Synthetic and Other Drug Use among High School Students: The Role of Perceived Prevalence, Access, and Harms

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Abstract

Background: Synthetic and other drugs have become available to teens, yet little is known about risk factors of use.

Objective: To examine adolescent use of one class of synthetic drugs and its association with perceptions about its prevalence, access, and risk of substance use.

Methods: Adolescents from a convenience sample of 104 middle and high schools (*N*=59,218) participated in an anonymous survey to assess school climate and substance use in 2013-2014. Multilevel logistic regression examined the association between risk for synthetic and other drug use, perceptions of substance use, and school-level characteristics.

Results: Results indicated that 2,407 (4.3%) students reported synthetic and other drug use in the past 30 days. A large proportion of youth perceived drugs to be problematic at school but underestimated the harms associated with drug use. Participants also perceived tobacco, alcohol, marijuana, and prescription drugs are easy to obtain. Risk factors for synthetic and other drug use included the perception that substance use was a large problem at school, ease of access to drugs, and limited harm associated with drug use. School enrollment and socio-economic status of students reduced odds of drug use. Similar trends were found regarding marijuana use.

Conclusion/Importance: Synthetic and other drug use is an emerging public health concern. Many youth identified substances as problematic and easily accessible in their schools but underestimated their potential harms. Health and education professionals need to increase effective education around substance use, including common risk factors for synthetic drug use.

Key Words: Synthetic drugs, drugs, schools, perceived use, marijuana.

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1. Introduction

Youth in the United States have access to a wide array of psychoactive substances, including prescription drugs for recreational purposes, illicit substances, and new synthetic, commercially available drugs (Brewer & Collins, 2014; Miotto, Striebel, Cho, & Wang, 2013). Many of the new synthetic drugs lack standard assays, and their expansive variety make them challenging to regulate. With rapidly advancing technologies creating newer synthetic drugs, adolescents are vulnerable to the significant and severe adverse effects of these substances as they are a population for whom drug experimentation is widespread (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2014). Furthermore, changing state laws regarding marijuana use may also signal to some youth that illicit substances may not be as harmful as previously purported. Given shifting societal norms regarding the acceptability of drug use, there is increasing concern about adolescents' use of synthetic drugs (Weinstein, Rosca, Fattore, & London, 2017). The purpose of the current study was to examine adolescent use of one class of synthetic drugs and its association about its perceptions of prevalence, access, and risk of substance use. We were particularly interested in the extent to which these perceptions varied as a function of school contextual factors among middle and high school aged youth. The findings of this study are intended to inform school-based substance use prevention efforts, particularly in light of the recent emergence of synthetic drugs.

1.1. Emergence of Synthetic Drugs

Synthetic cannabinoids first emerged in the United States in 2008. There are hundreds of synthetic cannabinoids, which are grouped into approximately 15 classes (Castatneto, Gorelick,

Desrosiers, Hartman, Pirard, & Huestis, 2014). Synthetic cannabinoids typically include over 200 different individual compounds, which makes them difficult to test for (Elsohly, Gul, Wanas, & Radwan, 2014). These substances are sometimes marketed as incense or potpourri and referred to as K2 and Spice (Brewer & Collins, 2014). They have a high binding affinity to CB1 and CB2 cannabinoid receptors that are very similar to that of plant-based marijuana; however, the use of these substances is often associated with a larger number of immediate somatic and psychoactive effects (Brewer & Collins, 2014; Elsohly et al., 2014). Research is still emerging regarding the long-term or residual effects of these controlled substances, although recent studies have revealed impaired executive functioning abilities among synthetic cannabinoid users (Cohen et al., 2017; Tomas-Roig et al., 2017). In 2013, the U.S. Poison Control Center reported 2,668 calls related to synthetic cannabinoids, a decrease from 2012, but the number of calls increased sharply in 2015 to over 7,000 (American Association of Poison Control Centers, 2017). Although 2016 saw a decrease in the number of calls related to synthetic substances to under 3,000, the 2015 and 2017 Youth Behavior Risk Surveillance Surveys each contained a specific question about the use of synthetic cannabinoids. In 2015, approximately 9% of high school adolescents reported ever using synthetic cannabinoids one or more times during their lives (Centers for Disease Control and Prevention, 2015).

