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## Residential Proximity to Electronic Dance Music Nightclubs and Associations with Substance Use, Sexual Behaviors, and Related Problems

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### Abstract

This study examines the association between proximity of place of residence to preferred nightclub and substance use, sexual risk behaviors, and related problems, among a sample of 498 young adult substance users in Miami who report regular nightclub participation. Hierarchical linear models and logistic regressions were constructed to examine the impact of residential proximity to preferred nightclub on risk behaviors. Compared with participants residing in closer proximity to their preferred nightclub, participants residing further away reported higher intensities of alcohol and cocaine use ( $p < .01$ ), greater condomless vaginal sex frequencies ( $p < .001$ ), and more substance dependence symptoms ( $p < .05$ ). Conversely, participants residing in closer proximity to their preferred nightclub had higher likelihood of arrest history ( $p < .05$ ) than participants residing further away. Results suggest that participants residing further from their preferred nightclubs may be more invested in the nightclub outing and, therefore, engage in more risk behaviors.

### Keywords

Substance use; electronic dance music; sexual behavior; club drugs

### Introduction

The electronic dance music (EDM) nightclub scene is found in almost every large city, but is especially prevalent in major tourist destinations, including Miami, where people tend to

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look for an escape from their routines (Owen, 2003; Shister, 1999; Uriely & Belhassen, 2006). Ecstasy is a popular drug in the EDM nightclub scene, but use of other “club drugs” (e.g., powder cocaine, methamphetamine, ketamine, rohypnol, gamma-hydroxybutyric acid [GHB], lysergic acid diethylamide [LSD], and marijuana) is also prevalent and has tended to vary over time and location (Byrnes, Miller, Johnson, & Voas, 2014; Kelly, LeClair, & Parsons, 2013; Measham, Aldridge, & Parker, 2001; Miller, Byrnes, Branner, Voas, & Johnson, 2013; Reynolds, 1998; Sanders, 2006; Shacham & Cottler, 2010). The nonmedical use of prescription medications has also become popular in the EDM nightclub scene—most typically benzodiazepines and opioid analgesics (Buttram & Kurtz, 2016; Kelly & Parsons, 2007; Kurtz, Buttram, & Surratt, 2016; Kurtz, Inciardi, Surratt, & Cottler, 2005; Kurtz, Surratt, Buttram, Levi-Minzi, & Chen, 2013).

Because of their tendency to mix numerous drugs during their typical drug binges, club drug users are at high risk of health problems (Boyd, McCabe, & d’ Arcy, 2003; Cottler, Womack, Compton, & Ben Abdallah, 2001; Freese, Miotto, & Reback, 2002; Kurtz et al., 2016). Ecstasy and other club drug use have been linked to high-risk sexual behaviors as well as chronic psychiatric symptoms, including memory problems, depression, anxiety, and suicidal ideation (Klitzman, Greenberg, Pollack, & Dolezal, 2002; MacInnes, Handley, & Harding, 2001; Mattison, Ross, Wolfson, & Franklin, 2001; McCardle, Luebbers, Carter, Croft, & Stough, 2004; Parrott, Milani, Parmar, & Turner, 2001; Roiser & Sahakian, 2004; Schifano, Di Furia, Gorza, Minicuci, & Bricolo, 1998; Semple, Patterson, & Grant, 2002). Similarly, polydrug users in the club scene have reported depressive symptoms and other mental health problems; difficulties with peer, family, and other social relationships; and extensive criminal justice involvement (Chinet, Stephan, & Zobel, 2007; Kurtz, Inciardi, & Pujals, 2009; Medina & Shear, 2007; Singer, Linares, Ntiri, Henry, & Minnes, 2004).

The multitude of health and social problems associated with alcohol and drug use in the club scene is well documented, and research is increasingly investigating the associations between residential patterns and substance use. Most research has focused on the density of substance use/ procurement locations (e.g., bars, alcohol or tobacco retail outlets) in an individual’s residential neighborhood. Generally, this literature indicates that greater densities of substance use/procurement locations in one’s residential neighborhood are associated with greater use of alcohol, tobacco, and other drugs among adolescent, young adult, and minority populations (Cederbaum et al., 2015; Lipperman-Kreda et al., 2014; Robertson, McGee, Marsh, & Hoek, 2015; West et al., 2010; Wouters, Benschop, van Laar, & Korf, 2012). Advancing this line of inquiry are studies that focus on proximity, rather than density, by acknowledging that individuals may travel outside of their residential neighborhood to consume alcohol or drugs. With limited exceptions (Lipperman-Kreda et al., 2014; Pasch, Hearst, Nelson, Forsyth, & Lytle, 2009; Wouters et al., 2012), these studies indicate that closer proximity between place of residence and substance use/procurement locations is associated with increased use of alcohol, tobacco, and other drugs, including among adolescents and young adults (Halonen et al., 2013; Milam, Furr-Holden, Harrell, Ialongo, & Leaf, 2014; Picone, MacDougald, Sloan, Platt, & Kertesz, 2010; Truong & Sturm, 2009; West et al., 2010).

