding the interview [7]. Twenty-one percent

tested positive for MDMA by OF analysis [7]. Yacoubian and Wish explored the validity of self-reported recent ecstasy use with this same sample of rave attendees [8]. Seventy-five percent of the sample tested negative for MDMA via OF analysis and denied ecstasy use in the two days preceding the interview, while 13% tested positive for MDMA and reported two-day ecstasy use [8]. Concordance was therefore high, with 88% of the two-day self-reports agreeing with the OF test results.

Palacios and Fenwick used a qualitative approach to explore the culture of club drugs among rave attendees in Tampa, Florida [14]. Their research focused primarily on the emotional state of individuals who ingested club drugs, the local market for such drugs, and the vernacular of the drug culture. Palacios and Fenwick identified that ecstasy “. . . is affordable, does not have the same stigma associated with other illegal drugs, and is very much a part of the local youth culture” [14, p. 283]. In the most comprehensive study of rave attendees in the United States, Yacoubian et al. collected self-report personal drug use information and OF specimens from a sample ($n = 126$) of rave attendees along the Baltimore-Washington corridor in the fall of 2002 [10]. Twenty-four percent reported using ecstasy within the two days preceding the interview, and 30% tested positive for MDMA by OF analysis [10]. Sixteen percent of the sample reported at least one of three MDMA-specific dependence criteria, suggesting a relatively high percentage of respondents may need treatment for ecstasy [10].

While ecstasy is generally considered to be the most popular club drug [10, 27], a variety of other drugs—including LSD [32], PCP [32], Ketamine [33-36], Rohypnol [37-39], and GHB [40-41]—have also become popular among rave attendees. Dotson et al., for example, identified that “the social-recreational use of Ketamine has reemerged in the context of a recent subcultural music phenomenon known as ‘acid house’ music” [35, p. 751]. Curran and Morgan observed that, since the mid-1980s, there has been increased Ketamine use linked with the growth of the culture of techno clubs, parties, and raves [33]. O’Connell et al. noted that GHB has recently become popular as a drug of abuse and that “. . . persons who attend nightclubs and parties (such as all-night ‘raves’) use it as a euphoriant” [40, p. 2478]. These findings, taken collectively with the results from Arria et al. [7] and Yacoubian et al. [9, 10], suggest that any interventions tailored to rave attendees should address the use of *all* club drugs.

Given the high prevalence of EOCD use among rave attendees in the United States [7, 9, 10], the current study focuses on members of a primarily homosexual club attendee population. While not a study of rave attendees, we build on our earlier work by exploring whether high EOCD use rates extend to members of a different “club attendee” population. Three primary questions are addressed:

- What is the prevalence of EOCD use and dependence among club attendees?
- What is the relationship between EOCD use and other drug use among club attendees?

- What is the relationship between EOCB use and the perceived harm of alcohol and other drugs among club attendees?

METHODS

Data were collected over the course of six Saturday nights at one club in Washington, DC, between June 29 and August 2, 2003. Two undergraduate students and two graduate students in the Department of Criminology and Criminal Justice at the University of Maryland were recruited and trained as interviewers. The lead author conducted the training prior to the start of data collection. The data collection protocol and consent form was approved by the Institutional Review Board for the Protection of Human Subjects at the University of Maryland in the spring of 2003. The protocol was identical to that used in our earlier studies of rave attendees [7, 9, 10].

The club was open between 9 p.m. and 3 a.m. Operating under the assumption that most attendees would likely spend at least two hours at the club, data collection was scheduled between 11 p.m. and 3 a.m. Potential respondents were conveniently sampled as they exited the clubs. We elected not to approach potential respondents before they entered the club because any illicit drug use that took place inside the venue would have been missed by the survey. Moreover, interviewing subjects inside the club would have been difficult because a club atmosphere is not conducive to survey administration.

The introduction included the purpose and sponsorship of the study and informed consent provisions. Potential respondents were told that researchers from the Department of Criminology and Criminal Justice at the University of Maryland were conducting a personal 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 club attendees.

Demographic information was collected on gender, age, race, sexual orientation, education, and employment status. Respondents were then asked to report whether they had *ever* used any of the following drugs: alcohol, marijuana, powder cocaine, crack cocaine, crystal methamphetamine, heroin, phencyclidine (PCP), LSD/acid, ecstasy, Ketamine, GHB, Rohypnol, Tryptamine ("Foxy"),¹ Ya Ba,² and Viagra. 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, the number of days used within the past 30 days, whether they had

¹ Tryptamine psychedelics, like Foxy, belong to a class of substances whose primary effect is to alter consciousness in an ego-transcending manner [42].

² Media reports have suggested that Ya Ba, a powerful methamphetamine, is gaining favor among West Coast youth [43].

used the drug within the past two days, and whether they had used the drug in the club that evening. Respondents who reported 12-month drug use were asked whether or not they felt dependent on that particular drug.

A module of questions also focused on the perceived harm of illicit drug use. 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. Respondents 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 coded as: strongly disagree (1); disagree (2); agree (3); and strongly agree (4).