Synthetic cathinones are a commercially available synthetic drug primarily used by young people (Miotto et al., 2013). These substances are most popularly known as bath salts but are also marketed as plant food and glass cleaners. This class of drugs is comprised of some 20 or so different compounds that have binding activity similar to that of methamphetamines and MDMA (Ellefsen, Concheiro, & Huestis, 2016; Banks, Worst, & Sprague, 2014). They are also associated with a variety of medical and psychiatric complications (e.g., seizures, psychosis, and

death) (Banks et al., 2014; Miotto et al., 2013). In 2012, the U.S. Poison Control Center tracked about 2,500 cases of bath salts ingestion; that number dropped to less than 600 in 2015. However, it remains a significant concern given its availability and its unknown affects on the human brain (American Association of Poison Control Centers, 2016).

In 2012, President Obama signed into law the Synthetic Drug Abuse Prevention Act as part of the FDA Safety and Innovation Act. The law permanently places 26 types of synthetic cannabinoids and cathinones into Schedule I of the Controlled Substances Act (CSA). National surveillance data from the 2014 Monitoring the Future Study suggest that use of synthetic cannabinoids among 8th, 10th, and 12th graders has been decreasing (Miech, Johnston, O'Malley, Bachman, & Schulenberg, 2015). For example, synthetic cannabinoid use among high school seniors decreased from over 11% in 2012 to less than 8% in 2013 and 6% in 2014. The overall prevalence of bath salts use was less than 1.5% in both 2013 and 2014 for all grade levels (Miech et al., 2015). This trend is likely the result of an increase in perceived risk of using bath salts between 2012 and 2013, but interestingly its perceived risk of harm decreased in 2014 (Johnston et al., 2014).

Commercially available drugs including the synthetic cannabinoids and cathinones may be considered an alternative substance for young people who are closely monitored for substance use because of involvement in drug treatment, the criminal justice system, and military recruitment, since many synthetic drugs cannot be detected in drug screens (Perrone, Helgesen, & Fischer, 2013). Less is known, however, about youth who are not routinely drug screened and have access to both illicit and commercially available psychoactive substances.

1.2. Youth Perception and Substance Use

Data from the Monitoring the Future Study suggested an inverse association between the perceived harms of drug use among adolescents and their use of marijuana and other substances (Johnston et al., 2014). Similarly, the National Survey on Drug Use and Health (NSDUH) reported a strong negative association between youth perceiving health consequences of drug use and risks for drug use (Substance Abuse and Mental Health Services Administration, 2013). Over the last decade, data from the NSDUH have suggested that youth perception of alcohol as a great health risk has increased, and binge drinking has declined. Similarly, as youth perceptions of the harms associated with marijuana use have decreased, the use of this substance has increased (Substance Abuse and Mental Health Services Administration, 2013).

Like underestimating the risk of substance use, the level of availability of drugs in schools has also been associated with negative outcomes for youth. Studies have shown that increased drug availability in schools is associated with increased violence and gang presence (Van Dorn, 2004). Furthermore, greater availability of alcohol outlets and higher rates of drug possession in communities have been positively associated with child maltreatment and neglect (Freisthler, 2005). Despite knowledge of the detrimental relationship between drug availability and negative consequences for youth, high school students continue to report easy access to drugs in school. Findings from the 2015 Monitoring The Future Study show that approximately 40% of 12th grade students think it is “fairly easy” to “very easy” to obtain narcotics, with the availability of marijuana endorsed at 80% (Miech et al., 2016).

From a prevention perspective, youth reported perceived drug use by their peers and misperceived harms of use are important factors to consider, as they serve as possible precursors to substance use (Gibbons, 2012). Specifically, the construct of the subjective norm within the Theory of Planned Behavior suggests that perception that others are engaging in a health risk

behavior increases the intention of an individual to also engage in that behavior (Godin & Kok, 1996; Park, Klein, Smith, & Martell, 2009). Adolescents especially overestimate the prevalence of risky behavior amongst their peers, which is positively associated with increased engagement in risk-taking behaviors (Perkins, 2007). Similarly, the Health Belief Model suggests that the perceived susceptibility to associated harms of substance use informs the decision to use that substance (Carpenter, 2010). When adolescents underestimate the harms that substances may cause to their health, they may be more likely to engage in substance use. Yet there has been limited application of these theoretical frameworks to the more recent phenomena of synthetic drug use and more generally to the student and school-level correlates of synthetic drug use. Indeed, a recent study conducted by Clayton et al. (2017) found that synthetic cannabinoid use among high school students was associated with a higher prevalence of health risk behaviors than was observed with marijuana use alone. Such risk factors may serve as targets to be addressed through school-based substance use prevention programs.