It is theorized that closer proximity between place of residence and substance use/procurement locations reduces travel time and transportation costs, allows for greater access to and heightened visibility of alcohol or drugs, and provides opportunities for modeling, imitation, and social reinforcement of substance use and related behaviors (West et al., 2010). Substance use/procurement locations examined in the literature are largely confined to bars and retail outlets. No apparent research has examined proximity between place of residence and large EDM nightclubs, even though substance use is prevalent and part of the EDM nightclub culture (Owen, 2003). Given the substance use and health and social problems associated with participation in the EDM nightclub scene, it is likely that EDM nightclubs may be similar to other substance use/procurement locations. The potential association between residential proximity to EDM nightclubs has public health implications for individual participants (e.g., substance dependence) as well as the wider community (e.g., individuals driving while intoxicated).

The present study builds on previous work describing the health and social risks associated with club drug use and EDM nightclub scene participation in addition to recent studies documenting the association between substance use and residential proximity to substance use/procurement locations. Specifically, we examine the associations between residential proximity to preferred EDM nightclub and substance use and sexual risk behaviors among a sample of substance-using young adults. Based on existing literature, we test two hypotheses.

**Hypothesis 1:**

Individuals who reside in closer proximity to their preferred EDM nightclub will report more substance (mis)use.

**Hypothesis 2:**

Individuals who reside in closer proximity to their preferred EDM nightclub will be more likely to report additional substance use-related problems, including substance dependence, sexual risk behaviors, and legal problems.

**Method****Site**

Miami-Dade County, Florida, is a diverse community of more than 2.6 million people, of whom 66.2% are Hispanic, 18.9% Black, and 14.8% White (U.S. Census Bureau, 2015). Miami's club scene is centered on two neighborhoods on the eastern edge of the county: downtown, in which large EDM nightclubs operate 24 hr per day; and South Beach where EDM nightclubs operate until 5:00 a.m.

**Sample**

Data are drawn from baseline assessments conducted between September 2011 and November 2015 as part of a behavioral intervention trial designed for young adult participants in Miami's EDM nightclub club scene. A total of 498 participants completed baseline comprehensive health and social risk assessments. Inclusion criteria included (a)

ages 18 to 39; (b) heterosexual vaginal and/or anal sex in the past 90 days; (c) use of club drug(s), defined as powder cocaine, ecstasy/3,4-methylenedioxy methamphetamine(MDMA), LSD, methamphetamine, GHB, and/or ketamine, at least three times in the past 90 days; (d) nonmedical use of a psychoactive prescription medication in the past 90 days; and (e) attendance at large local EDM nightclubs at least once per month.

All interviews were conducted in private offices, and lasted approximately 90 min. After providing informed consent, participants completed the baseline assessment and received a US\$50 stipend for their time and travel expenses following the interview. Human subjects protocols were approved by the university's Institutional Review Board.

Participants were recruited through respondent-driven sampling (Heckathorn, 1997). Seeds (initial respondents) were recruited through outreach at local nightclubs and existing contacts in the club culture. Each seed and subsequent study participant was provided with recruitment coupons to give to other drug users in their social network, with the understanding that they would earn US\$50 for the recruitment of each additional eligible respondent. Based upon recruitment patterns in the prior natural history study, steering incentives (Heckathorn, 2002) of an additional US\$10 were implemented to reward the recruitment of women and African Americans. Each participant-recruiter was limited to five coupons to prevent a few participants with large social networks from biasing the overall sample toward those with similar demographic and drug-using profiles.

## Measures

**Nightclub proximity.**—Data collection included participants' residential address and the name of their preferred EDM nightclub. Address information for each nightclub was obtained through online searches. Using Google Earth software, the distance between place of residence and preferred EDM nightclub was calculated using the shortest distance between the two points via roadways, in miles.

