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Nonmedical opioid use among electronic dance music party attendees in New York City

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Abstract

Background—Nonmedical opioid use remains an epidemic in the United States. Electronic dance music (EDM) party attendees have been found to be at high risk for the use of drugs such as ecstasy, but little is known about nonmedical opioid use in this population.

Methods—Using time-space sampling, we surveyed 954 individuals (ages 18–40) attending randomly selected EDM parties in New York City in 2017. Participants were asked about the use of 18 different opioids and about willingness to use if offered by a friend in the next 30 days. We estimated the prevalence of use in this population and examined correlates of past-year and past-month use.

Results—Almost a quarter (23.9%) of EDM party attendees are estimated to have used opioids non-medically in their lifetime, and one out of ten (9.8%) in the past year. 5% are estimated to be current users (reporting past-month use), and 16.4% are willing to use opioids non-medically if offered by a friend in the next 30 days. Past-year nonmedical benzodiazepine users were at high odds for reporting current nonmedical opioid use (aOR=10.11, $p<.001$) and, on average, report using more different opioid drugs in the past year than non-past-year-users ($p=.012$). Nearly three-quarters (73.6%) of those who have used in the past year indicated that they would use again if offered by a friend in the next 30 days.

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Authors Disclosures

Contributors

All authors are responsible for this reported research. J. Palamar conceptualized and designed the study and conducted the statistical analyses. C. Cleland mentored J. Palamar regarding sampling and statistical analysis conducted in this study. A. Le and J. Palamar drafted the initial manuscript, and all authors interpreted results, and critically reviewed and revised the manuscript. All authors approved the final manuscript as submitted.

Conflict of Interest

No conflict declared.

Conclusion—Nonmedical opioid use is prevalent in the EDM scene and many attendees are willing to use if offered. Prevention efforts are needed in this high-risk population.

Keywords

opioids; young adults; dance music; benzodiazepines

1. Introduction

In recent years, the popularity of electronic dance music (EDM) and associated parties has increased in popularity. Recent industry reports currently value the global EDM market at \$7.4 billion, up from \$4.5 billion in 2012/13 (Watson, 2017), and this rise in popularity is expected to continue.

It has been well documented that EDM nightclub and festival attendees tend to be at high risk for use of “club” drugs, which typically include ecstasy (3,4-methylenedioxymethamphetamine [MDMA], or “Molly”), ketamine, *gamma*-hydroxybutyrate (GHB), powder cocaine, and methamphetamine (Halkitis et al., 2007; Hughes et al., 2017; Kelly et al., 2006; Palamar et al., 2015). Moreover, use of these drugs in such party environments has been associated with severe adverse outcomes including death (Friedman et al., 2016; Lund and Turriss, 2015; Ridpath et al., 2015). However, there is little information in the existing literature regarding the nonmedical use of opioids in this high-risk population, despite the widespread public health attention that the opioid epidemic has drawn.

Nonmedical opioid use and associated adverse outcomes have grown to epidemic proportions in the US. National estimates suggest that in 2016, approximately 11.5 million Americans had used prescription opioids non-medically (representing 4.7% of the population aged 12 or older), with 1.8 million having met criteria for dependence or abuse (Center for Behavioral Health Statistics and Quality [CBHSQ], 2017b). While users of other illegal drugs have been shown to be at high risk for nonmedical opioid use (Hughes et al., 2016), of specific concern is that nonmedical prescription opioid users appear to be at high risk for heroin use (Cerdá et al., 2015; Mateu-Gelabert et al., 2015; Palamar et al., 2016c). A recent longitudinal study investigating drug use among nightclub attendees in Miami found that among those reporting nonmedical prescription opioid use at baseline, 7.7% reported initiating heroin use within the next year (Surratt et al., 2017). Indeed, nonmedical use of prescription opioids has been found to be the main contributor to a resurgence of heroin use, as well as the spread of HIV and Hepatitis C (Compton et al., 2016; Murthy, 2016).

