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Correlates of New Psychoactive Substance Use Among a Self-Selected Sample of Nightclub Attendees in the United States

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Abstract

Background and Objectives—Although new psychoactive substances (NPS) continue to emerge at a rapid rate, US national surveys only measure the use of non-specific categories of NPS and are not designed to access high-risk populations. In this paper we report lifetime use of specific NPS (of 58) and examine correlates of use among a high-risk population: nightlife attendees.

Methods—The self-selected sample from the Global Drug Survey (2013) consisted of 2,282 respondents in the US, aged 16–60 years, who reported nightclub attendance in the last year. Multivariable logistic regression models determined unique predictors of lifetime use.

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Declaration of Interest

Dr. Winstock is founder and managing director of Global Drug Survey, the independent drug use data exchange hub that conducted the study. There is nothing further to declare.

Results—Lifetime use of a wide range of NPS was reported (any NPS; 46.4%), including synthetic cannabinoids (24.8%), tryptamines (eg, 4-AcO-DMT, 23.0%), psychedelic phenethylamines (eg, 2C-B, 25I-NBOMe; 21.7%), euphoric stimulants (eg, BenzoFury; 16.2%), and synthetic cathinones (eg, methylone; 10.5%). Females (AOR = 0.49 [.41, .60]) and older respondents (age 22–60; AOR = .73 [.59, .89]) were at lower odds of reporting any lifetime NPS use. Frequent nightclub attendance was associated with increased odds of reporting lifetime NPS use overall (eg, weekly compared with less than once a month, AOR =2.33 [1.70,3.19]), but not specifically with synthetic cannabinoid use.

Discussion and Conclusions—Among a self-selected sample of nightclub attendees, a large range of novel substances were reported, and young attendees, males, and those who attended more frequently were at increased odds of reporting use.

Scientific Significance—Harm reduction initiatives are needed to reduce risk of harm in this population, where environmental characteristics may augment risks associated with consuming lesser-known psychoactive substances.

INTRODUCTION

The last decade has seen the emergence of an increasing number of new psychoactive substances (NPS), which the United Nations Office on Drugs and Crime (UNODC) defines as substances that do not fall under international drug controls, but which may still pose a threat to public health. NPS may not necessarily be newly invented or discovered, but they may have instead become more recently available.[1] The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) has identified over 560 NPS, of which 100 were newly identified in 2015.[2] Most of these NPS can be categorized as synthetic cathinones or synthetic cannabinoid receptor agonists.[2] NPS have variously been referred to as novel or emerging psychoactive substances and designer drugs, and more colloquially as research chemicals, “legal highs,” or synthetic drugs. The terms “synthetic drugs” and “legal highs” can create confusion when used to refer to NPS because: (i) many “traditional” illicit drugs (eg, LSD, methamphetamine, MDMA) are also synthesized; and (ii) many countries have moved to prohibit these substances, despite remaining “legal” at the international level.[3]

While the EMCDDA and other national surveys throughout Europe monitor use of various NPS, the US does not monitor self-reported use to the same extent. Systems such as the National Forensic Laboratory Information System (NFLIS) collect NPS identification results from drug seizures analyzed by forensic laboratories throughout the US,[4] but such seizure data do not necessarily reflect broader patterns of use. Data from Poison Control Centers and emergency departments may be more useful indicator data than seizure data with regard to estimating prevalence, and these two sources suggest synthetic cannabinoids and synthetic cathinones have been the two most problematic NPS classes in the US. From 2011 through 2015, synthetic cannabinoids and synthetic cathinones were associated with 26,327 and 10,927 reported poisonings, respectively,[5,6] and synthetic cathinone use was associated with over 20,000 emergency department visits in 2011.[7] There is a lack of national survey data focusing on NPS, however.