**Demographic and background characteristics.**—These included age, gender, race/ethnicity, education, and primary partner status. Race/ethnicity was assessed by asking participants whether they were Hispanic or Latino, followed by asking them what race/ethnicity they consider themselves to be. Years of education was assessed with the question, "What is the highest grade or year you completed in school?" Primary partner was assessed by asking participants whether they had a current primary partner, such as a boyfriend or girlfriend. Background characteristics included the frequency of EDM nightclub participation during the past 90 days. Regarding social relationships, participants were asked, "of the people that you regularly socialized with or hung out with, would you say that none, a few, some, most, or all of them get drunk weekly?" Using the same 5-point Likert-type scale (*none* = 0, *a few* = 1, *some* = 2, *most* = 3, *all* = 4), participants also reported the number of friends who used drugs. The responses to these questions were combined into the variable, number of friends who get drunk/high. The higher response of the two items was assumed for the summary variable; those endorsing the same response to each item were coded with the same response value (e.g., endorsing "none" to both items was coded as

“none”). Frequency of EDM nightclub participation and number of friends who get drunk/high were not significantly correlated ( $r = .01$ ,  $p = .64$ ).

**Substance use frequencies and intensities.**—The survey instrumentation assessed substance use frequencies and intensities in the past 90 days. For frequency of the most commonly used substances (alcohol, cocaine, ecstasy, prescription benzodiazepines, prescription opioids), participants reported the number of days and amounts of each substance that was used. In accordance with other substance use research (Stout et al., 2012), intensities were calculated by dividing the amounts (e.g., drinks, doses, hits, pills) (mis)used by the number of days used (e.g., 100 drinks/20 drinking days = mean five drinks per drinking day; 60 ecstasy doses/30 days ecstasy use = mean two ecstasy doses per day of ecstasy use). Small, positive correlations were found between the five substance use intensity score ( $r = .1-.2$ ,  $p < .01$ ).

**Sexual behaviors.**—Sexual behaviors were assessed with four indicators: number of lifetime sexual partners, past 90-day condomless vaginal and anal sex frequencies, and group sex participation history. Past 90-day vaginal sex frequencies were assessed by the following questions, “In the past 90 days, how many different times have you had vaginal sex?” and “Of those ‘X’ times you had vaginal sex, how many times was it without a condom even if for only part of the time, like starting without one or taking it off before finishing?” The same questions were repeated for anal sex. Participants were also asked whether they had a current primary partner (e.g., boyfriend or girlfriend). For condomless sex measures, participants with a primary partner and no other sex partners in the past 90 days were coded as ‘0’ to indicate no exposure to new infectious disease via condomless sex during that time. Group sex was defined as three or more people, including the participant, and was assessed with the question, “Have you ever participated in group sex?” This variable was dichotomized into “group sex history” versus not. Intracorrelations between sexual behavior indicators were nonsignificant except for low, positive correlations between condomless vaginal and anal sex frequencies and group sex participation history ( $r = .1-.2$ ,  $p < .01$ ).

**Symptom severity.**—The Global Appraisal of Individual Needs (GAIN; Dennis, 2006) was used to assess substance dependence and mental distress symptoms. The two symptom severity indices were calculated by totaling the number of symptoms endorsed by each participant. Substance dependence symptoms were assessed using the seven *Diagnostic and Statistical Manual of Mental Disorders* (4<sup>th</sup> ed.; *DSM-IV*; American Psychiatric Association, 1994) symptoms during the past 90 days (e.g., needing more alcohol/drug to get the same effect, experiencing withdrawal symptoms, used alcohol/drugs in larger amounts or more often). The *DSM-IV* has a range of 0 to 7 and a score of three or higher indicates substance dependence. The GAIN also includes the General Mental Distress Scale (GMDS), which includes past year symptoms of somatization (four items, for example, headaches, faintness, dizziness, tingling, numbness, sweating, or hot/cold spells; sleep trouble; shortness of breath or lump in the throat), depression (nine items, for example, feeling sad, lonely, or hopeless; feeling tired or having no energy), and anxiety (10 items, for example, feeling nervous anxious or tense, unable to control worries). The GMDS has a range of 0 to 25 and a score

of seven or higher indicates severe mental distress. The two symptom severity indices were significantly correlated ( $r = .5, p < .01$ ).