Few studies indicate that nonmedical opioid use may be common in the EDM scene. A survey of nightlife attendees in New York City (NYC) in 2011 found that 16.5% reported nonmedical opioid use in the past three months (Kelly et al., 2013); however, this study examined many scenes (e.g., hip-hop, indie rock) and only focused partially on EDM scenes. A few other studies found that nine out of ten participants in nightclub surveys reported past 90-day nonmedical opioid use (Buttram and Kurtz, 2016; Kelly and Parsons, 2007; Kurtz et al., 2017a), but inclusion criteria required current club drug use, and one also required recent nonmedical prescription drug use. More research is needed to provide estimates of

nonmedical opioid use in this scene to inform prevention and harm reduction. As such, we sought to examine nonmedical opioid use in the EDM party scene. We surveyed a sample of nightlife attendees in NYC to estimate the prevalence of nonmedical opioid use, as well as correlates and factors associated with use to inform prevention in this high-risk scene.

2. Methods

2.1. Participants and Procedure

Time-space sampling (MacKellar et al., 2007) was utilized to collect data. Parties (primarily at nightclubs) were randomly selected each week to survey attendees. Specifically, each week, a list of upcoming EDM parties in NYC (which were located primarily in Brooklyn and Manhattan) was created. The list was based on EDM ticket websites, party listings on social media, and recommendations from key informants. Parties from EDM ticket websites were eligible for random selection if at least 15 tickets were purchased for the party by mid-week. Parties were randomly selected each week using R software (R Development Core Team, 2013) to survey potential participants and recruitment was typically limited to one to two nights per week on Thursday through Sunday. Time slots, however, were not randomly selected; recruitment took place in 2–3-hour time slots and recruitment for night parties was conducted between 11:30 pm and 2:30 am because the majority of parties ended at 4 am (with very few parties ending at 5 am or 6 am). Participants were also surveyed outside of two large daytime festivals which were not formally randomly selected.

Individuals were eligible if they were ages 18–40 and about to enter the randomly selected party. Recruiters approached passersby (who were alone or in groups), and if confirmed eligible, they were asked if they would like to take a survey about drug use. Recruiters ensured that participants were not visibly inebriated (e.g., unsteady gait, slurred speech). Surveys were conducted on tablets, and participants provided informed consent on the first page. We surveyed 954 EDM party-attending individuals and the survey, on average, took 11.5 (SD=3.7) minutes to complete. Participants were compensated \$10 USD for completing the survey. Recruitment was conducted from June through September of 2017, and the response rate was 74%. This study was approved by the institutional review board at New York University Langone Medical Center.

2.2. Nonmedical Opioid Use and Other Drug Use

Participants have presented a checklist of 18 different opioids and asked to check off whether they had ever used any in a nonmedical manner. Nonmedical use was defined for participants as use without a prescription or in a manner in which it was not prescribed; for example, to get high. Specifically, they were asked about Vicodin, OxyContin, Percocet, Purple Drank (“Sizzurp, Lean, Sprite with codeine”), codeine (“including Tylenol 3, other than Purple Drank/Sizzurp”), morphine, Tramadol, Demerol, Dilaudid, methadone, fentanyl, and heroin. They were also asked if they had ever used newer designer opioids, including krokodil (desomorphine), W-18, carfentanil, U-47700, AH-7921, and other new opioid drugs not listed.

Those reporting lifetime nonmedical use (ever-use) of a particular opioid were then asked to check whether they had used that specific drug in the past 12 months, and in the past 30 days. All participants have then presented with the full list of opioids again and asked to check off drugs they would use (non-medically) in the next 30 days if offered by a friend. We defined affirmative responses to this question as a willingness to use. Those indicating the past-year use of any opioids were also asked whether they had sniffed or injected opioids in the past year. Participants were also asked about the past-year use of a variety of other drugs. These analyses focus on the use of cigarettes, alcohol, ecstasy (MDMA, Molly), powder cocaine, methamphetamine, GHB, and nonmedical use of amphetamine and benzodiazepines.

For each opioid, we coded variables indicating 1) lifetime use, 2) past-year use, 3) past-month use, and 4) willingness to use opioids non-medically in the next 30 days if offered by a friend. We also collapsed responses into the use of any listed opioid in one's lifetime, in the past year, past month, and willingness to use any listed opioid, and we also created a sum variable indicating the number of opioids reportedly used in the past year. In addition, we coded variables indicating recency of opioid use; for example, to compare no past-year use, past-year use but not past-30-day use, and past-30-day use.

2.3. Sociodemographic Characteristics

We asked participants about sociodemographic characteristics including age, gender, race/ethnicity, education, weekly income, and sexual orientation. Participants were also asked to report their level of EDM nightclub/festival/rave/party attendance in the past year, and answer options were never, once or twice a year, every couple of months, every month, every other week, and every week or more often.