Of the three national drug surveys conducted in the US, Monitoring the Future (MTF) is the only survey to ask about (two) NPS classes—synthetic cannabinoids (referred to as "synthetic marijuana") and synthetic cathinones (referred to as "bath salts").[8] MTF results suggest that self-reported past-year use of synthetic cannabinoids among high school seniors was highest in 2011 (11.4%) and this estimate decreased to 5.2% in 2015.[8] Self-reported "bath salt" use among high school seniors has remained somewhat stable at ~1%;[8,9] however, recent studies have found that a lot of "bath salt" use in the US is actually unintentional as the drug ecstasy (MDMA, "Molly") is often adulterated with "bath salts" and/or other NPS.[10] While MTF is an annual nationally representative study, the survey is only administered to high school students, thus, results are not generalizable to adults (or to those who have dropped out of high school). The National Survey on Drug Use and Health (NSDUH) does systematically ask about use of DMT (N,N-Dimethyltryptamine)—which is sometimes categorized as an NPS (but it has been a popular drug for decades)—and it allows participants to type in names of stimulants and hallucinogens not assessed.[11] However, a recent study examining NSDUH NPS data found that NPS use is severely underreported as per the type-in method.[12] Specifically, this recent study found that self-reported prevalence of any NPS using the type-in method is only 1.2% so it is essential for surveys to specifically ask about NPS.

Although there is a lack of national data regarding NPS use in the US, results from a study examining national rates of drug use suggest that rave attendees are at higher risk of using illicit drugs and NPS than non-attendees in the general population.[13] For example, this recent study found that 12-month synthetic cannabinoid and "bath salt" use was reported by 20.4% and 3.7% of rave-attending high school seniors, respectively—compared to 7.6% and .9% of non-attendees. Likewise, other studies focusing on nightclub attendees have found high rates of illicit drug use,[14,15] and increasingly, NPS, which may be marketed as legal alternatives to traditional prohibited drugs.[16]

It is important to examine the correlates of NPS use among nightclub attendees not only because they are at high risk for use, but also because they are at high risk of experiencing adverse outcomes associated with use. Poisonings related to ecstasy and NPS use have become more common in recent years, and one recent American dance festival had 22 poisonings and two deaths—many of which were related use of methylone, which is a synthetic cathinone ("bath salt").[17] Although only 1% of high school seniors in the US report use,[9] and reported poisonings appear to be decreasing,[5] in 2011, "bath salt" use was related to about 23,000 emergency department visits.[7] In addition, while prevalence of synthetic cannabinoid use is decreasing,[8] poisonings related to use are increasing.[6,18]

Nightclub attendees appear to be at particularly high risk for NPS use and associated adverse outcomes, yet there is a lack of large-scale survey data with this population that measures the use of specific NPS and characterizes this population. This paper reports lifetime use of 58 NPS and examines the sociodemographic correlates of lifetime use of any NPS and different NPS classes, among a large self-selected sample of nightclub attendees in the US.

METHODS

Design

Global Drug Survey (GDS) designs and conducts anonymous, online surveys every year to investigate trends in drug use. In collaboration with media partners (see acknowledgements), the survey is actively promoted via social networking sites such as Twitter, Facebook, and Reddit for a period of 1–2 months from its launch in mid-November each year. The study received ethical approval from the Kings College London Psychiatry, Nursing and Midwifery Research Ethics Subcommittee.

Between November 11 and December 29, 2013, a total of 78,819 survey responses were submitted. After preparing the data, 3,955 records were excluded due to data capture glitches, duplicate entries, missing data on key variables (age, sex, and drug screen items) and the reporting of using a fictitious drug (Xenorap). Of the remaining 74,864 survey responses, only respondents who resided in the US, were aged between 16 and 60 years, and had reported attending a nightclub within the last year were retained in the sample. The analytic sample consisted of the 2,282 respondents who (i) reported attending a nightclub within the last year (39.5% of the full US sample) and (ii) identified as being age 16–60 (with 16 being the minimum age for inclusion; 90.5% of the full US sample).

Measures

Respondents answered a variety of questions about sociodemographics and drug use. They were asked their sex (ie, male, female), age, and race/ethnicity (categorized into white, black, Hispanic, Asian, and other race). Respondents answered whether or not they are employed, and they provided their sexual orientation (ie, heterosexual, bisexual, gay/lesbian). They were also asked about whether they had attended a nightclub within the past year and answer options were “never,” “less than once a month,” “once a month,” “once a fortnight” (every other week), and “at least once a week.” Respondents who answered “never” were excluded from the analytic sample.

We asked about lifetime use of numerous traditional drugs and 58 NPS. Respondents checked off whether or not they have ever used each drug. We collapsed all NPS into a single variable indicating whether or not any NPS use was reported, and we also collapsed all NPS into categories (and subcategories) with guidance from popular psychonaut websites (eg, Erowid) and annual and semi-annual government reports (eg, NFLIS, EMCDDA). These categorizations allowed us to examine and compare associations across categories.

