Assessment of Club Patrons' Alcohol and Drug Use:

The Use of Biological Markers

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Abstract

Background—Young adulthood (ages 18–25 years) represents a time when high-risk behaviors, including alcohol and drug use, peak. Electronic music dance events (EMDEs) featured at clubs provide an ecologic niche for these high-risk behaviors.

Purpose—This paper examines the prevalence of alcohol and drug use among EMDE patrons. Examination of personal characteristics associated with exit levels of alcohol and drug use identifies important indicators of risk taking for prevention strategies.

Methods—Data were collected anonymously during 2010–2012 from 2028 patrons as they entered and exited clubs in the San Francisco Bay area featuring EMDEs. Nearly half were aged 25 years. Biological measures of drug and alcohol and self-reported personal characteristics were attained. Analyses were completed in 2012.

Results—At entrance, more than one fifth of patrons were positive for drug use and one fourth arrived either impaired (blood alcohol concentration [BAC]: 0.05%–0.079%) or intoxicated (BAC: >0.08%) by alcohol. At exit, one fourth tested positive for drugs, and nearly half were impaired or intoxicated by alcohol. Individual characteristics that were important for levels of risk included prior alcohol use behaviors, sexual identity, ethnic/racial identity, and transportation to the event. Gender did not differentiate for alcohol use but fewer women used drugs.

Conclusions—Findings confirm the importance of targeting EMDEs for prevention efforts. EMDEs attract young working adults who are engaged in heavy alcohol and/or drug use. Targeting these social settings for delivering public health prevention strategies regarding alcohol and drug use and related harms is indicated by the findings.

Introduction

Young adulthood (aged 18–25 years) is a time when many risk behaviors peak, such as alcohol and drug use, certain sexual behaviors, and driving while intoxicated.[1,2] Risk behavior is common during this time because of the freedom from parental monitoring typical at this stage, often combined with lack of responsibilities such as marriage or

parenthood.[1,3] Thus, young adults tend to have high rates of alcohol (60.7% in the past month) and drug (21.4% in the past month) use, and binge drinking (40.6% in the past month),[4] which is strongly related to the increased likelihood of impaired driving.[5] About one fifth (19%) of young adults have used marijuana in the past month, 1.4% cocaine, and 0.9% ecstasy.[6]

Clubs attract young adults who are engaged in a range of risky behaviors, including heavy drinking, drug use, driving under the influence of alcohol and riding with a drinking driver.[7–10] Prior studies have primarily relied on self-reports of drug and alcohol use,[11–13] which do not always match biological measurements. One explanation for the relationships between clubs and the emergence of risky behaviors may be that these settings provide space for "time-out" behavior. Time-out is defined by lowered social controls and less individual accountability for behavior.[14,15]

Clubs represent one location for time-out behaviors in that expectations of acceptable behavior are expanded and deviance is more legitimized.[14] Clubs may also attract individuals who are seeking such experiences. An important framework relevant to these relationships is the overall ecologic model proposed by Bronfenbrenner.[16] An individual's social behavior must be considered within the social contexts where it takes place (e.g., club, peer group).

Characteristics and behaviors of individual patrons that may increase the risk of greater alcohol and drug use include being male, intending to get drunk, intending to drink after leaving, and spending more time in the bar.[17] Lesbian, gay, bisexual and transsexual identities have also been reported as risk factors for increased drug use, alcohol use and related problems (heavy drinking, alcohol dependence, and alcohol-related consequences such as negative health or legal consequences) in bar settings.[18–20] Most studies have examined behavior in bars, and few studies have examined risks related to electronic music dance events (EMDEs) at clubs, which are reported as attracting patrons who use alcohol and drugs.[7–9]

Knowledge regarding alcohol and other drug use connected to specific high-risk ecologic moments provides targeted opportunities for developing prevention and intervention strategies for health promotion. The current study is directed at determining whether the club setting, particularly those that feature EMDEs, is an appropriate ecologic niche for these high-risk occasions. The clubs used in the current study were located in the San Francisco Bay area.

At EMDEs, both dancing and electronic music (as opposed to live music) are featured, often with well-known disk jockeys delivering the music in a specific genre and style that constitutes an event. Generally, space is largely devoted to dancing and standing next to bars, noise levels are high as the music predominates, and the clubs are crowded. EMDEs occur in clubs that are physical locations and that serve alcohol. Clubs are required to perform identification checks at the door and are legally required to ensure responsible beverage service.