2.4. Analyses

Selection probabilities were composed of two components: 1) self-reported frequency of party attendance; and 2) the proportion of eligible individuals at a particular event who agreed to participate (i.e., response rate). For the attendance component, weights were inversely proportional to the frequency of attendance (e.g., the weight for once per year attendees was 52 times larger than the weight for weekly attendees). For the response rate component, weights were inversely proportional to the response rate. The two weight components were combined by multiplication and normalized (i.e., the sum of the weights was equal to the total sample size). This up-weighting of respondents believed to have a lower probability of selection (relative to other participants), and down-weighting of respondents believed to have a higher probability of selection has been used in other studies with venue-based sampling (Jenness et al., 2011; MacKellar et al., 2007).

We first examined descriptive statistics for the sample and computed prevalence estimates for overall nonmedical opioid use, and for nonmedical use of each opioid. Specifically, we estimated the prevalence of 1) lifetime use, 2) past-year use, 3) past-month use, and 4) willingness to use in the next 30 days if offered by a friend. Next, we examined sociodemographic and other drug use characteristics according to past-year use and past-month use using chi-square. We then fit all covariates simultaneously into binary

multivariable logistic regression models with past-year and past-month use as separate outcome variables. Each covariate was thus associated with an adjusted odds ratio (aOR) in each model.

We then compared sociodemographic and other drug use covariates according to a total number of opioids used non-medically in the past year. It should be noted that we did not fit a multivariable model due to an insufficient sample size of past-year users. Finally, using chi-square, we compared intention to use any opioid non-medically as well as intention to use each of the six most common opioids according to recency of use.

Probability weights were utilized in all analyses; thus, analyses accounted for clustering of participants in each party and differential selection probability. Taylor series estimation was used to obtain accurate standard errors (Heeringa et al., 2010) with randomly selected party specified as the primary sampling unit. Data were analyzed using Stata 13 SE (StataCorp, 2013).

3. Results

Table 1 presents sample characteristics. The majority of the sample was age 25–40 (54.6%) and white (52.1%). Most participants (56.4%) had a college degree or higher. A quarter (25.0%) reported past-year ecstasy use and a quarter (25.4%) also reported past-year powder cocaine use. Use of methamphetamine (2.0%) and GHB (1.5%) were less common.

As shown in Table 2, we estimate that nearly a quarter (23.9%) of EDM party attendees have used opioids non-medically in their lifetime. We estimate that one out of ten (9.8%) have used in the past year, 5.0% have used in the past month, and 16.4% would be willing to use in the next 30 days if offered by a friend. OxyContin was the most highly reported opioid ever used non-medically by individuals in this scene, followed by Vicodin, Percocet, codeine, and Purple Drank (which contains codeine syrup). Among those reporting past-year nonmedical opioid use, 14.5% reported having sniffed an opioid in the past year, and 10.9% reported having injected an opioid in the past year.

With regard to recency of nonmedical opioid use (Table 3), older participants were at nearly six times (aOR=5.59, $p=.004$) the odds of reporting use in the past year compared to younger participants. Compared to those with a high school diploma or less, those with a college degree were at lower odds (aOR=0.08, $p=.014$) of reporting past-month opioid use. Compared to heterosexual participants, gay/lesbian participants were at lower odds for reporting past-month use (aOR=0.01, $p=.005$). In bivariable models, past-year users of cigarettes, benzodiazepines, amphetamine, ecstasy, methamphetamine, and/or powder cocaine were more likely to report the use of opioids in the past year ($p<.05$). Cigarette, benzodiazepine, amphetamine, methamphetamine, and powder cocaine users were also more likely to report the use of these drugs in the past month ($p<.05$). In the multivariable models, benzodiazepine use remained a robust correlate of past-year (aOR=7.54, $p<.001$) and past-month (aOR=10.11, $p<.001$) opioid use. Powder cocaine use also remained a significant correlate of past-year opioid use (aOR=3.48, $p=.007$) and methamphetamine use

remained a significant correlate of past-month use ($aOR=14.86$, $p=.001$), but other drug-related associations lost significance.