Analyses

We first examined the self-reported use of overall NPS use, NPS classes, and individual NPS among this self-selected sample. We then examined descriptive statistics for each covariate (sociodemographic variables and nightclub attendance) according to whether or not any NPS use was reported. We then examined each covariate in relation to self-reported lifetime NPS use. Specifically, we examined how each covariate related to NPS use in a bivariable manner which produced unadjusted odds ratios (ORs) associated with each variable. We then fitted all covariates into a single multivariable logistic regression model to determine conditional

associations of each variable with all else being equal. Thus, each covariate in this model was associated with adjusted ORs (AORs). We repeated the same multivariable model for the five most prevalent NPS classes to examine whether associations were similar across groups. However, since use of multiple NPS (or NPS classes) was not uncommon (with 25.3% reporting using a drug in more than one class), we implemented a statistical correction as these five outcomes may not have been completely independent. Specifically, we utilized a Bonferroni correction to correct for potential Type I Error (α =.05/5 =.01) along with 99% confidence intervals (CIs). Since use of traditional drugs was very commonly reported by this nightclub-attending sample (see Results) we did not include other drugs in the models. We ensured that all models had good fit (eg, as per Hosmer–Lemeshow tests). In addition, we examined whether number of NPS (or NPS classes) used differed according to level of nightclub attendance. Analyses were conducted using SAS 9.3 and Stata 14.

RESULTS

Almost half (46.4%) of respondents reported lifetime use of at least one of the 58 NPS assessed by GDS. Self-reported lifetime use of each NPS (and NPS class) is presented in Table 1, and the most commonly reported classes of use were synthetic cannabinoids (24.8%), tryptamines (23.0%), psychedelic phenethylamines (21.7%), euphoric stimulants (16.2%), and synthetic cathinones (10.5%). Use of 2C series drugs was most commonly reported among psychedelic phenethylamines (21.7%) and 8.0% of respondents reported use of an NBOMe series phenethylamine. DMT was the most commonly reported tryptamine (19.0%), MDA was the most commonly reported euphoric stimulant (14.9%), and methyl-one was the most commonly reported synthetic cathinone (7.8%). Methoxetamine (MXE) was the most commonly reported dissociative (3.5%), 4-Fluroamphetamine (4-FA) was the most commonly reported miscellaneous stimulant (1.3%), and etizolam was the most commonly reported novel benzodiazepine (1.7%). Lifetime use of traditional drugs was also frequently reported in this sample: alcohol (98.8%), cannabis (91.4%), psilocybin (62.1%), LSD (56.7%), cocaine (53.8%), MDMA pills (48.2%), MDMA powder (44.7%), ketamine (20.9%).

Table 2 presents sample characteristics and the raw percentages of each level of each covariate (sample characteristic) according to whether or not any lifetime NPS use was reported. It also presents the unadjusted and adjusted estimates. Females were at half the odds (AOR =.49, p <.001) for reporting NPS use and black respondents were also at low odds for reporting NPS use compared to white respondents (AOR =0.39, p <.001). With regard to age, analysis (not presented here) revealed that the association between ever using a NPS and age was non-linear. Between the age of 16 and 21 there was a positive association with reporting ever using a NPS; for those aged 22–60 there was a negative association with using NPS. As such we dichotomized age into respondents 16–21 years of age and respondents 22–60 years of age. The older age group was at decreased odds for reporting lifetime NPS use compared to younger respondents (AOR =.73, p <.01). Compared to heterosexual respondents, those identifying as bisexual were at consistent increased odds for use (AOR =1.61, p <.001) and those identifying as gay/lesbian were consistently at lower odds for use (AOR =.61, p <.01). With respect to nightclub attendance, compared to those

who attended less than once a month, more frequent use was robustly associated with increased odds of lifetime NPS use, even while controlling for all other covariates. Attending every week more than doubled the odds of reporting NPS use (AOR =2.33, $p <.001$).