We are aware of only two studies that have explored the potential dependence liability of ecstasy [10, 44]. Yacoubian et al. used the Center for Substance Abuse Research (CESAR) Arrestee Drug Screener (CADS) [10], a short scale—based on Diagnostic and Statistical Manual of Mental Disorders, third edition-revised (DSM-III-R) criteria—that was originally developed to estimate cocaine dependence among arrestees.³ The three CADS items modified to the current study were:

- Have you ever spent a great deal of time getting, using, or getting over the effects of ecstasy?
- Have you often wanted to cut down on ecstasy, or ever tried to cut down, but couldn't?
- Did you continue to use ecstasy after you realized it was causing problems with your family, friends, on the job, at school, or with police?

Club attendees who reported 12-month ecstasy use were asked the three CADS items. An affirmative response to *any* of the three questions resulted in a probable diagnosis of ecstasy dependence [45].

DATA ANALYSIS AND FINDINGS

Data analysis was accomplished in six phases. First, participation rates were calculated. Second, descriptive statistics were computed. Third, estimates of EOCD use—defined as the use of ecstasy, Foxy, GHB, Ketamine, LSD, PCP, Rohypnol, Viagra, and Ya Ba [32, 46]—were calculated. Fourth, estimates of ecstasy dependence were generated. Fifth, the sample was divided into non-EOCD users, 12-month EOCD users, and non-recent EOCD users (those attendees who reported lifetime EOCD use but no use in the past 12 months). Chi-square statistics

³ A cocaine scale was utilized because of the similar chemical properties shared by MDMA and cocaine.

were used to compare the three subgroups with respect to demographic characteristic and AOD use. Sixth, *t*-tests were used to compare the three subgroups with respect to perceived harm caused by EOCD use.

Participation Rates

A total of 211 club attendees were approached for interviewing. Of these, 88% ($n = 186$) completed the interview. These high rates of participation are comparable to our three studies of rave attendees [7, 9, 10].

Descriptive Statistics

As shown in Table 1, a majority of the sample (79%) was female and white (75%). The mean age of the sample was approximately 26 years old. Eighty-six percent were employed at least part-time, while 97% had completed at least the 12th grade. A majority of our sample (87%) reported being either homosexual or bisexual.

Alcohol and Other Drug Use

Table 2 provides 12-month and two-day prevalence rates for our panel of drugs. As shown, a high majority of the respondents reported 12-month (93%) and two-day (80%) alcohol use. Twelve-month and two-day marijuana use rates were 39% and 16%, respectively. Ten percent of the respondents reported 12-month MDMA use, while 9% reported 12-month powder cocaine use. Two-day prevalence rates for all drugs other than alcohol and marijuana were less than 1%. As discussed earlier, Foxy, GHB, Ketamine, LSD, PCP, Rohypnol, Viagra, and Ya Ba prevalence rates were recoded into an all-inclusive EOCD variable. As shown, 41% of the respondents reported lifetime EOCD use, 15% during the 12 months preceding the interview, and 2% during the past two days.

Dependence Symptoms

As indicated previously, the CADS is composed to three diagnostic questions and was asked of respondents who reported having used ecstasy in the 12 months preceding the interview. Table 3 illustrates the percentage of club attendees who responded affirmatively to each of the three items. Three percent of the sample responded that they had spent a great deal of time getting, using, or getting over the effects of ecstasy, while 2% continued to use ecstasy after they realized it was causing problems with their family, friends, on the job, at school, or with police. Five percent of the sample responded affirmatively to at least one of the three dependence items, suggesting that 5% of the sample may be dependent on ecstasy.

Table 1. Demographic Characteristics
(*n* = 186)

Variable	Distribution
Sex	
Female	79%
Race/ethnicity	
White	75%
Asian	5%
Hispanic	5%
African-American	8%
Other	8%
Age	
25 and under	60%
Mean age (in years)	25.7
Employment status	
Employed full-time	73%
Employed part-time	13%
Unemployed	15%
	}86%
Educational level	
Completed at least 12th grade	97%
Sexual orientation	
Homosexual	64%
Bisexual	23%
Heterosexual	13%
	}87%

Comparison Between Non-EOCD Users, 12-Month EOCD Users, and Non-Recent EOCD Users

Table 4 presents a comparison between non-EOCD users (*n* = 110), 12-month EOCD users (*n* = 27), and non-recent EOCD users (*n* = 49). As shown, 12-month EOCD users were significantly less likely than the non-EOCD users and the non-recent EOCD users to be female (59% v. 85% and 78%, $p < 0.05$). In addition, 12-month EOCD users were significantly more likely than the non-users and the non-recent users to be younger (85% v. 58% and 51%, $p < 0.01$) and to have used marijuana (67% v. 26% and 55%, $p < 0.001$), powder cocaine (52% v. 2% and 4%, $p < 0.001$), and methamphetamine (19% v. 0%, $p < 0.01$) during the 12 months preceding the interview.