Among those reporting the past-year opioid use, users reported, on average, using 2.26 ($SE=0.28$) different opioid products listed. Half (49.1%) reported using only one opioid while 50.9% reported using more than one: 16.8% used two, 14.4% used three, 10.9% used four, and 8.6% used between five and eight. As shown in Table 4, participants identifying as black, on average, reported using fewer opioid products than participants of other races ($p<.001$), and those identifying as gay/lesbian, on average, reported using fewer opioid products than heterosexual and bisexual/other participants ($p=.014$). Those reporting more recent opioid use (past-month use), on average, reported using more opioid products than those who had not used in the past month ($p=.049$), and those who had injected opioids in the past year, on average, reported using more than twice as many different opioid products in the past year than those who had not injected ($p=.027$). Those reporting past-year nonmedical use of benzodiazepines ($p=.012$) or cocaine ($p=.003$) in the past year, also, on average, reported using more opioid products than those who did not report use.

Finally, we examined willingness to use specific opioid drugs in the next 30 days if offered by a friend according to whether the specific opioid was used in the past year (Table 5). Among non-lifetime opioid users, 5.7% reported intention to initiate the nonmedical use of an opioid if offered by a friend in the next month. About a third (34.4%) of participants who had used in their lifetime, but not the past year reported that they would use an opioid again if offered by a friend in the next 30 days, and almost three out of four (73.6%) past-year opioid users reported intention to use again in the next 30 days if offered. We also present percentages for the six most prevalent opioid drugs in this sample. Of note, more than half of past-year users of opioids other than heroin (52.4–86.0%) reported intention to use in the next 30 days if offered, and most (86.0%) past-year Purple Drank users reporting a willingness to use again in the next month if offered.

4. Discussion

Nonmedical opioid use and associated adverse outcomes remain at epidemic proportions in the US. Attendees of EDM parties at nightclubs and festivals, which continue to grow in popularity, are known to be at high risk for the use of “club” drugs, but research was needed to investigate the extent of nonmedical opioid use among this population.

We estimate that one in every ten EDM party attendees have used opioids non-medically in the past year. This estimated prevalence appears to be higher than the national prevalence of approximately 7% in 2016 (CBHSQ, 2017a), suggesting that this population is also at high risk for nonmedical opioid use. In particular, attendees reported a higher prevalence of past-year use of OxyContin compared to the national estimate (4% versus 1.1%, respectively). We also found that 14.5% of past-year users reported sniffing an opioid in the past year and a tenth reported injecting an opioid in the past year. This percentage is lower than the proportion (35%) of recent nonmedical opioid users who reported alternate routes of administration in another nightclub study (Buttram and Kurtz, 2016), but recent nonmedical prescription drug use was an inclusion criterion of that study. Such alternative routes of

administration can place users at higher risk of overdose, dependence, and transmission of bloodborne pathogens (Buttram and Kurtz, 2016; Compton et al., 2016; Compton and Volkow, 2006; Hall et al., 2008; Murthy, 2016).

Several studies focusing on nationally representative samples have found males to be at higher risk for using opioids non-medically (Johnston et al., 2017; Palamar et al., 2016c), but we found no significant differences in the prevalence of use based on gender. We also found that attendees with a college degree were less likely to report current nonmedical opioid use, which adds to a previous study which found that nonmedical prescription opioid users were more likely to lack a high school education (Wu et al., 2011). While we found no significant difference regarding race/ethnicity, black past-year users tended to report using fewer types of opioids than those of other races/ethnicities. This adds to recent national data suggesting that racial/ethnic minorities are at lower risk for nonmedical opioid use than white individuals (CBHSQ, 2017a). Potential explanations are that black and Hispanic individuals seem less likely than whites to “doctor shop” (Weiner et al., 2015) and that it may be more difficult for black patients to obtain prescription opioids (Hausmann et al., 2013). It is unknown, however, whether black users in our sample had less access to various opioids.

Regarding sexual orientation, identifying as gay/lesbian was associated with decreased odds of reporting current use, and it was also associated with reporting the use of fewer opioid products. In contrast, identifying as bisexual/other sexuality was associated with using more types of opioids. These findings corroborate those of previous studies focusing on the use of other drugs. For example, other studies have found that compared to heterosexuals, those identifying as bisexual were more likely to report use of various substances, including nonmedical use of prescription drugs such as opioids, while gay/lesbian participants were typically less likely to report use (Corliss et al., 2010; Palamar et al., 2016a). Thus, sexual orientation appears to be a leading sociodemographic factor in the nonmedical use of opioids in this scene.