We then fitted the same multivariable models, but examined correlates of use within the five most prevalent classes of NPS (Table 3). Females were consistently at low odds for reporting use of any of the five classes, and older respondents were less likely to report use of psychedelic phenethylamines and tryptamines. Compared to white respondents, black respondents were less likely to report use of psychedelic phenethylamines and euphoric stimulants, and those identifying as "other" race were less likely to report use of synthetic cathinones. Compared to employed respondents, unemployed respondents were at higher odds for reporting use of synthetic cathinones or synthetic cannabinoids. Compared to those identifying as heterosexual, those identifying as gay/ lesbian were significantly at decreased odds of reporting each class except for synthetic cathinones, and those identifying as bisexual were at increased odds for reporting use of tryptamines and synthetic cannabinoids. Finally, frequent nightclub attendance was a robust risk factor for use of each class; however, no level of attendance was significantly related to use of synthetic cannabinoids. Frequency of nightclub attendance was a less-robust risk factor for use of tryptamines.

Finally, since multi-NPS use was relatively common with a quarter (25.3%) reporting use of multiple classes of NPS, we examined the mean and median number of NPS (and NPS classes) reported by level of nightclub attendance (Table 4). More frequent attendance generally was associated with use of more NPS or NPS classes (ps <.001), but those attending every other week reported using more NPS or NPS classes on average than those who attended every week.

DISCUSSION

Although NPS continue to emerge at a rapid rate, few survey studies in the US have identified the use of specific NPS (beyond nebulous categories like "bath salts") and examined sociodemographic correlates of their use. We utilized recent data from GDS, an annual international online survey that monitors drug trends, to examine self-reported use of 58 NPS as reported by a subgroup well-known for their relatively high prevalence of drug use—nightclub attendees. Due to self-selected sampling strategies, it is not possible to extrapolate prevalence estimates of NPS use among US nightclub attendees using the GDS. Nevertheless, we did access a sample where almost half (46.4%) reported lifetime use of an NPS. Synthetic cannabinoids were the most commonly reported (24.8%), and tryptamines (23.0%), psychedelic phenethylamines (21.7%), euphoric stimulants other than ecstasy (16.2%), and synthetic cathinones (10.5%) were also common among this sample.

Females in this sample were at about half the odds for use of the five most common NPS classes we examined. These results corroborate previous toxicology studies focusing on NPS use and poisonings which found that males and young adults are at highest risk for use of different NPS.[19–21] A recent nationally representative study of high school seniors in the US found that females were at low odds for reporting synthetic cannabinoid use[22] and a recent

study of self-reported NPS use among young adults in the US found that females were at low odds for reporting overall NPS use, as well as for specifically reporting use of psychedelic phenethylamines, tryptamines, and synthetic cathinones.[12]

Results from our models also suggest that compared to white participants, black participants were at very low odds for reporting use psychedelic phenethylamines and euphoric stimulants, and those identifying as "other" race were at low odds for reporting use of synthetic cathinones. The national study that focused on use of NPS use among individuals age 12–34 also found that compared to whites, racial minorities were at low odds for self-reporting any NPS use as well as specific NPS classes including psychedelic, phenethylamines, and tryptamines.[12] Interestingly, neither this study nor the national study found significant race/ethnicity differences for synthetic cannabinoids. While racial minorities can be viewed as "protected" against use of many NPS, they do not appear to be at low risk for use of these drugs, possibly as synthetic cannabinoids are commonly used to replace natural cannabis in the US, and because blacks and Hispanics are more likely to be stopped by police, and arrested and sentenced for cannabis possession than other races.[23]

We also found that being unemployed increased the odds for reporting use of synthetic cathinones or synthetic cannabinoids. Synthetic cathinones are common replacements for ecstasy/MDMA and synthetic cannabinoids tend to be cheaper than natural cannabis[24] so some individuals may be resorting to these substances because they cannot afford their drug of choice. The same nationally representative study of Americans age 12–34 discussed above found that unemployed participants were more likely to report use of psychedelic phenethylamines, tryptamines, or synthetic cathinones; however, associations disappeared when controlling for other sociodemographic variables.[12]

Compared to participants identifying as heterosexual, those identifying as bisexual were at high risk for reporting NPS use, and this finding was consistent for most NPS classes. In contrast, participants identifying as gay/lesbian were at significantly lower risk for NPS use compared to heterosexuals. While some studies that have collapsed gay/lesbian with bisexual found that these individuals were at higher risk for drugs such as ecstasy, ketamine, GHB, cocaine, and methamphetamine compared to heterosexuals,[25] other studies have found that those identifying as bisexual are at even higher risk that those identifying as gay/ lesbian.[26] While our results confirm identifying as bisexual as being a strong risk factor for use—in this case NPS—we found those identifying as gay/ lesbian to be at even lower risk for reporting NPS use than heterosexuals. Interestingly however, multiple studies have found that while sexual minorities were at risk for use of a variety of other drugs, they found that heterosexuals were at highest risk for LSD/hallucinogen use.[14,26] Therefore, our findings appear to be consistent with previous literature in that those identifying as gay/lesbian are actually at lower risk for use of psychedelics—in this case—psychedelic phenethelamines and tryptamines. In fact, those identifying as gay/ lesbian were at low risk for most NPS classes we examined.