Few studies have examined prevalence of heavy alcohol use and drug use at EMDEs, and little work has focused on the individual-level risks associated with heavy alcohol and drug use. Identification of personal characteristics may permit more targeted efforts to direct prevention strategies. Also, by gaining more knowledge about the level of risk associated with these events and the personal characteristics of the risk takers, future strategies can be developed to reach young adults in settings and times when high-risk behaviors are occurring. Further, the importance of targeting these social settings for delivering public health prevention strategies and safety messages regarding alcohol and drug use and related

harms, is emphasized by more careful examination of the level of risks across multiple years and settings.

Using a sample of patrons at entry and exit to clubs featuring EMDEs, the following hypotheses were tested: (1) Patrons attracted to EMDEs will have high levels of alcohol and drug use, both at entrance and exit; (2) Patron characteristics and behaviors will identify individuals at high risk for leaving a club with high levels of alcohol use or under the influence of drugs.

Methods

Data were collected from patrons as they entered and exited clubs for 70 different EMDEs featured at ten clubs in the San Francisco area on an evening during 2010–2012. Criteria for club inclusion were attendance of at least 200 patrons (weekend nights) and agreement by management for data collection. Initially randomly selected clubs from a prior study were chosen and this list was supplemented by key informants who provided a more extensive list of clubs. Three clubs refused access. Data collection occurred mostly on Friday and Saturday nights, beginning around 9:30pm and ended at closing (typically 2 a.m.). Clubs were randomly rotated so that data collection nights were not predictable.

Procedures

Participants were recruited as they approached the club, and the entire group was invited to participate.[8,21] Although the current sampling method did not achieve a random sample of all club patrons, there was random selection of patrons entering the specific clubs that were in the convenience sample. Street recruitment is difficult and 39.5% of the people approached did not stop. Of the groups informed and eligible (i.e., going to club, not working at club), the percentage of patrons participating varied widely across clubs and EMDEs (13% to 93.8%). Across EMDEs, the median participation rate was 57.9%. Refusal reasons included being in a hurry to enter the club (29.9%); hesitancy to provide data (8.5%); and weather related (5.0%).

After informed consent was obtained, a wrist band with a unique identifier maintained anonymity but allowed entrance and exit data to be linked. Brief interviews were followed by self-administered questionnaires. Both oral fluid and breath tests were collected. Exit procedures mirrored entry. Participants received $10 at entrance and $20 at exit. All drug and alcohol results were conducted offsite and were not available onsite. Procedures were approved by the IRB at the Pacific Institute for Research and Evaluation.

No drug or alcohol use results were available in the field. If patrons reported being buzzed or intoxicated and planning to drive, supervisors were required to intervene (e.g., convince them to ride with someone else, to take public transportation) and take extra measures if this was unsuccessful (e.g., enlist help from club security). Those exhibiting obvious drunk/ drugged behaviors (based on staff training on observational skills) were approached as well to determine if there was a safe exit strategy (e.g., sober companion to take them home).

Measures

Drug use—Saliva samples using the Quantisal collection device provided presence of seven drug categories: (1) THC; (2) cocaine—including benzoylecogonine, cocaethylene, norcocaine; (3) amphetamine/MDMA—including methamphetamine, MDA, MDEA; (4) opiates/analgesics— including morphine, codeine, oxymorphone, 6 AM, Hydrocodone, Hydromorphone, oxycodone; (5) methadone; (6) Phencyclidine—PCP; and (7) Ketamine. GHB use was only available from self-reports. Drug presence was followed by a

confirmatory test to determine the parts per milliliter (pp mL). These levels of drug use were rescaled and multiplied by 100 and highest pp/ml within category was used. (Opiates/analgesics had different scales requiring standardization).

Alcohol use—Breath samples, taken with CMI Intoxilizer 400PA breathalyzer units, approximated blood alcohol concentration (BAC) levels. Impairment was defined as a BAC 0.05% and <0.08%, and legal intoxication was defined as a BAC 0.08%. Prior 30-day alcohol use (self-reports) was calculated by multiplying the number of drinks per drinking day by the number of drinking days in that time period. Alcohol problems were assessed for the past year through nine items adapted from the Alcohol Use Disorders Identification Test (AUDIT[22]; e.g., felt guilty after drinking, 0=never to 4=daily/almost daily).