**Legal problems.**—Legal problems were assessed with three indicators: arrest history, driving under the influence (DUI), and public drunkenness. To assess arrest history, participants responded to the question, “In your lifetime, about how many times have you been arrested, charged with a crime and booked?” which was dichotomized into “arrest” versus not. Participants with a history of arrest also reported the offenses for which they have been arrested, including DUI and public drunkenness, which were dichotomized into “DUI arrest” versus not and “public drunkenness arrest” versus not. Intracorrelations between legal variables were small ( $r_s = .1-.2, p < .01$ ).

### Analytic Strategy

Statistical analyses were conducted with SAS Version 9.3 (SAS Institute Inc., Cary, NC). Distributions of variables were examined for normality; positively skewed variables (substance use intensities, GMDs symptom severity, lifetime sexual partners, condomless vaginal and anal sex frequencies) were log transformed.

The effect of residential proximity to preferred EDM nightclub on four sets of outcomes (substance use, sexual behavior, symptom severity, legal problems) was examined using hierarchical linear modeling (HLM) for continuous outcomes and logistic regressions for discrete outcomes. For zero inflated discrete outcomes, a fixed-effects zero-truncated Poisson model was specified with a logit link function and a Pearson correction for dispersion. Six covariates (age, race/ethnicity, gender, education, current primary partner, number of friends drunk/high) were controlled for in regression models based on previously documented associations with outcomes under study and their potential role as confounders (Donovan, 2007; Pemberton, Colliver, Robbins, & Gfroerer, 2008). One interaction term between proximity and number of friends drunk or high was tested but not included in final models due to nonsignificant results. Examination of the correlation matrix for independent variables in analytic models found no correlation to exceed .3 and collinearity diagnostics indicated no problems. For interpretation purposes, Cohen considers  $r = .1$  “small,”  $r = .3$  “medium,” and  $r = .5$  “large.” The family-wise error rate for the four sets of outcomes was set at .05 (two-tailed).

### Results

The profile of the sample ( $n = 498$ ) at baseline is shown in Table 1. The mean age of participants was 25 years (range = 18–39 years) and more than half (55.4%) of the sample was male. The racially/ethnically diverse sample was 64.3% Hispanic, 20.9% African American/Black, 12.0% White, and 2.8% “Other” race/ethnicity. Except for a small, negative correlation with age ( $r = .2, p < .0001$ ), residential proximity to preferred EDM nightclub was not significantly correlated with demographic or background characteristics. Past 90-day mean number of days and mean intensities of substance use in the total sample ( $n = 498$ ) include alcohol (47.3 days; 5.1 drinks per drinking day), cocaine (32.0 days; 7.8 hits per cocaine-using day), ecstasy (30.1 days; 2.1 doses per ecstasy-using day), prescription benzodiazepines (34.4 days; 1.7 pills per benzodiazepine-using day), and

prescription opioids (32.4 days; 2.1 pills per opioid-using day). Participants reported an average of 7.1 sexual partners and 36.4 condomless vaginal and 5.4 condomless anal sex occasions during the past 90 days. Group sex participation history was reported by 40.7% of the sample. Participants also reported an average of 3.9 substance dependence symptoms and 8.3 mental distress symptoms. A majority of the sample (64.8%) reported a history of arrest and smaller numbers reported arrests for public drunkenness (6.2%) and DUI (8.8%).

Participants lived 13.7 miles (range = 0.1–35 miles) on average from their preferred EDM nightclub. The distribution of residential proximity was evenly spread with 38% living within 10 miles of their preferred EDM nightclub, 37% within 11 to 20 miles, and 25% within 20 to 35 miles. Except for a small negative correlation with age ( $r = -.2, p < .0001$ ), residential proximity to preferred EDM nightclub was not significantly correlated with demographic or background characteristics.

Table 2 shows the association between residency proximity to preferred EDM nightclub to substance use and related problems, controlling for model covariates. Results indicated no support for our first hypothesis. Residential proximity to preferred EDM nightclub was significantly associated with substance use intensity scores (logged) for alcohol and cocaine; a one-unit increase in residency proximity from preferred EDM nightclub, measured in miles, was associated with a significant increase in the number of drinks per drinking day ( $\beta = .01, SE = 0.01, p < .01$ ) and hits of cocaine on days using cocaine ( $\beta = .01, SE = 0.01, p < .05$ ). A similar pattern was found for dependence symptoms ( $\beta = .01, SE = 0.00, p < .05$ ) and condomless vaginal sex frequencies ( $\beta = .01, SE = 0.01, p < .0001$ ), which increased as distance from EDM nightclub increased.