As it pertains to opioid-specific characteristics, more recent (current) users and those who have injected opioids tended to use more opioid drugs. In general, more recent users were also more willing to use again if offered by a friend. For example, 6% of attendees who had never used opioids reported they would initiate if offered. In contrast, over one-third of those who have used in their lifetime, but not in the past year, are willing to use again, and nearly three-quarters of those who have used in the past year indicated they would use again if offered.

Notably, almost nine out of ten past-year users of Purple Drank indicated that they would use again if offered by a friend. To our knowledge, other epidemiological studies have not probed the for use of Purple Drank, and this may signify a potential area of interest for future research. A 7.5% prevalence of lifetime use of Purple Drank reported by EDM attendees (with high rates of self-reported willingness to use again) likely represents a problematic and understudied aspect of the opioid crisis. Moreover, we believe that nonmedical opioid use may be underestimated when this drug cocktail is not queried as it is possible that many Purple Drank users do not report nonmedical codeine use on surveys.

This substance is popular in other scenes as well (Agnich et al., 2013), and more research is needed on its use to inform prevention.

Past-year methamphetamine use was strongly associated with past-month opioid use in this sample. While we could not determine whether methamphetamine and opioids were used in a polydrug manner, recent research suggests a linear combination of these drugs is becoming more prevalent among some populations (Glick et al., 2018). More research is needed, however, to investigate less linear combinations involving opioid pills.

We also found nonmedical benzodiazepine use to be a consistent and robust correlate of opioid use, which adds to previous findings demonstrating that frequent opioid use is associated with benzodiazepine dependence among young adult participants in the EDM club scene (Kurtz et al., 2017b). Potential explanations for this correlation may be that benzodiazepines are often included in drug combinations when used in the club scene (Jones et al., 2012) and that many opioid users have co-ingested opioids with other drugs in the previous year (McCabe et al., 2012). Indeed, users of benzodiazepines and prescription opioids commonly combine the drugs to enhance or come down from the effects of other drugs (Jones et al., 2012; Mateu-Gelabert et al., 2017). In general, EDM attendees are at high risk for engaging in polydrug use (Halkitis et al., 2007; Kelly et al., 2015), but we must keep in mind that our study only demonstrates associations between past-year use in relation to opioid use; we were unable to determine whether drugs were combined. While it is possible that many users in this scene are simply more likely to use a variety of prescription pills in a nonmedical manner, combining these drug classes directly can lead to toxic health effects, a decrease the success of treatment outcomes, and an increase in likelihood and severity of overdose (Jones et al., 2012; Kurtz et al., 2017b). Therefore, our current findings—although only correlational—coupled with the existing body of evidence, may warrant additional research to determine the extent to which attendees of EDM parties are using combinations involving these prescription opioids and benzodiazepine.

4.1. Limitations

Since this study was conducted specifically on attendees of EDM parties, the generalizability of the results to the larger population may be limited. Willingness to use implies an openness to use given opportunity and does not necessarily suggest an intention to use (Pomery et al., 2009). Therefore, reported willingness should not be interpreted as individuals seeking out a particular drug, but rather a predicted reaction to receiving an offer. Willingness and intention are both important predictors of risk behavior (Gibbons et al., 1998), but these do not definitively determine one engaging in that behavior. In addition, we probed for willingness to use if offered by a friend; however, it should be noted that qualitatively, some respondents indicated that “friend” needed to be defined, suggesting that willingness may be further dependent on the nature or extent of the friendship. We were also unable to determine whether other drugs used were directly combined with opioids.

It is also possible that misreporting may have occurred as some respondents may have reported the medical use of opioids, despite being asked about nonmedical use specifically. While all use of heroin and novel opioid analogs is illegal in the US, it is possible that some participants reported the medical use of prescribed opioid pills or fentanyl as nonmedical

use. Furthermore, we did not ask about every type or brand of opioid, which may have led to classification error. However, we did provide an extensive list of opioids, which we believe helped limit classification error, as previous studies have found that individuals do not always know that a specific drug (e.g., Vicodin) is classified as an opioid (Palamar et al., 2016b). Some respondents may have also confused OxyContin with oxycodone. It is also possible that some participants over reported use of Purple Drank. The main product used in this concoction containing both promethazine and codeine was taken off the market in 2014. Although there is still limited availability of the product and availability of separate ingredients continues, it is possible that some participants used Purple Drank with different ingredients that may not have contained codeine. It is possible that some participants were inebriated and this could have affected their responses. Finally, while recruiters encouraged participants to keep their responses confidential, it is possible that some underreporting occurred when participants took the survey next to their peers.