Table 2. Drug Use Prevalence Rates
(*n* = 186)

Time frame	Percentage
12-month use of:	
Alcohol	93
Marijuana	39
Powder cocaine	9
Crack cocaine	<1
Crystal methamphetamine	3
Heroin	1
PCP	1
LSD/acid	4
MDMA	10
Ketamine	2
GHB	1
Rohypnol	1
Foxy	2
Ya Ba	0
Viagra	2
2-day use of:	
Alcohol	80
Marijuana	16
Powder cocaine	0
Crack cocaine	0
Crystal methamphetamine	<1
Heroin	0
PCP	0
LSD/acid	<1
MDMA	<1
Ketamine	<1
GHB	0
Rohypnol	0
Foxy	<1
Ya Ba	0
Viagra	0
Use of ecstasy and other club drugs (EOCD)	
Lifetime	41
12-month	15
2-day	2

Table 3. Affirmative Responses to
Dependence Symptoms
($n = 186$)

Diagnostic question	Percentage
• Have you ever spent a great deal of time getting, using, or getting over the effects of ecstasy?	3
• Have you often wanted to cut down on ecstasy, or ever tried to cut down, but couldn't?	1
• Did you continue to use ecstasy after you realized it was causing problems with your family, friends, on the job, at school, or with police?	2
• At least one symptom (of 3)	5

Perceived Harm

Independent sample *t*-tests were used to compare the 12-month EOCD users to the non-EOCD users and the non-recent EOCD users with respect to the perceived harm caused by alcohol and other drugs. As shown in Table 5, the 12-month EOCD users and the non-recent EOCD users perceived marijuana as the drug with the *least* amount of risk when used once or twice. For the non-EOCD users, alcohol was perceived as the drug with the *least* amount of risk when used once or twice. The use of heroin once or twice was associated with the *most* risk for all three subgroups. Non-EOCD users were significantly more likely than the 12-month EOCD users to perceive greater risk with the use of most drugs once or twice, including powder cocaine (3.56 v. 3.11, $p < 0.01$), ecstasy (3.43 v. 2.59, $p < 0.001$), Ketamine (3.67 v. 2.85, $p < 0.001$), and Ya Ba (3.71 v. 2.95, $p < 0.001$). No significant differences were discerned between the three subgroups with respect to the use of Viagra once or twice.

With the exception of marijuana and Viagra, 12-month EOCD users and the non-recent EOCD users perceived moderate to great risk with the regular use of all drugs. The non-EOCD users perceived moderate to great risk with the regular use of all drugs. The non-EOCD users were significantly more likely than the past-year users to perceive greater risk with the regular use of most club drugs, including PCP (3.95 v. 3.81, $p < 0.001$), ecstasy (3.86 v. 3.59, $p < 0.001$), Ketamine (3.92 v. 3.59, $p < 0.001$), and Rohypnol (3.94 v. 3.67, $p < 0.001$). No significant differences were discerned between the three subgroups with respect to the regular use of Viagra.

Table 4. Comparison between Non-EOCD Users, 12-Month EOCD Users, and Non-Recent EOCD Users ($n = 186$)

Variable	Non-EOCD users ($n = 110$)	12-month EOCD users ($n = 27$)	Non-recent EOCD users ($n = 49$)
Sex			
Female	85%*	59%*	78%*
Race			
White	77%	70%	74%
Age			
25 and under	58%**	85%**	51%**
Employment status			
Employed at least part-time	87%	78%	86%
Educational level			
Completed at least 12th grade	99%***	85%***	100%***
Sexual orientation			
Homosexual	67%	63%	57%
Bisexual	22%	26%	25%
Heterosexual	11%	11%	18%
12-month use of:			
Alcohol	91%	100%	94%
Marijuana	26%***	67%***	55%***
Powder cocaine	2%***	52%***	4%***
Crack cocaine	0%	4%	0%
Methamphetamine	0%***	19%***	0%***
Heroin	0%	4%	0%

*Significant at the $p < 0.05$ level.**Significant at the $p < 0.01$ level.***Significant at the $p < 0.001$ level.

DISCUSSION

The use of EOCD is unquestionably injurious to the human body. The effects associated with ecstasy use include depression, memory loss, and paranoia [47-49]. Ketamine ingestion can lead to impaired motor functioning and hallucinations [34-36], while the effects of Rohypnol use include decreased blood pressure and mental lethargy [39]. GHB is a depressant that sedates the body and slows the heart rate [41], while LSD and PCP use can lead to increased body temperature, tremors, and abnormalities in sensory perceptions [32]. Initial

Table 5. Comparison between Non-EOCD Users, 12-Month EOCD Users, and Non-Recent EOCD Users ($n = 186$)