Results showed partial support for our second hypothesis. The likelihood of being arrested for any reason ( $\beta = -.02, SE = 0.01, p < .05$ ) and public drunkenness ( $\beta = -.02, SE = 0.01, p < .05$ ) was significantly higher for participants living closer to their preferred EDM nightclub. Controlling for model covariates, the coefficient for proximity ( $-0.02$ ) revealed that, for each one-mile increase in distance from EDM nightclub, the odds of an arrest or public drunkenness decreased by 2% (i.e.,  $100 \times [\exp \times (-0.02) - 1]$ ).

Several covariates were associated with study outcomes (Table 2). Males had higher rates of group sex history ( $p < .05$ ), alcohol use quantity per using day ( $p < .05$ ), arrest history ( $p < .0001$ ), and arrest for public drunkenness ( $p < .0001$ ), whereas females reported more mental distress symptoms ( $p < .0001$ ). Lower education was associated with more lifetime sexual partners ( $p < .01$ ), and older participants had higher rates of group sex ( $p < .05$ ). Higher number of friends who get drunk/high was significantly associated with higher substance use intensities for all substances ( $p < .05$ ), more lifetime sexual partners ( $p < .05$ ), substance dependence symptoms ( $p < .05$ ), and likelihood of DUI arrest ( $p < .05$ ).

## Discussion

This study has examined the association between residential proximity to preferred EDM nightclub and substance use and health and social problems among a sample of young adults. In general, the sample is young, diverse, and frequently engages in EDM nightclub



scene participation. Reports of past 90-day substance use days and intensities are high, and it is not surprising that approximately two thirds of the sample meets criteria for *DSM-IV* substance dependence (Kurtz, Buttram, Pagano, & Surratt, 2017). Co occurring with substance use are high levels of sexual risk behaviors as well, including an average of 36 condomless vaginal and five condomless anal sex frequencies. The majority of participants reported an arrest history; this finding is similar to prior studies of EDM nightclub participants in Miami (Kurtz et al., 2017) and suggests that the sample's arrest profile is representative of the population.

The hypotheses guiding these analyses were based on prior literature and a theoretical framework, which suggests that residing in closer proximity to one's preferred EDM nightclub would be associated with increased substance use and related health and social problems. However, our sample demonstrated that, with the exception of legal problems, individuals residing further from their preferred EDM nightclub reported greater levels of substance use, risk behaviors, and problems. Opposite to the first hypothesis, that individuals who reside in closer proximity to their preferred EDM nightclub will report greater quantities of substance (mis)use, the results indicate that participants residing further from their preferred EDM nightclub were more likely to report higher intensities of alcohol and cocaine use. These findings contrast with existing literature (Halonen et al., 2013; Milam et al., 2014; Picone et al., 2010; Truong & Sturm, 2009; West et al., 2010). As a result, we propose an alternative hypothesis specific to the EDM nightclub scene context: Young adults who must travel further to reach their preferred EDM nightclub are more invested in the club outing, which may encourage greater intensities of substance use and result in more experiences of substance use-related health and social problems.

Reasons for greater substance use intensities among these club scene participants are likely related to greater distance traveled. Club scene participants residing further from their preferred EDM nightclub may feel isolated from the club scene or that they have limited access to it. Thus, when these young adults do reach their preferred nightclubs, they may be motivated to make their long commute worthwhile by engaging in increased substance use and making their time in the EDM nightclub last as long as possible. Additional reasons might be related to automobile transportation between place of residence and preferred EDM nightclub. Evidence suggests that approximately 80% of club scene participants typically arrive at and depart from EDM nightclubs in groups (Miller et al., 2009). Thus, it is likely that club scene participants in Miami may carpool from distant suburbs, where public transportation is limited, to the major nightclubs located in entertainment districts downtown and in South Beach. Young adults who have a reliable means of transportation, such as a ride with friends, may consume greater amounts of alcohol or drugs, compared with their peers who must drive home from the club (Rivara et al., 2007). In addition, some club scene participants who travel greater distances may not have a safe or easy route of transportation back to their place of residence because of limited public transportation, a lack of money to pay for a taxi/on-demand rideshare service (e.g., Uber or Lyft), or being too intoxicated to drive. Thus, without transportation, these club scene participants may remain longer in EDM nightclubs, resulting in increased substance use.