Personal characteristics/behaviors—Demographics (gender, age, relationship status, race/ethnicity, sexual orientation, and income) were self-reported at entrance. Patrons reported their ZIP code, which was coded as 1=within San Francisco vs 0=outside of San Francisco. In addition, patrons reported how they arrived at the club (drove, rode, or another method such as taxi) and frequency of club attendance at entrance and feelings of safety at the club (1=not safe, 4=very safe), reported at exit.

Data Analysis

During 2012, descriptive statistics were conducted for sample characteristics and levels of alcohol and drug use. Chi-square tests provided comparisons between patrons who did and did not return at exit. Mixed-model regressions, using SPSS version 20, revealed the relationship between personal characteristics/behaviors with BAC and drug use levels at exit. Due to the large number of personal characteristic variables, only variables that were correlated with each outcome were included in each model. Mixed models (multilevel) were used to account for clustering of individual patrons within clubs, EMDEs, and patron groups. Club, EMDE, and group were the nested levels. BAC, cocaine level, and THC exit level were model outcomes.

Results

Sample

From a total of 2028 participants, complete entrance and exit data are available for 1797 (91.2%). Only entrance data are available for 231 participants. Examining the differences between patrons who did and did not return at exit, all demographic and personal indicators were the same.

Roughly equal proportions of women (47.1%) and men (52.4%) are represented, and 0.5% self-identified as transgender. Patrons were ages 18–21 years (18.5%); 22–25 years (29.8%); 26–35 years (37.9%); and 36 years (13.8%). (Some clubs had EMDEs open to patrons aged <21 years either on a regular or occasional basis.) The sample reflected the racial/ethnic diversity of the San Francisco Bay area. More than one quarter (28.2%) was Hispanic or Latino. Racial categories were self-identified as follows: 53.8% white, 17.5% Asian, 9.3% black, 3.1% Pacific Islander, 1.7% Native American/Alaska Native, 7.9% multiracial, and 4.5% some other race. The remaining 2.2% did not report their race.

Sexual orientation was as follows: 72.1% heterosexual, 17.8% homosexual, 7.8% bisexual, and 2.3% unsure. Slightly less than half (40.1%) described themselves as in a relationship. Approximately two thirds (59.4%) were not students; more than half were employed full-time (54.7%). Approximately half were either college graduates (34.8%) or graduates with

an advanced degree (17.6%). Annual income was reported as follows: 38.6% at $20,000; 20.0% at $20,001–$40,000; 17.3% at $40,001–$60,000; and 24.1% at $60,001.

Prevalence of Drug and Alcohol Use at Entry and Exit

For the entire sample, slightly more than one fifth (22.3%) of patrons used drugs, and half (54.9%) used alcohol prior to entering the club (Table 1). One fourth (26.3%) of the patrons were either impaired or intoxicated at entrance. Comparisons between those who did and did not return at exit revealed that patrons who did not return were significantly more likely to be impaired (13.9% vs 11.8%) or intoxicated (18.9% vs 13.1%) at entrance (χ^2=22.14, p<0.001). There were no significant differences in drug use for these two groups.

Based on the exit data, 71.6% of patrons had detectable levels of alcohol, and 44.8% tested as impaired or intoxicated. One fourth (25.3%) tested positive for drugs at exit (Table 1). At exit, drug assays revealed the percentages of patrons using specific drug categories: (1) THC: 18.2%; (2) cocaine: 6.5%, (3) amphetamines/MDMA: 5.4%; (4) opiates/analgesics: 1.0%; (5) methadone: 0.1%; (6) PCP: 0.1%; and (7) ketamine: 0.3%. Self-reports of GHB use were less than 1% (0.6%). An average of only one drug was detected (M=1.06, SD=0.70). Only 6.0% converted from no drug use to drug use on premises. Both drug and alcohol use was detected for 19.1% of the patrons as they left the club, and 8.7% of patrons used drugs <u>and</u> were intoxicated.

Personal Characteristics and Behaviors

Levels of alcohol, cocaine, and THC were modeled as outcomes, controlling for the nested levels of club, EMDE, and group. High BAC was predicted by being gay, lesbian, or bisexual, higher income, higher levels of alcohol consumed in the prior 30 days, alcohol problems, and drug use detected at exit (Table 2). Predictive of lower BAC at exit was being African-American and driving or riding to the club (as compared to using other transportation). Characteristics that predicted higher levels of THC included being African-American, male, heterosexual, living within San Francisco, and driving or riding as a passenger (as compared to other modes of transportation), and alcohol problems (Table 2). Higher levels of cocaine were predicted by having driven to the club and higher levels of alcohol consumed in the past 30 days (Table 2).