1.3. School Context

Schools are an important setting for substance use prevention and intervention (Winters, Fawkes, Fahnhorst, Botzet, & August, 2007). In addition to the normative beliefs regarding peers' substance use in the school environment, school contextual factors may also influence rates of substance use. For example, Monitoring the Future survey data generally show that ethnic minority students report lower rates of substance use than White students (Johnston et al., 2014). Thus, adolescents who attend a school with a high percentage of ethnic minority students may be less exposed to substance using peers. Additionally, research has shown that school-level poverty and high absenteeism are associated with increased levels of alcohol and marijuana use

(Hill & Mrug, 2015), but less is known about how these school-level factors relate to use of this more recent group of synthetic drugs.

The primary aim of the current study was to investigate the prevalence of and associated individual and school risk factors for a specific class of synthetic drugs, hereafter referred to as "synthetic and other drug users". These data came from a large statewide convenience sample of middle and high school aged youth. First, we examined the demographic characteristics of synthetic and other drug users in comparison to non-users. Second, we explored perceptions of risk, prevalence, and access to drugs for synthetic and other drug users. Finally, we examined the individual and school-level demographic predictors of synthetic drug use and marijuana use to evaluate how risk factors compared across the classes of substances. This study has important and timely implications for adolescents' use of synthetic drugs and school-based prevention efforts.

2. Material and methods

Data for the study came from the Maryland Safe and Supportive Schools (MDS3) Climate Survey, which is a collaborative effort of the Maryland Department of Education, Johns Hopkins University, and Sheppard Pratt Health System aimed at improving school climate and student outcomes. This self-report survey was administered online to students in 104 public middle and high schools in 13 Maryland public school districts. All schools volunteered to administer the MDS3 survey. Survey administration was not mandatory, thus resulting in a convenience sample of participating schools across the state. The survey contains approximately 150 questions and takes approximately 20 minutes for students to complete. Data reported here were collected in 2013-2014 from 59,218 students in grades 6-12 (see Table 1).

The anonymous, online survey was administered using a waiver of active parental consent process and youth assent process; all participation was voluntary and anonymous. Letters were sent home to parents providing information about the survey. The survey was administered online in classrooms at participating schools by school staff following a written protocol. Specifically, schools surveyed the students from 18 language arts classrooms from the 49 middle schools and the students from 25 language arts classrooms from the 55 high schools; 100% of the enrolled middle and high schools participated in the data collection. Students not present in school on the day of survey administration were not provided an additional opportunity to participate, resulting in a response rate of 76%, including completions and partials (i.e., RR2 formula; American Association for Public Opinion Research, 2016). The non-identifiable data were obtained for analysis for the current paper and approved for analysis by the university Institutional Review Board (For additional details regarding the MDS3 School Climate Survey see Bradshaw et al., 2014; Bradshaw, Waasdorp, Debnam, & Johnson, 2014).

2.1. Measures

Self-reported demographic characteristics were collected regarding each student's grade, age, sex, and race/ethnicity.

2.1.1. Substance Use. Students separately reported their drug use in the 30 days prior to survey administration with respect to marijuana and synthetic drug use (i.e., "K2, Spice, Bath Salts, or any other substances to get high"). Students were asked if they had used each of these classes of substances *0 days, 1-2 days, 3-5 days, 6-9 days, 10-19 days, 20-29 days, or all 30 days*. For the purpose of this study and analysis, responses were coded: Drug use (1=any report of use in 30 days, 0=0 out of 30 days). These items were adapted from the Youth Risk Behavior

Surveillance System and have been widely used and well-validated (Centers for Disease Control and Prevention, 2015).

2.1.2. Perceptions of prevalence. Students were also asked about their perceptions regarding the prevalence of substance use. A scale score was created from students' responses to: "*How much of a problem at this school is students' use of (type of substance).*" Separate items were completed for each of the following classes of substances: marijuana, cocaine, tobacco, and alcohol. Student response options ranged from *a large problem* to *not a problem* on a 4-point Likert scale for all the perception of prevalence items. The 4-items were aggregated to form a scale score ($\alpha = .91$) of perceptions of prevalence with a higher score indicating stronger belief that substances are a problem at the school. These items were adapted from previous measures (Arthur, Hawkins, Pollard, Catalano, & Baglioni Jr, 2002; Hanson & Kim, 2007).

2.1.3. Access to drugs. Students were asked "*How difficult is it for students in your grade to get any of the following substances if they really want them?*" with respect to the following substances: cigarettes, alcohol, marijuana, prescription drugs or other medications for non-medical reasons, other drugs (cocaine, LSD, amphetamines). Student response options ranged from *very easy* to *very difficult* on a 4-point Likert scale for all the access to drug items. The five items were aggregated to form a scale score ($\alpha = .92$) of access to drugs with a higher score indicating greater access. These items were adapted from previous measures (see Arthur et al., 2002; Hanson & Kim, 2007).