It is also possible that reasons for greater substance use intensities among club scene participants who reside further from their preferred EDM nightclub are related to the EDM nightclub experience and the entertainment district neighborhoods where the nightclubs are located. Young adults in the club scene may desire to engage in substance use and related activities present in these locations, and EDM nightclubs provide spaces for like-minded individuals to socialize and engage in substance use together. Thus, EDM nightclubs are attractive because they function as substance use/procurement locations, and for participants of this mind-set, distance is likely not a barrier.

The second hypothesis, that those individuals who reside in closer proximity to their preferred EDM nightclub will be more likely to report additional substance use-related health and social problems, was largely not confirmed. Our findings, indicating that individuals residing further from their preferred EDM nightclub are more likely to report condomless vaginal sex and more substance dependence symptoms, instead support the alternative hypothesis. Increased engagement with the club scene may yield greater influences from other substance-using peers and sexual partners, the neighborhood characteristics of large nightclubs (e.g., drug dealers, street crime), and aspects of the nightclubs themselves (e.g., lax security, the acceptance of substance use inside of the clubs; Buttram & Kurtz, 2015; Byrnes et al., 2014; Fox & Sobol, 2000; Kurtz et al., 2013).

In addition, condomless vaginal sex is also of concern as club scene participants may experience sexually transmitted infections (STIs) or unwanted pregnancy. This population is also at risk of HIV infection. Previous research has shown that many participants in the club scene engage in sexual HIV risk behaviors, including condomless vaginal, anal, and group sex (Buttram & Kurtz, 2015, 2016; Ibanez, Kurtz, Surratt, & Inciardi, 2010; Kurtz et al., 2013). Condomless sex may facilitate HIV/STI transmission among this population and add to the vulnerability of participants, especially those who reside further from their preferred nightclub.

Partially supporting the second hypothesis, results indicate that club scene participants who reside in closer proximity to their preferred EDM nightclub reported greater frequencies of arrest. One possible explanation for this is neighborhood demographics. Adjacent to downtown Miami's entertainment district is the Overtown neighborhood, a disadvantaged community with high rates of crime and violence (Nielsen & Martinez, 2006). In addition, club scene participants residing closer to their preferred EDM nightclub also report more arrests for public intoxication. This is likely because they have the ability to walk home from the nightclub and are, therefore, more visible to law enforcement in and around neighborhoods in the area's entertainment districts (i.e., downtown Miami and South Beach).

The data suggest that club scene participants who reside in closer proximity to their preferred EDM nightclub, and in some cases reside in the same neighborhood, maintain regular access to major nightclubs. Thus, having EDM nightclubs available and accessible may remove the feeling of being isolated from the club scene that participants residing further away may feel. These participants may not be as motivated to engage so heavily in club scene activities because the option to do so is more readily available and the barriers of

distance and travel are not as onerous. Residing in closer proximity to one's preferred EDM nightclub increases transportation options, such as walking, inexpensive taxis or mobile on-demand ride services, and more frequent and accessible public transportation. In addition, these club scene participants may not engage in higher intensities of substance use because they have a greater ability to go home when they desire, compared with participants who may continue to consume alcohol or drugs as they wait for their carpool of friends to drive them home.

Several recommendations have emerged from this study to make club scene participation safer. First, opening hours of large nightclubs should be restricted to help limit the amount of alcohol and drugs consumed by club scene participants. Alcohol and other drug use occurs inside of clubs (Fox & Sobol, 2000; Miller, Holder, & Voas, 2010), and large nightclubs in local entertainment districts are open until 5:00 a.m. (South Beach) or do not close at all (downtown Miami). Therefore, this recommendation has the potential to limit alcohol and drug consumption while still allowing for participants to access the club scene. For participants who do not reside in close proximity to EDM nightclubs, this recommendation would also have the effect of limiting the amount of time individuals would be in EDM nightclubs and be exposed to related social and neighborhood influences (e.g., substance-using peers and sex partners, drug dealers, street crime).

Second, establishment and enforcement of policies to prohibit substance use inside of EDM nightclubs would also aid in reducing substance use and related health and social problems. Security personnel at nightclubs are largely present to prevent violence rather than prevent drug use (Byrnes et al., 2014). In addition, many large EDM nightclubs contain dimly lit areas or semiprivate spaces in which drugs may be consumed, bought, or sold (Fox & Sobol, 2000). Policies that would prohibit substance use inside nightclubs, and modifications to nightclub interiors that would hinder consumption, buying, and selling of drugs would make EDM nightclubs safer.