Results from this study also add to and corroborate findings from a recent nationally representative study of high school seniors that found that any "rave" attendance was associated with increased risk of use of the 16 drugs examined, and that frequent attendance

was related to increased risk of reporting NPS use (with rave attendees reporting 12-month use of synthetic cannabinoids and “bath salts” at 20.4% and 3.7%, respectively, and those attending raves monthly or more often reporting use of synthetic cannabinoids and “bath salts” at 25.8% and 6.7%, respectively).[13] With regard to NPS, students attending raves a few times a year were at double the odds for reporting synthetic cannabinoid use and those attending monthly or more often were at triple the odds. Those attending raves monthly or more often were at almost five times the odds of reporting bath salt use. Interestingly, while higher-frequency of nightclub attendance was a robust risk factor for overall NPS use and for most specific NPS classes in this current study, attendance was not related to self-reported use of synthetic cannabinoids. Therefore, while synthetic cannabinoids are the most prevalent NPS in the US and worldwide, we found that these drugs tend to be used more often by individuals who do not frequent the nightclub scene. However, similar to correlates identified with ecstasy consumption,[27–29] we found that the frequency of nightclub attendance uniquely predicted the frequency of psychostimulant and psychedelic NPS categories.

When judged against traditional epidemiological criteria for monitoring public health, we acknowledge that web surveys that utilize purposive sampling have potentially significant limitations.[30] There will inevitably be non-response bias, whereby there will be inherent differences between those who participate and those who do not. Volunteer bias is also a concern, as people are more likely to respond if they are interested in the topic, and thus by definition will differ from those who do not participate. Therefore, as participants in our survey may have a greater interest in or experience with drugs, they may not be representative of the wider population. However, as our interest is in identifying emerging substances and new trends in drug use, rather than highlighting current trends in the general population, the benefits of the sampling strategy and web-based design in accessing otherwise hidden populations actually improves our capacity to answer these kinds of questions among people who use illicit drugs.[31,32] Given the above, it is important not to interpret the findings reported here as prevalence estimates.

The data are based on self-report—but it has been found that self-report of drug that people intended to consume is relatively high[33] and that the anonymous web survey format helps people to feel more comfortable revealing sensitive information.[34] Nevertheless, in the area of NPS reporting, surveys such as these can only ever report on the drug types people know they have taken. We know that NPS are often used as adulterants of other more conventional drugs, and obviously it is not possible to measure this kind of use through a survey without also validating self-reports with oral swab or hair tests[35] or testing the substances themselves.[36] Thus, surveys likely lead to underreporting the extent of NPS use in the clubbing population.

In conclusion, among a self-selected sample of nightclub attendees in the US, a large range of novel substances were reported, and young attendees, males, and those who attended nightclubs more frequently were at increased odds of reporting their use. Prevention and harm reduction initiatives need to be adapted to reduce the risk of harm among in this population, where increased rates of experimentation and environmental characteristics may combine to increase risk.

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TABLE 1

Lifetime use of NPS and NPS classes assessed by GDS

Drug	*n*	%
Any NPS	1,058	46.36
Synthetic cannabinoids	566	24.80
Herbal preparation	547	23.97
Powder preparation	73	3.20
Tryptamines	525	23.01
DMT	435	19.06
4-AcO-DMT	81	3.55
5-MeO-DMT	72	3.16
Alphamethyltrytamine	25	1.10
4-HO-DiPT	22	.96
4-HO-MiPT	20	.88
Psychedelic phenethylamines	495	21.69
2C series	420	18.40
2C-B	296	12.97
2C-I	242	10.60
2C-E	195	8.55
2C-CT-7	44	1.93
2C-C	39	1.71
2C-D	20	.88
3C-P	7	.31
3C-E	5	.22
NBOMe series	184	8.06
25I-NBOMe	138	6.05
25C-NBOMe	65	2.85
25B-NBOMe	32	1.40
25I-NBOH	21	.92
25iP-NBOMe	5	.22
Euphoric stimulants	370	16.21
MDA	340	14.90
Benzofury	41	1.80
MDAI	34	1.49
5-IAI	4	.18
5/6-EAPB	3	.13
MDAT	1	.04
5-IT	1	.04
Synthetic cathinones	239	10.47
Methylone	177	7.76
Mephedrone	115	5.04
MDPV	38	1.67