2.1.4. Risk of harm. To assess students' understanding of substance related health risks, students were asked "*How much do you think people risk harming themselves (physically or in other ways) if they_*" with respect to three risk taking behaviors: 1) smoke 1-2 packs of cigarettes/day; 2) take 1-2 alcoholic drinks/day; 3) smoke marijuana regularly. Student response

options ranged from *no risk* to *great risk* on a 4-point Likert scale for all the risk of harm items. These items were adapted from previous measures (Arthur et al., 2002). The three items were aggregated to form a scale score ($\alpha = .82$) of risk of harm with a higher score indicating higher perceived risk of harm.

2.1.5. School contextual factors. A set of school-level demographic variables was obtained from the Maryland State Department of Education for inclusion in the models as school-level covariates. Those variables were: the percentage of students receiving free and reduced priced meals *(FARMS;* i.e. an indicator of socio-economic status), the percentage of students who received an out of school *suspension*, school *urbanicity* (i.e., suburban/rural vs. city/urban), and the total number of students enrolled in the school (*enrollment*).

2.2. Analyses

All analyses were conducted on a weighted sample of students, which reflected the analytic student population within the 104 schools. Specifically, sampling weights were created using the raking method (Battaglia, Izrael, Hoaglin, & Frankel, 2004), an iterative procedure that produces weights based on marginal results from multiple variables in Stata 11 (Stata Corp, 2011). The three school-specific variables of interest were the total number students at each grade level (i.e., 6-12th grade), of each sex, and of each race/ethnicity (i.e., White, African American, Hispanic, Asian American, Other). Using one variable at a time, weights that adjusted the subsample of participants from each school to the first school-specific characteristic were calculated. The weights were further adjusted to match the school population using the next variable of interest. Once all of the variables were used, the sequence was repeated until the weights converged. This iterative procedure was repeated for each school (Battaglia et al.,

2004). The weighted sample allows for generalizability of the sample to the full population of students within the 104 Maryland schools.

After conducting descriptive analyses, we fit a hierarchical linear model to examine risk factors for synthetic drug use. Two-level hierarchical linear models were fit using the HLM 7.0 software to examine the association between the school contextual factors, perceptions of prevalence, access, and risk of harm, while accounting for the nested nature of the data (i.e., students within schools). Student demographic variables at level-1 included student *grade*, *gender*, and *race.* At level-2, we included the school-level *enrollment*, *FARMS*, *suspension rate*, and *urbanicity*. The enrollment, FARMS, and suspension rate variables were grand-mean centered. We also present a model of marijuana use in this sample to compare and contrast findings for synthetic drug use. There was limited missing data in the sample on the outcomes of interest (<11%) with a margin of error of <.001%. The primary results are presented in terms of covariate-adjusted odds ratios.

3. Results

3.1. Sample Characteristics

Data were collected on 59,218 students in grades 6-12, of which 50.1% were male. Approximately half of the sample (47.2%) characterized themselves as White, 26.7% as African-American, 9.9% as Latino, 7.7% as Other, and 5.4% as Asian. The mean age of the sample was 14.8 (*SD*=1.9) years old. The largest percentage of students was in grade 6 (18.3%). Over 60% of the participants came from suburban schools. The convenience sample of schools (N = 104) had diverse populations, with a mean student enrollment of 1039.8 (SD = 428.8) and a mean FARMs rate of 40.9% (SD = 17.8). Across all schools, the average percentage of students

receiving free or reduced-priced meals was 40.1%. Youth and school demographic characteristics are presented in Table 1.

3.2. Prevalence of Drug Use

In response to survey items asking if a student had used a particular substance in the last 30 days, 19.1% students reported using alcohol and 12.5% reported using marijuana (Table 1). Approximately 6.5% of students reported smoking cigarettes, 5.7% of the sample reported using prescription drugs or medications for nonmedical reasons, and 4.3%, or 2,759 youth, reported synthetic drug use (i.e., “using K2, Spice, Bath Salts or any other substances to get high”) in the last month.

3.3. Perception of Prevalence, Access, and Harm among Students Using Synthetic Drugs

Among students reporting synthetic drug use, over half perceived that tobacco and alcohol were either a large problem or somewhat of a problem at their schools (Table 2). Approximately 68% of synthetic drug users perceived that drug use overall was a problem at their respective schools. Over 76% perceived that cigarettes, alcohol, and marijuana were fairly easily or very easily accessible, and approximately 67% perceived that prescription drugs for nonmedical reasons were easily accessible, and slightly less (66%) perceived that other drugs (e.g., cocaine, LSD, amphetamines) were easily accessible. The students grossly underestimate the health risks of substance use. Almost half of participants reporting synthetic drug use responded that there was no risk or slight risk to smoking 1-2 packs of cigarettes a day. Over 54% perceived that there was no risk or only slight risk to having 1-2 drinks daily, and similarly 61% perceived no risk or only slight risk to smoking marijuana regularly.