Variable	Non-EOCD users ($n = 110$)	12-month EOCD users ($n = 27$)	Non-recent EOCD users ($n = 49$)
Risk associated with use once or twice of:			
Alcohol	2.14	1.96	2.14
Marijuana	2.21	1.56	1.82
Powder cocaine	3.56**	3.11**	2.90
Crack cocaine	3.74***	3.27***	3.41
Crystal methamphetamine	3.75***	3.15***	3.41
Heroin	3.80***	3.42***	3.63
PCP	3.80***	3.04***	3.47
LSD/acid	3.64**	2.88**	2.94
Ecstasy	3.43***	2.59***	2.79
Ketamine	3.67***	2.85***	3.30
GHB	3.65***	2.88***	3.28
Rohypnol	3.74***	3.04***	3.48
Foxy	3.69***	2.96***	3.25
Ya Ba	3.71***	2.95***	3.45***
Viagra	2.28	1.77	1.98
Risk associated with regular use of:			
Alcohol	3.46	3.56	3.33
Marijuana	3.25	2.74	2.67
Powder cocaine	3.94	3.89*	3.69*
Crack cocaine	3.97	3.96	3.84
Crystal methamphetamine	3.98	3.93	3.88
Heroin	3.97	3.92	3.92
PCP	3.95***	3.81***	3.83
LSD/acid	3.92***	3.65***	3.69
Ecstasy	3.86***	3.59***	3.55
Ketamine	3.92***	3.59***	3.80
GHB	3.89	3.81	3.85
Rohypnol	3.94***	3.67***	3.89
Foxy	3.89****	3.57***	3.83
Ya Ba	3.91***	3.63***	3.85
Viagra	3.06	2.36	2.70

*Significant at the $p < 0.05$ level.**Significant at the $p < 0.01$ level.***Significant at the $p < 0.001$ level.

evidence also suggests that permanent serotonin depletion may be a long-term neurotoxic effect of ecstasy ingestion [50, 51]. In addition, ecstasy-related deaths have been reported at raves, where its ingestion, combined with the hot, crowded conditions, can lead to dehydration, hyperthermia, and heart or kidney failure [52, 53].

In the current study, we collected data on personal drug use and high-risk sexual behaviors from a sample of adult, primarily homosexual, club attendees in Washington, DC, during the summer of 2003. Our high rates of participation should encourage other investigators to study members of this population. EOCD prevalence rates were low. With the exception of marijuana, two-day self-reports for all illicit drugs were less than 1%. These low prevalence rates aside, we estimate that 5% of our sample may be dependent on ecstasy. Not surprisingly, non-EOCD users were significantly more likely than the 12-month EOCD users to perceive greater risk with the use of most drugs once or twice and regularly.

Three methodological limitations should be noted. First, the external validity of our findings is unknown because we studied a sample of primarily lesbian club attendees from a single club in Washington, DC. Because the results may not be representative of all homosexual club goers, we recommend additional studies before generalizability can be discussed more sensibly. Second, because the EOCD users in our primarily female sample were more likely to be male, a study with primarily homosexual male club attendees should be undertaken. This would permit a more definite conclusion regarding the prevalence of EOCD use among gay *and* lesbian club attendees. Third, the CADS may not be the ideal tool to screen for ecstasy dependence. Future research should validate a tool to screen specifically for MDMA dependence and field test it with a sample of club attendees.

The findings in the current study, amalgamated with results from other EOCD-related studies, offer considerable insight into the state of ecstasy and other club drugs in American society. The findings are clear. There is only one population in which ecstasy has proliferated to any significant degree—rave attendees. Studies with rave attendees in the United States have consistently indicated high levels of ecstasy use relative to other populations, including criminal offenders [54-57], high school and college students [58-64], and youthful household respondents [65, 66]. While the current study does not preclude the possibility that homosexual male club attendees may be at risk for EOCD use (see recommendation above), these findings, taken collectively with the results from our studies of rave attendees [7, 9, 10], strongly suggest that the EOCD use is overrepresented among rave attendees relative to all other populations.

The overrepresentation of EOCD use among rave attendees requires that we consider the implementation of prevention interventions with members of this population. While it is difficult to know whether the use of ecstasy will escalate like the crack cocaine epidemic of the 1980s, it is more prudent to spend prevention dollars now than treatment dollars later. That said, prevention dollars must

be spent wisely. It is more important to target the population *at highest risk* for ecstasy use rather than distributing prevention funds to populations who need little or no protection from the underlying behavior. Given that rave attendees are at the highest risk for EOCD use relative to all other populations of youth, they should be targeted for intervention. Because rave attendees comprise a hidden population, however, the task is not an uncomplicated one. That said, a community-level intervention may be a reasonable prevention alternative for rave attendees.

Community-level interventions move beyond traditional settings and attempt to make changes within the largest proportion of a given population [67]. While the formats may differ, all community-level prevention efforts strive to place intervention activities in the context of individuals' daily lives. Community-level approaches have three primary advantages: 1) they reach more persons in the community than one-on-one interventions; 2) they involve community members; and 3) specific populations can receive explicit prevention messages [68].

The decision to implement a specific prevention program within any population should be based on that program's empirical support. The Center for Substance Abuse Prevention (CSAP) has identified a plethora of model prevention programs that have been empirically tested across the United States [69]. The AIDS Community Demonstration Projects (ACDP) is one such model. The ACDP was a 5-year study (1989–1994) that evaluated the impact of community-level HIV prevention interventions in Dallas, Denver, Long Beach, New York City, and Seattle [70, 71]. Target populations included injection drug users, female sex partners of injection drug users, female commercial sex workers, non-gay-identified men who had sex with men, and youth in high-risk situations. The two primary objectives of the ACDP were to increase the prevalence of consistent condom use among targeted groups and to increase the use of bleach to clean injection equipment among drug users [70].