Drug	*n*	%
Methcathinone	22	.96
Flephedrone	5	.22
Naphyrone	2	.09
Synthetic dissociatives	88	3.86
Methoxetamine	80	3.51
Nethylketamine	13	.57
Tiletamine	3	.13
Other synthetic stimulants	86	3.77
4-Fluroamphetamine	30	1.31
4-MEC	28	1.23
BZP	26	1.14
4-MA	13	.57
Ethylphenidate	13	.57
TFMPP	11	.48
Dimethocaine	5	.22
Methiopropamine	5	.22
3/4-CTMP	3	.13
Methoxypiperamide	2	.09
2-AI	2	.09
2-DPMP	1	.04
C1C	1	.04
Camfetamine	1	.04
D2PM	1	.04
DNP	1	.04
Methylhexaneamine	1	.04
Synthetic benzodiazepines	56	2.45
Etizolam	38	1.67
Phenezapam	21	.92
Diclazepam	12	.53
Pyrazolam	3	.13

NPS, new psychoactive substance; GDS, global drug survey.

TABLE 2

Sample characteristics and binary logistic models delineating correlates of lifetime NPS use

	Raw percentages			Unadjusted estimates		Adjusted estimates	
	Full sample (%)	**No NPS use (%)**	**NPS use (%)**	**OR**	**95% CI**	**AOR**	**95% CI**
Sex							
Male	1,435 (63.6)	690 (57.1)	1,435 (63.6)	1.00		1.00	
Female	823 (36.4)	519 (42.9)	823 (36.4)	.54***	(.46, .65)	.49***	(.41, .60)
Age (mean [SD] median)	29.6 (10.9), 26.0	32.4 (12.0), 29.0	29.6 (10.9), 26.0				
16–21	593 (26.2)	263 (21.7)	593 (26.2)	1.00		1.00	
22–60	1,674 (73.8)	949 (78.3)	1,674 (73.8)	.61***	(.50, .74)	.73**	(.59, .89)
Race/ethnicity							
White	1,905 (83.8)	1,000 (82.1)	1,905 (83.8)	1.00		1.00	
Black	54 (2.4)	41 (3.4)	54 (2.4)	.35**	(.19, .66)	.39**	(.20, .74)
Hispanic	131 (5.8)	76 (6.2)	131 (5.8)	.80	(.56, 1.14)	.82	(.56, 1.21)
Asian	43 (1.9)	26 (2.1)	43 (1.9)	.72	(.39, 1.34)	.69	(.36, 1.32)
Other	140 (6.2)	75 (6.2)	140 (6.2)	.96	(.68, 1.35)	.95	(.65, 1.38)
Employment							
Employed	1,666 (73.7)	909 (75.1)	1,666 (73.7)	1.00		1.00	
Unemployed	595 (26.3)	302 (24.9)	595 (26.3)	1.17	(.97, 1.41)	1.09	(.89, 1.33)
Sexual orientation							
Heterosexual	1,655 (74.7)	887 (74.4)	1,655 (74.7)	1.00		1.00	
Bisexual	339 (15.3)	161 (13.5)	339 (15.3)	1.28*	(1.01,1.61)	1.61***	(1.24, 2.08)
Gay/lesbian	222 (10.0)	144 (12.1)	222 (10.0)	.63**	(.47, .84)	0.61**	(.45, .83)
Nightclub attendance (past year)							
Less than once a month	1,416 (62.1)	859 (70.2)	1,416 (62.1)	1.00		1.00	
Once a month	428 (18.8)	183 (15.0)	428 (18.8)	2.06***	(1.66, 2.57)	1.91***	(1.52, 2.41)
Every other week	231 (10.1)	98 (8.0)	231 (10.1)	2.09***	(1.58, 2.77)	1.91***	(1.42, 2.57)
Every week	207 (9.1)	84 (6.9)	207 (9.1)	2.26***	(1.68, 3.04)	2.33***	(1.70, 3.19)

NPS, new psychoactive substance; OR, (unadjusted) odds ratio; AOR, adjusted OR (controlling for all variables in the logistic regression model); CI, confidence interval.