5. Conclusions

We found that nonmedical opioid use is prevalent in the EDM scene, and that individuals who frequent these parties do not necessarily limit their drug use to common “club” drugs such as ecstasy. We believe the high prevalence of nonmedical opioid use among attendees of EDM parties (compared to the general population) suggests that prevention and harm reduction efforts need to target this increasingly popular scene as efforts continue to be made towards reducing the opioid crisis. Many individuals in this population are experienced with drugs such as ecstasy, but due to their experience with various drugs, they may underestimate the addictive potential of opioids, which are typically not used as “club” drugs. Not only have one out of ten individuals in this population used opioids non-medically in the past year, but 16% report willingness to use if offered by a friend. A portion of these users has also snorted or injected opioids, which increases the risk for overdose and dependence. This population of experienced drug users needs to be reached to prevent initiation and to prevent continued use which can lead to riskier and more frequent use, dependence, and deleterious outcomes such as overdose—particularly if opioids are combined with other drugs.

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Highlights

- We examined nonmedical opioid use among electronic dance music party attendees
- We estimate that a tenth has used in the past year and that 5% are current users
- We estimate that 16% would use in the next 30 days if offered by a friend
- Nonmedical benzodiazepine use is a strong correlate of use
- A quarter of current opioid users intend to use again if offered in the next 30 days

Table 1

Sample characteristics (N=954)

	N	%
Age		
18–24	433	45.4
25–40	521	54.6
Sex		
Male	489	51.3
Female	465	48.7
Race/Ethnicity		
White	534	52.1
Black	73	7.4
Hispanic	174	20.0
Asian	109	13.6
Other/Mixed	64	6.9
Education		
High School or Less	123	16.5
Some College	268	27.1
College Degree	428	45.4
Graduate School	135	11.0
Weekly Income		
<\$500	477	49.9
\$500	477	50.1
Sexual Orientation		
Heterosexual	774	83.5
Gay/Lesbian	66	5.4
Bisexual/Other Sexuality	114	11.1
Past-Year Other Drug Use		
Cigarettes	520	46.2
Alcohol	739	70.4
Ecstasy	352	25.0
Benzodiazepine (nonmedical)	146	12.4
Amphetamine (nonmedical)	201	13.0
Methamphetamine	26	2.0
Powder Cocaine	339	25.4
GHB	27	1.5

GHB = *gamma*-hydroxybutyrate

Table 2

Estimated prevalence of nonmedical opioid use and willingness to use opioids in the next month among EDM party attendees in NYC

	Lifetime Use % (95% CI)	Past-Year Use % (95% CI)	Past-Month Use % (95% CI)	Willingness to Use % (95% CI)
Any Opioid	23.9 (19.4, 29.1)	9.8 (7.0, 13.7)	5.0 (2.6, 9.1)	16.4 (12.7, 20.9)
OxyContin	13.9 (10.3, 18.5)	3.9 (2.0, 7.5)	2.8 (1.2, 6.2)	8.7 (5.9, 12.7)
Vicodin	13.2 (9.3, 18.3)	4.0 (2.3, 6.7)	2.1 (0.1, 4.5)	7.9 (5.6, 11.0)
Percocet	12.8 (9.8, 16.6)	4.0 (2.6, 6.2)	1.1 (0.5, 2.4)	8.2 (6.0, 11.2)
Codeine	9.1 (6.2, 13.0)	2.1 (1.2, 3.8)	0.6 (0.2, 1.6)	4.1 (2.6, 6.5)
Purple Drank	7.5 (5.3, 10.5)	1.6 (1.0, 3.6)	0.8 (0.2, 3.1)	6.4 (4.3, 9.4)
Morphine	3.7 (2.2, 5.9)	0.6 (0.2, 1.6)	0.6 (0.0, 1.6)	3.9 (2.4, 6.2)
Tramadol	3.0 (1.3, 6.8)	1.3 (0.4, 4.1)	0.6 (0.1, 3.4)	0.6 (0.2, 1.7)
Heroin	2.6 (1.3, 5.1)	1.3 (0.6, 2.7)	0.3 (0.0, 1.1)	1.1 (0.4, 3.2)
Fentanyl	2.4 (1.3, 4.5)	0.5 (0.2, 1.7)	0.4 (0.0, 1.9)	1.0 (0.5, 2.0)
Other Opioids	1.6 (0.1, 3.4)	0.5 (0.2, 1.7)	0.2 (0.0, 0.5)	0.4 (0.0, 1.7)
Methadone	1.4 (0.1, 2.8)	0.3 (0.0, 1.7)	0.0 (0.0, 0.0)	0.4 (0.2, 1.1)
Dilaudid	1.2 (0.5, 2.9)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.5 (0.2, 1.6)
Demerol	0.5 (0.0, 1.5)	0.3 (0.0, 1.7)	0.0 (0.0, 0.0)	0.3 (0.0, 1.2)