Discussion

Electronic music dance events that occur in clubs represent an important ecologic niche where there are young, working adults engaged in drug and alcohol use. Based on biological measurements, one quarter used drugs, and half were impaired or intoxicated from alcohol use during a single evening. For nearly 10% of patrons, drug use was combined with levels of alcohol use that meet legal criteria for intoxication.

Current findings, in comparison to a similar, smaller study,[8] indicate more marijuana use (17.7% vs 11.6%) and less cocaine and amphetamine/stimulant use (6.3% vs 11.2% and 5.1% vs 11.2%, respectively). This may be explained by the larger number of EMDEs surveyed in the current study and/or economic conditions during the years of the data collection (2010–2012) which may have decreased use of more expensive drugs. Clubs largely attract a population of young adults who attend clubs approximately three times a month.[9] From a public health perspective, the risk of unintended consequences as a result of their alcohol/drug use is a concern.

More personal indicators are related to alcohol use and marijuana use than to cocaine use, perhaps because these two drugs are more commonly used. Specifically, being self-

identified as LGBT, prior patterns of alcohol use, and alcohol problems are risk indicators for higher levels of alcohol use. Surprisingly, there were no significant differences between men and women in levels of alcohol use. Personal indicators related to drug use do indicate a gender difference, and sexual identity remains relevant. Being male and heterosexual were related to use of THC. Also, living in San Francisco as opposed to surrounding communities, driving or riding to the club, being African-American, and alcohol problems were all related to higher THC level. Fewer indicators were related to cocaine use. Patrons who drove to the club or had consumed more alcohol in the past 30 days had higher levels of cocaine at exit.

These findings are important to guiding prevention efforts. First, EMDEs are social activities where young adults who are engaged in high levels of alcohol and drug use are found. Targeting public health and safety messages for this audience may require more targeted efforts to appeal to and reach this audience. These findings also identify the importance of prevention strategies targeting female club patrons as well as male, specifically for alcohol use. Women may be particularly vulnerable to risks associated with sexual aggression when over-indulging, and encouraging strategies targeted at women may be particularly helpful to reducing these risks.[23]

Clubs that host EMDEs are expected to manage patron behaviors and to ensure public safety. However, training and licensing standards focus on beverage service and security plans.[24] Little attention has been given to assisting clubs in managing patron behavior related to potentially serious health consequences due to drugs and alcohol. Whether clubs attract high-risk patrons or whether practices permit high-risk behaviors needs further exploration. Restrictive management practices may eliminate problems in a specific club, but send high-risk individuals to other locations. However, patron reports indicate that the more they observe control exercised over "out-of control" patrons, the more likely they are to report that they will return in the next 30 days. Therefore, part of the prevention focus must be on assisting club management in implementing policies that encourage the attendance of patrons who are concerned about safety. Management practices are important for controlling over-service of alcohol. However, there is little conversion on premises from no drug use to drug use (less than 5%).

Limitations and Strengths

Limitations to these findings include that club patron behavior is only focused on clubs that feature EMDEs. Potential biases are introduced by the representativeness of clubs and patrons that agreed to participate. Further, intoxicated patrons at entrance were less likely to return at exit. Patrons using more drugs and alcohol at entrance may have been more likely to refuse to participate, but many participants did have high levels of alcohol use and drug use. This study was conducted in one west coast city and thus findings might not generalize to other cities and urban areas. In addition, seasonal and date variations in data collection may have affected findings, but these were random, not systematic, variations, and so any influence should be minimized. Future analyses will examine the relationship of risky outcomes for EMDE patrons to event- and club-level data.

Important strengths of this study include the use of biological measures of alcohol and drug use rather than self-report measures. Drugs obtained from nonmedical sources may not be accurately represented and the dosage of the pharmaceutic agent can vary from sample to sample, making accurate self-reports difficult even among truthful participants. This sample included diversity both in ethnicity and gender identity. Most of the patrons were able to be retained from entrance to exit (nearly 90%). Further, no differences were detected in most personal characteristics for entrance only versus entrance and exit samples. Finally, EMDEs attract young adults who are working and not in college. Most major public health

intervention strategies for reducing risky behaviors have relied on the college infrastructure for delivery. This research underscores the importance of utilizing existing ecologic niches that naturally attract young adults who are at high risk due to their drug/alcohol use.