The ACDP used a quasi-experimental design with 10 matched intervention and comparison communities. A total of 15,205 field interviews were conducted across five sites. Analyses suggested overall program success, both in terms of outcome and process evaluations [72–81]. One of the fundamental goals of the ACDP was to illustrate that peer volunteers could be effective as a means of disseminating information among hidden populations. Overall, results indicated that the ACDP had success in reaching members of the target population. In the last three waves of data collection, for example, 70% of interviewees recalled seeing ACDP intervention materials in the three months preceding the interview [78].

Outcome findings were equally encouraging. In Long Beach, for example, rates of condom carrying in the intervention community ($n = 1,497$) increased from 10% to 27% ($p < 0.001$) between baseline and post-intervention [76]. No increases were witnessed in the comparison community ($n = 1,584$). Moreover, women who reported exposure to ACDP in Long Beach were more likely to use condoms

consistently with main ($p < 0.05$) and non-main ($p < 0.001$) partners than those who were not exposed [73, 74]. In Denver, subjects in the intervention community ($n = 890$) were three times more likely ($p < 0.001$) than comparison community respondents ($n = 1,107$) to use bleach consistently post-intervention and 14 times more likely ($p < 0.001$) to use condoms consistently with main partners [80]. Taken collectively, the results demonstrate that the ACDP was an effective community-level intervention for reducing high-risk behaviors.

The ACDP would be an appropriate prevention model for rave attendees. A three-pronged effort could be undertaken: 1) the development and distribution of flyers and pamphlets; 2) the development and marketing of a Web site designed specifically for rave attendees; and 3) the distribution of condoms and promotional materials. Consistent with the ACDP, flyers and pamphlets on the dangers associated with EOCD use and high-risk sexual activity could be developed and distributed to rave attendees. Because many of the pamphlets developed for this younger population, while informative, are likely to be misunderstood or discarded without careful consideration, trained staff members could attempt to engage the rave attendees in conversations about the contents of the pamphlets, thereby making them more relevant to the venue and the recipient.

The second component of the proposed prevention intervention would be the creation and marketing of a Web site tailored specifically to rave attendees. The Web site could contain general information about the dangers associated with EOCD use and high-risk sexual activity; information about the legal penalties associated with EOCD production, sale, and possession; information about the relationship between EOCD use and high-risk sexual behaviors; information about a diagnostic tool to self-diagnose AOD dependence; and electronic links to national, state, and local substance abuse prevention and treatment resources (e.g., CSAP and the National Institute on Drug Abuse (NIDA)). Moreover, dates and times for Internet chat rooms for exchanging information on EOCD use and high-risk sexual activity could be advertised. In addition to providing rave attendees with the Internet address for the Web site, laptop computers could be used to provide on-site demonstrations of the Web site.

Third, condoms and promotional materials could be distributed to rave attendees. Consistent with the environmental facilitation component of the ACDP, this promotion would encourage the use of condoms by making them readily available to persons at risk. Given the college-age population, backpacks that contain a variety of promotional materials (e.g., t-shirts, magnets, pens, and key rings) could be distributed. Each item, including the backpack, would have a newly created logo and the address of the Web site.

Rave attendees comprise the population *at highest risk* for EOCD use, including criminal offenders, high school and college students, and youthful household respondents. If federal agencies are interested in preventing EOCD use and abuse, a scientifically driven approach is warranted. Given the overwhelming evidence that EOCD use is concentrated among rave attendees, prevention efforts among

other populations (e.g., juvenile offenders) or within other settings (e.g., schools) may not be worthwhile. By focusing on rave attendees in their natural settings, prevention specialists would be assured that the EOCD-related interventions are reaching the population for which they would be most beneficial.