Note. Willingness to use indicates that the participant responded that he or she would use in the next 30 days if offered by a friend. Purple Drank (a.k.a.: Lean or Sizzurp) is a beverage (typically Sprite) containing codeine cough syrup. An estimated 0% of participants have used (or would use if offered) krokodil, AH-7921, W-18, carfentanil, or U-47700.

Table 3

Correlates of past-year and past-month nonmedical opioid use

	Past 12-Month Use, %		Past 30-Day Use, %		Past 12-Month Use		Past 30-Day Use	
	No, %	Yes, %	No, %	Yes, %	aOR	95% CI	aOR	95% CI
Age								
18–24	47.6*	25.2	46.3	28.2	1.00		1.00	
25–40	52.4	74.8	53.7	71.8	5.59**	(1.81, 17.33)	3.37	(0.88, 12.97)
Sex								
Male	50.4	59.8	50.8	60.9	1.00		1.00	
Female	49.6	40.2	49.2	39.1	0.67	(0.36, 1.28)	0.52	(0.21, 1.32)
Race/Ethnicity								
White	51.1	61.3	52.0	54.1	1.00		1.00	
Black	7.2	9.3	7.7	1.4	0.86	(0.21, 3.59)	0.19	(0.01, 3.11)
Hispanic	21.1	10.7	20.1	18.3	0.53	(0.20, 1.38)	1.24	(0.30, 5.10)
Asian	13.7	12.8	13.4	17.8	1.44	(0.27, 7.68)	2.80	(0.74, 10.63)
Other/Mixed	7.0	5.9	6.8	8.4	0.72	(0.21, 2.52)	0.99	(0.16, 6.13)
Education								
High School or Less	16.1	19.9	15.7	32.2	1.00		1.00	
Some College	26.5	32.8	27.2	26.1	0.50	(0.13, 1.93)	0.22	(0.04, 1.28)
College Degree	46.1	38.2	46.2	30.1	0.22	(0.05, 1.07)	0.08*	(0.01, 0.58)
Graduate School	11.2	9.1	11.0	11.7	0.19	(0.02, 1.90)	0.19	(0.01, 3.40)
Weekly Income								
<\$500	49.2	55.9	50.1	45.3	1.00		1.00	
\$500	50.8	44.1	49.9	54.7	0.35	(0.11, 1.09)	0.82	(0.22, 3.09)
Sexual Orientation								
Heterosexual	84.7	72.8	83.6	81.8	1.00		1.00	
Gay/Lesbian	4.8	11.1	5.6	0.6	1.61	(0.54, 4.82)	0.01**	(0.00, 0.21)
Bisexual/Other Sexuality	10.5	16.1	10.7	17.6	0.97	(0.33, 2.84)	0.66	(0.21, 2.07)