Conclusion

These findings are not only of concern for the U.S. but also reflect a growing youth culture and youth trends that are reflective of worldwide trends. A growing body of research suggests that clubbing is not just a U.S. phenomenon, but has emerged around the world and has far-reaching implications for global health of young adults.[25–28] Findings also have important public health implications, as costs from excessive alcohol consumption have health, social, and economic consequences.[29]

Acknowledgments

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Table 1

Alcohol and Drug Use at Club Entrance and Exit

	Total Sample (N=2028)		Entrance Only Subsample (*n*=231)	Entrance and Exit Subsample (*n*=1797)
	Entrance (%)	Exit (%)	Entrance (%)	Entrance (%)
Any Drug Use	22.3	25.3	24.8	21.9
Any Alcohol Use	54.9	71.6	59.7	54.3
Level of Alcohol Use				
No alcohol	45.1	28.4	40.3	45.7
Low alcohol use (BAC: 0.001%–0.049%)	28.6	26.8	22.1	29.4
Impaired (BAC: 0.05%–0.079%)	12.0	16.9	13.9[*]	11.8
Intoxicated (BAC: 0.08%)	14.3	27.9	18.9[*]	13.1
Total	100.0	100.0	100.0	100.0
Presence of Drugs and Alcohol				
Neither drugs nor alcohol	36.7	24.0	32.2	37.3
Drugs, no alcohol	8.5	5.5	8.3	8.5
Alcohol, no drugs	41.0	51.5	43.0	40.8
Both drugs and alcohol	13.8	19.1	16.5	13.4
Total	100.00	100.0	100.0	100.0
Drug Use and Intoxicated (BAC 0.08%)	4.2	8.7	5.6	4.1

[*] Combining impairment/intoxication rates, a significantly greater percentage of entrance-only patrons as compared to the entrance and exit patrons were impaired/intoxicated ($\chi^2 = 22.14$, $p < 0.0001$).

Table 2

Mixed-Model Regression Predicting BAC, THC, and Cocaine levels by Personal Characteristics and Behaviors

	b	*SE*	*t*	*p*
BAC at exit				
Asian American	−0.005	0.003	−1.443	0.149
African-American	**−0.012**	**0.004**	**−2.848**	**0.004**
Gay/lesbian/bisexual	**0.008**	**0.003**	**2.900**	**0.004**
Drugs at exit	**0.007**	**0.003**	**2.324**	**0.020**
Non-SF ZIP code	0.001	0.003	0.269	0.788
Drove□	**−0.026**	**0.003**	**−7.587**	**0.000**
Rode as passenger□	**−0.011**	**0.003**	**−3.602**	**0.000**
Income	**0.002**	**0.001**	**2.484**	**0.013**
QFA	**0.027**	**0.005**	**6.015**	**0.000**
Alcohol problems	**0.003**	**0.000**	**7.351**	**0.000**
THC level at exit				
African-American	**74.441**	**20.276**	**3.671**	**0.000**
Hispanic	−12.309	13.625	−0.903	0.366
Female	**−34.766**	**12.017**	**−2.893**	**0.004**
Gay/lesbian/bisexual	**−32.376**	**13.862**	**−2.336**	**0.020**
Non-SF ZIP code	**−35.289**	**13.638**	**−2.588**	**0.010**
Drove□	**55.724**	**16.636**	**3.350**	**0.001**
Rode as passenger□	**34.987**	**14.868**	**2.353**	**0.019**
Age	0.994	0.854	1.164	0.245
Alcohol problems	**4.752**	**1.631**	**2.913**	**0.004**
Cocaine level at exit				
Drove□	**340.770**	**161.527**	**2.110**	**0.035**
Rode as passenger□	208.168	147.587	1.410	0.159
Age	7.834	8.078	0.970	0.332
QFA	**440.522**	**200.737**	**2.195**	**0.028**
Feelings of safety	−176.627	99.499	−1.775	0.076

Note.; Non-SF ZIP code = ZIP code outside of San Francisco proper

□Compared to other modes of transportation (e.g., taxi)

QFA=Quantity-frequency of alcohol use in the past 30 days