REFERENCES

1. C. Critcher, "Still Raving": Social Reaction to Ecstasy, *Leisure Studies*, 19, pp. 145–162, 2000.
2. E. Weir, Raves: A Review of the Culture, the Drugs and the Prevention of Harm, *Canadian Medical Association Journal*, 162:13, pp. 1843–1848, 2000.
3. G. Yacoubian, The Global Proliferation of Ecstasy, *International Journal of Comparative Criminology*, 1, pp. 127–136, 2001.
4. D. Leinwand and G. Fields, Crack Down on Ecstasy, *USA Today*, pp. A1, A4, April 19, 2000.
5. R. H. Schwartz and N. S. Miller, MDMA (Ecstasy) and the Rave: A Review, *Pediatrics*, 100:4, pp. 705–708, 1997.
6. T. Randall, "Rave" Scene, Ecstasy Use, Leap Atlantic, *Journal of the American Medical Association*, 268, pp. 1506, 1992.
7. 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.
8. G. Yacoubian and E. D. Wish, Exploring the Validity of Self-Reported Ecstasy Use among Club Rave Attendees, *Journal of Psychoactive Drugs*, in press.
9. G. Yacoubian, C. L. Boyle, C. A. Harding, and E. A. Loftus, Estimating the Prevalence and Perceived Harm of Ecstasy and Other Drugs among Club Rave Attendees, *Journal of Drug Education*, 33:2, pp. 187–196, 2003.
10. G. Yacoubian, J. Deutsch, and E. Schumacher, Estimating the Prevalence of Ecstasy Use among Club Rave Attendees, *Contemporary Drug Problems*, 31, pp. 163–177, 2004.
11. A. Boys, S. Lenton, and N. Norcross, Polydrug Use at Raves by a Western Australian Sample, *Drug and Alcohol Review*, 16, pp. 227–234, 1997.
12. E. R. S. Brown, D. R. Jarvie, and D. Simpson, Use of Drugs at 'Raves,' *Scottish Medical Journal*, 40, pp. 168–171, 1995.
13. S. R. Gross, S. P. Barrett, J. S. Shestowsky, and R. O. Pihl, Ecstasy and Drug Consumption Patterns: A Canadian Rave Population Study, *Canadian Journal of Psychiatry*, 47:6, pp. 546–551, 2002.
14. W. R. Palacios and M. E. Fenwick, E is for Ecstasy: A Participant-Observation of Ecstasy Use, in *In Their Own Words: Criminals on Crime* (3rd Ed.), P. F. Cromwell (Ed.), Roxbury Publishing Company, Los Angeles, pp. 295–301, 2002.
15. C. Siokou, Rave Culture, *Youth Studies Australia*, 21:1, pp. 11–19, 2002.
16. T. Ter Bogt, R. Engels, B. Hibbel, F. Van Wel, and S. Verhagen, "Dancestasy": Dance and MDMA Use in Dutch Youth Culture, *Contemporary Drug Problems*, 29, pp. 157–181, 2002.
17. S. Thornton, *Club Cultures: Music Media and Subcultural Capital*, University Press of New England, Hanover, 1996.
18. 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.

19. A. R. Winstock, K. Wolff, and J. Ramsey, 4-MTA: A New Synthetic Drug on the Dance Scene, *Drug and Alcohol Dependence*, 67, pp. 111–115, 2002.
20. A. R. Winstock, P. Griffiths, and D. Stewart, Drugs and the Dance Music Scene: A Survey of Current Drug Use Patterns among a Sample of Dance Music Enthusiasts in the UK, *Drug and Alcohol Dependence*, 64, pp. 9–17, 2001.
21. S. C. E. Riley, C. James, D. Gregory, H. Dingle, and M. Cadger, Patterns of Recreational Drug Use at Dance Events in Edinburgh, Scotland, *Addiction*, 96, pp. 1035–1047, 2001.
22. F. Measham, H. Parker, and J. Aldridge, *Dancing on Drugs: Risk, Health and Hedonism in the British Club Scene*, Free Association, London, 2001.
23. H. Zhao, R. Brenneisen, A. Scholer, A. J. McNally, M. A. ElSohly, T. P. Murphy, and S. J. Salamone, Profiles of Urine Samples Taken from Ecstasy Users at Rave Parties: Analysis by Immunoassays, HPLC, and GC-MS, *Journal of Analytical Toxicology*, 25, pp. 258–269, 2001.
24. M. Collin and J. Godfrey, *Altered State: The Story of Ecstasy Culture and Acid House*, Serpent's Tail, New York, 1997.
25. 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.
26. S. Lenton and P. Davidson, Raves, Drugs, Dealing and Driving: Qualitative Data from a West Australian Sample, *Drug and Alcohol Review*, 18, pp. 153–161, 1999.
27. S. Lenton, A. Boys, and K. Norcross, Raves, Drugs and Experience: Drug Use by a Sample of People Who Attend Raves in Western Australia, *Addiction*, 92:10, pp. 1327–1337, 1997.
28. K. Sherlock and M. Connor, Patterns of Ecstasy Use amongst Club-Goers on the UK "Dance Scene," *International Journal of Drug Policy*, 10, pp. 117–129, 1999.
29. 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*, 29:3, pp. 679–702, 1999.
30. A. J. M. Forsyth, Places and Patterns of Drug Use in the Scottish Dance Scene, *Addiction*, 91, pp. 511–521, 1996.
31. A. J. M. Forsyth, Are Raves Drug Supermarkets? *The International Journal of Drug Policy*, 7:2, pp. 105–110, 1996.
32. E. S. Rome, It's a Rave New World: Rave Culture and Illicit Drug Use in the Young, *Cleveland Clinic Journal of Medicine*, 68:6, pp. 541–550, 2001.
33. V. Curran and C. Morgan, Cognitive, Dissociative, and Psychogenic Effects of Ketamine in Recreational Users on the Night of Drug Use and 3 Days Later, *Addiction*, 95, pp. 575–590, 2000.
34. P. J. Dalgarno and D. Shewan, Illicit Use of Ketamine in Scotland, *Journal of Psychoactive Drugs*, 28:2, pp. 191–199, 1996.
35. J. W. Dotson, D. L. Ackerman, and L. J. West, Ketamine Abuse, *Journal of Drug Issues*, 25:4, pp. 751–757, 1995.
36. K. L. R. Jansen, A Review of the Nonmedical Use of Ketamine: Use, Users, and Consequences, *Journal of Psychoactive Drugs*, 32:4, pp. 419–433, 2000.
37. S. R. Calhoun, D. R. Wesson, G. P. Galloway, and D. E. Smith, Abuse of Flunitrazepam (Rohypnol) and Other Benzodiazepines in Austin and South Texas, *Journal of Psychoactive Drugs*, 28:2, pp. 183–189, 1996.