The lifetime use of NPS (the outcome variable) was 46.4%.

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

TABLE 3

Binary logistic models delineating correlates of use of the five most common NPS classes

	Psychedelic phenethylamines		Euphoric stimulants		Tryptamines		Synthetic cathinones		Synthetic cannabinoids	
	AOR	**99% CI**	**AOR**	**99% CI**	**AOR**	**99% CI**	**AOR**	**99% CI**	**AOR**	**99% CI**
Sex										
Male	1.00		1.00		1.00		1.00		1.00	
Female	.51***	(.40, .65)	.61***	(.47, .80)	.40***	(.31, .52)	.61**	(.44, .84)	.53***	(.42, .67)
Age (quartiles)										
16–21	1.00		1.00		1.00		1.00		1.00	
22–60	.59***	(.46, .74)	1.23	(.93, 1.62)	.65***	(.51, .81)	.95	(.69, 1.31)	.82	(.66, 1.03)
Race/ethnicity										
White	1.00		1.00		1.00		1.00		1.00	
Black	.22*	(.07, .72)	.20*	(.05, .85)	.47	(.20, 1.13)	1.00	—	.48	(.21, 1.09)
Hispanic	.79	(.49, 1.28)	.63	(.35, 1.13)	1.23	(.80, 1.88)	.68	(.35, 1.32)	.71	(.44, 1.12)
Asian	.9	(.43, 1.90)	.49	(.17, 1.42)	.39	(.15, 1.01)	.73	(.25, 2.11)	.7	(.31, 1.54)
Other	.84	(.53, 1.34)	1.03	(.63, 1.67)	.8	(.51, 1.28)	.44*	(.20, .95)	1.21	(.81, 1.82)
Employment										
Employed	1.00		1.00		1.00		1.00		1.00	
Unemployed	1.05	(.82, 1.33)	1.13	(.86, 1.48)	.99	(.78, 1.25)	1.38*	(1.01, 1.88)	1.36**	(1.09, 1.70)
Sexual orientation										
Heterosexual	1.00		1.00		1.00		1.00		1.00	
Bisexual	1.24	(.92, 1.68)	1.23	(.88, 1.72)	1.69***	(1.26, 2.26)	1.06	(.70, 1.60)	1.76***	(1.34, 2.31)
Gay/lesbian	.44***	(.28, .69)	.63*	(.40, .99)	.55**	(.37, .83)	.57	(.32, 1.00)	.54**	(.36, .80)
Nightclub attendance (past year)										
Less than once a month	1.00		1.00		1.00		1.00		1.00	
Once a month	1.70***	(1.29, 2.22)	2.16***	(1.60, 2.90)	1.74***	(1.34, 2.26)	1.67**	(1.17, 2.40)	1.17	(.91, 1.52)
Every other week	2.62***	(1.90, 3.60)	2.61***	(1.83, 3.72)	2.01***	(1.45, 2.77)	2.36***	(1.57, 3.57)	1.05	(.75, 1.47)
Every week	2.24***	(1.58, 3.15)	3.03***	(2.11, 4.36)	2.11***	(1.50, 2.97)	2.72***	(1.79, 4.15)	1.30	(.92, 1.83)

NPS, new psychoactive substance; AOR, adjusted odds ratio (controlling for all other variables in the model); CI, confidence interval.

Although the mean number of NPS classes used in the sample was 1.04 (SD =1.55), the maximum used was eight classes with 25.4% reporting use of more than one class; therefore, we utilized a Bonferroni correction (α =.05/5=.01) to correct for potential Type I Error associated with examining non-independent outcomes.

* $p < .01$,

** $p < .001$,

*** $p < .0001$.

TABLE 4

Number of NPS and NPS classes used in relation to level of club attendance

	Number of NPS	Number of NPS classes
	Mean (median, IQR)	**mean (median, IQR)**
Less than once a month	1.21 (0,1)	1.04 (0,1)
Once a month	1.87 (1,2)	1.68 (1,3)
Every other week	2.39 (1,3)	1.97 (1,3)
Every week	2.01 (1,3)	1.82 (1,3)
	LR χ^2 (3) =257.97, p <0.001	LR χ^2 (3) =226.35, p <0.001