Finally, for club scene participants, utilizing a designated driver may be safer than not; yet, research suggests that club scene participants who act as designated drivers may still consume alcohol or drugs, especially if the driver is more familiar with the other group members he or she will be driving (Johnson, Voas, & Miller, 2012; Voas, Johnson, & Miller, 2013). Furthermore, literature also indicates that limited action is being taken by club scene participants to avoid drugged driving (Voas et al., 2013). Although no apparent literature has documented the effect of mobile on-demand ride services (e.g., Uber, Lyft) on alcohol or drug use or driving behavior, a recent media report indicates that providing free access to these services for intoxicated individuals has reduced DUI arrests by 65% (Reilly, 2015). As such, mobile on-demand ride services have the potential to reduce risks for club scene participants who reside further from their preferred EDM nightclub.

This study has some limitations worth noting. Although recruitment procedures resulted in a sample broadly inclusive of the racial/ethnic makeup of Miami-Dade County, the ability to generalize the findings to other young adult EDM club scene participants is limited by the study eligibility requirements. Moreover, given Miami's diverse population and prevalence and popularity of large EDM nightclubs, the ability to generalize to other cities is also

limited. Second, the comprehensive assessments did not assess mode of transportation to the EDM nightclub. Future research should assess details regarding participants' mode of transportation and explore the influence on length of time in EDM nightclubs and greater substance use. Third, study variables were assessed with self-report instruments, potentially leading to underreporting of socially undesirable behaviors. However, the high levels of substance use and sexual risk behaviors reported by the sample are similar to prior reports from young adult nightclub participants in Miami (Kurtz et al., 2013) and, thus, the likelihood of bias is low. Finally, the cross-sectional data presented do not permit attributions of causality to the observed relationships.

In conclusion, findings from this study demonstrate that, compared with those residing in closer proximity, young adult club scene participants who resided further from their preferred EDM nightclub reported higher intensities of alcohol and cocaine use, condomless vaginal sex, and more substance dependence symptoms. Club scene participants residing in closer proximity to their preferred EDM nightclub reported greater frequencies of arrest and arrest for public intoxication. The findings prompted the formation of an alternative hypothesis: Young adults who must travel further to reach their preferred EDM nightclub are more invested in the club outing, which may encourage greater intensities of substance use and result in more experiences of substance use-related health and social problems. Further research investigating aspects of the EDM nightclub scene, including risky driving behaviors, risk of DUI, and neighborhood influences is needed to advance knowledge about social and environmental influences on substance use and to build upon our recommendations to reduce risk and make club scene participation safer.

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## Author Biographies

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**Steven P. Kurtz**, PhD, is a professor and director of the Center for Applied Research on Substance Use and Health Disparities at Nova Southeastern University. He has more than two decades of experience researching substance use, HIV risk behaviors, and their interconnection.

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**Table 1.**

## Profile of Study Sample

		<b>Total</b>		
		<i>n</i> = 498	100%	
<b>Demographics</b>				
Age (years)	(M; SD)	25.3	(5.4)	
Male	(%)	276	55.4%	
Race/ethnicity	Hispanic	(%)	320	64.3%
	Black	(%)	104	20.9%
	White	(%)	60	12.0%
	Other	(%)	14	2.8%
Education (years)	(M; SD)	12.2	(1.7)	
Current primary partner	(%)	314	63.0%	
<b>Background Characteristics</b>				
Frequency of club participation (past 90 days)	(M; SD)	12.4	(7.6)	
Number of friends drunk/high	(M; SD)	2.8	(1.1)	
Nightclub proximity (in miles)	(M; SD)	13.7	(8.8)	
Substance use (past 90 days)				
Alcohol	Days	(M; SD)	47.3	(25.9)
	Intensity	(M; SD)	5.1	(5.9)
Cocaine	Days	(M; SD)	32	(26.3)
	Intensity	(M; SD)	7.8	(14.1)
Ecstasy	Days	(M; SD)	30.1	(24.0)
	Intensity	(M; SD)	2.1	(3.0)
Prescription benzodiazepines	Days	(M; SD)	34.4	(30.0)
	intensity	(M; SD)	1.7	(2.1)
Prescription opioids	Days	(M; SD)	32.4	(28.9)
	Intensity	(M; SD)	2.1	(3.2)
Sexual behavior				
Lifetime sexual partners (male + female)	(M; SD)	7.1	(13.6)	
Condomless vaginal sex (past 90 days)	(M; SD)	36.4	(32.7)	
Condomless anal sex (past 90 days)	(M; SD)	5.4	(13.2)	
Group sex history	(%)	203	40.7%	
Symptom severity				
Substance dependence (past 90 days)	(M; SD)	3.9	(2.4)	
Mental distress (past 12 months)	(M; SD)	8.3	(7.4)	
History of legal problems				
Arrest	(%)	321	64.5%	
Public drunkenness	(%)	31	6.2%	
Driving under the influence	(%)	44	8.8%	