38. V. I. Rickert, C. M. Wiemann, and A. B. Berenson, Prevalence, Patterns, and Correlates of Voluntary Flunitrazepam Use, *Pediatrics*, 103:1, pp. 1–5, 1999.
39. C. A. Saum and J. A. Inciardi, Rohypnol Misuse in the United States, *Substance Use and Misuse*, 32:6, pp. 723–731, 1997.
40. T. O'Connell, L. Kaye, and J. J. Plosay, Gamma Hydroxybutyrate (GHB): A Newer Drug of Abuse, *American Family Physician*, 62:11, pp. 2478–2482, 2000.
41. J. D. Roper-Miller, and B. A. Goldberger, Recreational Drugs: Current Trends in the 90s, *Clinical Laboratory Medicine*, 18, pp. 727–747, 1998.
42. A. Shulgin and A. Shulgin, *TiKHAL: The Continuation*, Transform Press, Berkeley, 1997.
43. D. Leinwand, Fed Raid Targets New Asian Drug, *USA Today*, August 21, 2002. Available at http://www.usatoday.com/news/nation/2002-08-20-drug-asian_x.htm.
44. K. L. R. Jansen, Ecstasy (MDMA) Dependence, *Drug and Alcohol Dependence*, 53, pp. 121–124, 1999.
45. E. D. Wish, K. R. Petronis, and G. Yacoubian, CADS: Two Short Screeners for Cocaine and Heroin Dependence among Arrestees, *Journal of Drug Issues*, 32:3, pp. 907–920, 2002.
46. E. M. Gorman and R. T. Carroll, Substance Abuse and HIV: Considerations with Regard to Methamphetamine and Other Recreational Drugs for Nursing Practice and Research, *Journal of the Association of Nurses in AIDS Care*, 11:2, pp. 51–62, 2000.
47. K. I. Bolla, U. D. McCann, and G. A. Ricaurte, Memory Impairment in Abstinent MDMA (“Ecstasy”) Users, *Neurology*, 51, pp. 1532–1537, 1999.
48. M. J. Morgan, Ecstasy (MDMA): A Review of Its Possible Persistent Psychological Effects, *Psychopharmacology*, 152:3, pp. 230–248, 2000.
49. S. J. Peroutka, H. Newman, and H. Harris, Subjective Effects of 3,4-Methylenedioxy-methamphetamine in Recreational Users, *Neuropsychopharmacology*, 1, pp. 273–277, 1988.
50. A. G. Montoya, R. Sorrentino, S. E. Lukas, and B. H. Price, Long-Term Neuropsychiatric Consequences of “Ecstasy” (MDMA): A Review, *Harvard Review of Psychiatry*, 10, pp. 212–220, 2002.
51. G. A. Ricaurte, U. D. McCann, Z. Szabo, and U. Scheffel, Toxicodynamics and Long-Term Toxicity of the Recreational Drug, 3,4-Methylenedioxymethamphetamine (MDMA, “Ecstasy”), *Toxicology Letters*, pp. 112–113, 143–146, 2000.
52. S. Karch, Ecstasy in Glasgow, *Forensic Drug Abuse Advisor*, 7:3, p. 19, 1995.
53. T. Randall, Ecstasy-Fueled ‘Rave’ Parties Become Dances of Death for English Youth, *Journal of the American Medical Association*, 268, pp. 1505–1506, 1992.
54. G. Yacoubian, E. D. Wish, J. D. Choyka, C. L. Boyle, C. A. Harding, and E. A. Loftus, Estimating the Prevalence and Perceived Harm of Ecstasy and Other Drugs among Juvenile Offenders, *Journal of Ethnicity in Substance Abuse*, in press.
55. 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*, 1:4, pp. 1–13, 2003.
56. G. Yacoubian, Estimating the Prevalence of Recent Ecstasy Use among National Arrestees, *Federal Probation*, 66:3, pp. 17–18, 2003.
57. G. Yacoubian, A. Arria, E. Fost, and E. D. Wish, Estimating the Prevalence of Ecstasy Use among Juvenile Offenders, *Journal of Psychoactive Drugs*, 34:2, pp. 209–213, 2002.