	Past 12-Month Use, %		Past 30-Day Use, %		Past 12-Month Use		Past 30-Day Use	
	No, %	Yes, %	No, %	Yes, %	aOR	95% CI	aOR	95% CI
Past-Year Other Drug Use								
Cigarettes	43.3 ^{***}	73.2	44.7 [*]	75.2	1.28	(0.48, 3.43)	1.78	(0.36, 8.79)
Alcohol	68.8	85.7	69.9	81.0	0.89	(0.22, 3.52)	0.56	(0.10, 3.26)
Benzodiazepine (nonmedical)	8.1 ^{***}	51.7	10.1 ^{***}	56.9	7.54 ^{***}	(4.22, 13.48)	10.11 ^{***}	(4.87, 20.96)
Ecstasy	22.7 [*]	46.2	23.8	49.1	1.10	(0.43, 2.79)	1.62	(0.32, 8.33)
Amphetamine (nonmedical)	11.0 ^{***}	31.0	12.0 [*]	31.2	1.47	(0.67, 3.23)	1.06	(0.55, 2.04)
Methamphetamine	0.8 ^{***}	12.4	1.0 ^{***}	19.4	3.88	(0.87, 17.36)	14.86 ^{**}	(3.24, 68.12)
Powder Cocaine	21.6 ^{**}	60.6	23.7 [*]	58.6	3.48 ^{**}	(1.44, 8.39)	2.22	(0.58, 8.56)
GHB	1.2	4.5	1.5	2.2	0.55	(0.02, 12.71)	1.03	(0.4, 24.37)

Note. aOR = adjusted odds ratio (controlling for all covariates); CI = confidence interval. GHB = *gamma*-hydroxybutyrate.

Asterisks next to covariate name indicate significance in bivariable model.

* p < .05,
 ** p < .01,
 *** p < .001

Table 4

Correlates of total number of different opioid drugs used in past-year among past-year users

	Mean (SE)	P
Age		.855
18–24	2.33 (0.24)	
25–40	2.24 (0.40)	
Sex		.496
Male	2.11 (0.38)	
Female	2.49 (0.41)	
Race/Ethnicity		<.001
White	2.38 (0.42)	
Black	1.15 (0.13)	
Hispanic	2.92 (0.36)	
Asian	2.03 (0.48)	
Other/Mixed	2.12 (0.33)	
Education		.426
High School or Less	2.01 (0.25)	
Some College	2.78 (0.66)	
College Degree	2.15 (0.32)	
Graduate School	1.44 (0.46)	
Weekly Income		.587
<\$500	2.11 (0.31)	
\$500	2.46 (0.53)	
Sexual Orientation		.014
Heterosexual	1.79 (0.28)	
Gay/Lesbian	0.82 (0.27)	
Bisexual/Other Sexuality	2.92 (0.61)	
Opioid Use Characteristics		.049
Used in the Past Year, but not Past 30 Days	1.72 (0.32)	
Used in the Past 30 Days	2.79 (0.42)	
Have Sniffed Opioids in Past Year		.151
No	2.12 (0.30)	
Yes	3.14 (0.67)	
Have Injected Opioids in Past Year		.027
No	1.95 (0.23)	
Yes	4.83 (1.22)	
Past-Year Other Drug Use		.440
Cigarettes		
No	1.92 (0.43)	
Yes	2.39 (0.37)	

	Mean (SE)	P
Alcohol		.924
No	2.21 (0.63)	
Yes	2.27 (0.32)	
Benzodiazepine (nonmedical)		.012
No	1.64 (0.20)	
Yes	2.85 (0.43)	
Ecstasy		.745
No	2.18 (0.46)	
Yes	2.36 (0.26)	
Amphetamine (nonmedical)		.923
No	2.25 (0.38)	
Yes	2.30 (0.34)	
Methamphetamine		.090
No	1.99 (0.24)	
Yes	4.20 (1.22)	
Powder Cocaine		.003
No	1.44 (0.16)	
Yes	2.80 (0.40)	
GHB		.419
No	2.28 (0.30)	
Yes	2.03 (0.09)	

Table 5

Willingness to use specific opioids in relation to recency of use

	Non-Lifetime Users %	Lifetime, but Not Past-Year Users %	Past-Year Users %
Any Opioid	5.7	34.4	73.6
OxyContin	3.4	32.1	67.3
Vicodin	3.8	23.2	64.4
Percocet	2.9	36.1	62.4
Codeine	1.6	22.7	52.4
Purple Drank	3.6	29.2	86.0
Heroin	0.7	8.8	26.0

Note. Willingness to use indicates that the participant responded that he or she would use in the next 30 days if offered by a friend, and corresponds to recency of use of the drug in the specific row. For example, recency of OxyContin use corresponds to willingness to use OxyContin. Row percentages for each category are presented. We could not examine past-30 day use as cells often had too few participants. Non-lifetime users were included as a category to determine risk for initiating use. Purple Drank (a.k.a.: Lean or Sizzurp) is a beverage (typically Sprite) containing codeine cough syrup. All $ps < .0001$