**Table 2.** Multivariate Associations between Proximity to Preferred EDM Nightclub and Substance Use, Sexual Behaviors, and Related Problems

	Predictor		Covariates					
	Nightclub proximity <i>F, p</i>	Age <i>F, p</i>	Race/ethnicity <i>F, p</i>	Gender <i>F, p</i>	Primary partner <i>F, p</i>	Education <i>F, p</i>	Friends drunk/high <i>F, p</i>	
Substance use intensity <sup>a</sup>								
Alcohol	4.44, **	0.49, 0.48	1.44, 0.23	4.24, *	0.15, 0.68	0.15, 0.67	11.21, ***	
Cocaine	2.64, *	17.51, ***	2.02, 0.11	0.01, 0.95	0.02, 0.87	1.21, 0.27	8.81, **	
Ecstasy	1.03, 0.39	0.18, 0.67	1.93, 0.12	1.82, 0.18	1.28, 0.26	0.97, 0.32	17.01, ***	
Prescription benzodiazepines	1.37, 0.24	0.45, 0.51	1.41, 0.24	0.61, 0.43	0.11, 0.75	0.57, 0.45	12.88, **	
Prescription opioids	0.75, 0.56	0.06, 0.81	1.65, 0.18	0.19, 0.66	0.33, 0.57	0.97, 0.32	4.11, *	
Sexual behavior								
Lifetime sexual partners <sup>b</sup>	0.02, 0.98	0.81, 0.37	0.68, 0.57	0.09, 0.77	3.77, 0.06	9.48, **	6.35, *	
Condomless vaginal sex <sup>d</sup>	19.44, ***	0.43, 0.51	3.52, 0.07	0.20, 0.66	0.01, 0.92	0.02, 0.88	0.03, 0.86	
Condomless anal sex <sup>d</sup>	0.96, 0.33	0.36, 0.55	0.53, 0.47	3.61, 0.06	0.00, 0.96	1.97, 0.16	1.53, 0.22	
Group sex history <sup>c</sup>	0.00, 0.98	6.25, *	0.80, 0.37	5.14, *	0.79, 0.37	0.37, 0.54	3.75, 0.06	
Symptom severity								
Substance dependence <sup>d</sup>	3.04, *	0.65, 0.42	1.42, 0.24	1.04, 0.31	3.34, 0.06	0.01, 0.92	4.37, *	
Mental distress <sup>d</sup>	1.55, 0.19	0.91, 0.33	0.68, 0.57	26.27, ****	0.98, 0.32	3.66, 0.06	3.07, 0.08	
History of legal problems								
Arrest history	4.77, *	4.37, *	0.45, 0.72	22.08, ****	2.85, 0.09	3.57, 0.06	0.24, 0.62	
Public drunkenness	4.50, *	0.70, 0.40	3.19, 0.07	24.55, ****	2.56, 0.11	0.49, 0.48	0.46, 0.50	
Driving under the influence	0.77, 0.38	0.19, 0.66	2.78, 0.95	5.11, *	0.13, 0.71	2.70, 0.10	5.57, *	

Notes:

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\*  $p < 0.05$   
 \*\*  $p < 0.01$   
 \*\*\*  $p < 0.001$   
 \*\*\*\*  $p < 0.0001$

<sup>a</sup>Past 90 days

<sup>b</sup>Lifetime sexual partners is the sum of male and female sexual partners

<sup>c</sup>295 subjects never had group sex

<sup>d</sup>Past 12 months; Race/ethnicity = 1 (Hispanic), 2 (White), 3 (Asian), and 4 (African American/Black – reference category); Gender = 0 (female) and 1 (male); Primary partner = 0 (no primary partner) and 1 (has primary partner); proximity to preferred EDM nightclub is measured in miles.