58. G. Yacoubian, M. Green, and R. Peters, Identifying the Prevalence and Correlates of Ecstasy and Other Club Drug (EOCD) Use among High School Seniors, *Journal of Ethnicity in Substance Abuse*, 2:2, pp. 53–66, 2003.
59. L. D. Johnston, P. M. O'Malley, and J. G. Bachman, *The Monitoring the Future National Survey Results on Adolescent Drug Use: Overview of Key Findings*, 2002, National Institute on Drug Abuse, Bethesda, Maryland, 2003.
60. G. Yacoubian, Correlates of Ecstasy Use among Students Surveyed through the College Alcohol Survey, *Journal of Drug Education*, 33:1, pp. 61–69, 2003.
61. G. Yacoubian, Correlates of Ecstasy Use among 10th Graders Surveyed through Monitoring the Future, *Journal of Psychoactive Drugs*, 34:2, pp. 225–230, 2002.
62. G. Yacoubian, Correlates of Ecstasy Use among High School Seniors Surveyed through Monitoring the Future, *Drugs: Education, Prevention and Policy*, 10:1, pp. 65–72, 2002.
63. 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.
64. H. Wechsler, *Harvard School of Public Health College Alcohol Study II: A Search for Change and Its Correlates*, Harvard School of Public Health, Boston, Massachusetts, 1997.
65. G. Yacoubian, The Emergence of Ecstasy: Findings from the National Household Survey on Drug Abuse, *Justice Policy Journal*, 1:2, 2002. Available at <http://www.cjcj.org/jpj/index.php>.
66. G. Yacoubian and B. J. Urbach, Exploring the Temporal Relationship Between Race and the Use of Ecstasy: Findings from the National Household Survey on Drug Abuse, *Journal of Psychoactive Drugs*, in press.
67. A. McAlister, Community Studies of Smoking Cessation and Prevention, In *Report to the Surgeon General on the Health Consequences of Smoking: Obstructive Lung Disease*, U. S. Department of Health and Human Services, Rockville, Maryland, 1984.
68. Centers for Disease Control and Prevention, Community-Level Prevention of Human Immunodeficiency Virus Infection among High-Risk Populations: The AIDS Community Demonstration Projects, *MMWR Recommendations and Reports*, 10:RR-6, pp. 1–24, 1996.
69. Substance Abuse and Mental Health Services Administration, *2001 Exemplary Substance Abuse Prevention Programs*, Substance Abuse and Mental Health Services Administration, Rockville, Maryland, 2002.
70. Centers for Disease Control and Prevention, *AIDS Community Demonstration Projects: What We Have Learned, 1985-1990*, Centers for Disease Control and Prevention, Atlanta, Georgia, 1992.
71. N. H. Corby, M. S. Jamner, and R. J. Wolitski, Using the Theory of Planned Behavior to Predict Intention to Use Condoms among Male and Female Injection Drug Users, *Journal of Applied Social Psychology*, 26, pp. 52–75, 1996.
72. CDC AIDS Community Demonstration Projects Research Group, The CDC AIDS Community Demonstration Projects: A Multi-Site Community-Level Intervention to Promote HIV Risk Reduction, *American Journal of Public Health*, 89:3, pp. 336–345, 1999.
73. N. H. Corby and R. J. Wolitski, *Community HIV Prevention: The Long Beach AIDS Community Demonstration Project*, The University Press, Long Beach, California, 1997.

74. N. J. Corby and R. J. Wolitski, Condom Use with Main and Other Partners among High-Risk Women: Intervention Outcome and Correlates of Behavior, *Drugs and Society*, 9, pp. 75–96, 1996.
75. G. M. Goldbaum, T. Perdue, R. J. Wolitski, C. A. Rietmeijer, A. Hedrich, R. W. Wood, M. Fishbein, and the AIDS Community Demonstration Projects, Differences in Risk Behavior and Sources of AIDS Information among Gay, Bisexual, and Straight-Identified Men Who Have Sex with Men, *AIDS and Behavior*, 2, pp. 3–21, 1998.
76. M. S. Jamner, R. J. Wolitski, and N. H. Corby, Impact of a Community HIV Intervention Targeting Injecting Drug Users' Stage of Change for Condom and Bleach Use, *American Journal of Health Promotion*, 12, pp. 15–24, 1997.
77. M. S. Jamner, R. J. Wolitski, and N. H. Corby, Bleaching Injection Equipment: Influencing Factors among IDUs Who Share, *Substance Use and Misuse*, 31, pp. 1973–1993, 1996.
78. M. S. Jamner and R. J. Wolitski, Findings of the Long Beach AIDS Community Demonstration Project, in *Community HIV Prevention: The Long Beach AIDS Community Demonstration Project*, N. H. Corby and R. J. Wolitski (eds.), The University Press, Long Beach, California, pp. 107–124, 1997.
79. M. Krepcho, M. E. Fernandez-Asker, A. C. Freeman, E. Magee, and A. McAlister, Predictors of Bleach Use among Current African-American Injecting Drug Users: A Community Study, *Journal of Psychoactive Drugs*, 25, pp. 135–141, 1993.
80. C. A. Rietmeijer, M. S. Kane, P. Z. Simons, N. H. Corby, R. J. Wolitski, D. L. Higgins, F. N. Judson, and D. L. Cohn, Increasing the Use of Bleach and Condoms among Injection Drug Users in Denver: Outcomes of a Community-Level HIV Prevention Program, *AIDS*, 10, pp. 291–298, 1996.
81. D. J. Schnell, C. Galavotti, M. Fishbein, D. Chen, and the AIDS Community Demonstration Projects, Measuring the Adoption of Consistent Use of Condoms Using the Stages of Change Model, *Public Health Reports*, 111, pp. 59–68, 1996.

Direct reprint requests to:

George S. Yacoubian, Ph.D.

PIRE

11710 Beltsville Drive, Suite 300

Calverton, MD 20705-3102

e-mail: gyacoubian@pire.org