3.4. Multilevel Analyses of Risk Factors for Drug Use

3.4.1. Marijuana Use. Analysis showed a reduction in the tau from the fully unconditional model (.747) to the final model (.059), thus showing a 92% reduction in variance for the final model (i.e. pseudo R2). As grade level increased, the odds of using marijuana increased (covariate Adjusted Odds Ratio [AOR] = 1.29, $p < .001$; See Table 3). Males had higher odds than females of using marijuana in the past 30 days (AOR = 1.27, $p < .001$). Black, Hispanic, and 'Other' youth had higher odds of marijuana use compared to the odds for White youth ($AOR_{Black} = 1.25$, $p < .001$, $AOR_{Hispanic} = 1.23$, $p < .05$, $AOR_{Other} = 1.15$, $p < .05$). With regard to access, students who reported fairly or very easy access to drugs had significantly increased odds of marijuana use (AOR = 1.11, $p < .001$). Students who perceived an increased risk of harm from using drugs were at lower odds of marijuana use when compared to those who did not perceive risk (AOR = 0.82, $p < .001$). In addition, perception that drug use is a problem at the school increased odds of marijuana use (AOR = 1.08, $p < .001$). At the school level, only suspension rate was significantly associated with marijuana use (AOR = 1.01, $p < .001$).

3.4.2. Synthetic Drugs. Analysis showed a reduction in the tau from the fully unconditional model (.257) to the final model (.146), thus showing a 43% reduction in variance for the final model (i.e. pseudo R2). Results for the synthetic drugs were similar to marijuana use. Males had approximately 88% greater odds of using synthetic drugs in the past 30 days than females (AOR = 1.88, $p < .001$). Black, Hispanic, and 'Other' youth had higher odds of synthetic drug use as compared to White youth ($AOR_{Black} = 1.46$, $p < .001$, $AOR_{Hispanic} = 1.46$, $p < .001$, $AOR_{Other} = 1.88$, $p < .001$). Youth who reported fairly to very easy access to drugs had increased odds of use as compared to those who did not report easy access to drugs (AOR = 1.13, $p < .001$). Students who perceived an increased risk of harm from using drugs were at lower odds of synthetic use when compared to those who did not perceive risk (AOR = 0.84, $p < .001$).

In addition, perception that drug use is a problem at the school was associated with increased odds of using synthetic drugs (AOR = 1.16, $p < .001$). At the school level, although the odds ratios were small, student enrollment and FARMs rate were statistically significant, suggesting that as schools' rates of student enrollment and concentrations of low socio-economic status students increase, there is a small reduction in the odds of synthetic drug use ($AOR_{enroll} = .95$, $p < .001$; $AOR_{FARMS} = .99$, $p < .05$).

4. Discussion

Although national data suggest that the use of synthetic drugs has declined since its initial debut a number of years ago (Johnston et al., 2014), the present study found a small but significant portion of students are using these harmful, commercially available drugs. Consistent with the Health Belief Model and the Theory of Planned Behavior, both perceived prevalence of substance use and easy access were associated with increased risk for using synthetic drugs. We also found that youth who used synthetic drugs underestimated the health risks associated with all drug use. We found similar trends for students who used marijuana.

These findings suggest that youth may not be using synthetic drugs as an alternative to illicit ones, but rather in addition to them. Indeed, post hoc correlation analysis showed moderate to strong associations between synthetic drugs and other substance use (e.g., Pearson coefficients ranging from .59 for alcohol to .76 for prescription drugs). These results also suggest that, currently, not enough is being done to limit the access of psychoactive substances to high school students. In the midst of several changes among societal drug use, including: rapidly evolving technology that continuously produces new synthetic drugs, a prescription drug epidemic, a national conversation regarding the legalization of marijuana, and longstanding

concerns about underage drinking and smoking, there must be thoughtful policies implemented to protect youth from the harms associated with substance use.

This study had several key strengths: it utilized a large and diverse weighted sample of adolescents representing over 100 middle and high schools in a single state. This study was also school-based and incorporated a few unique school-related measures, like the location of the school (i.e., urbanicity). We also assessed perceived use by other students who attend the school, as compared to the peer group more broadly. Since an anonymous online survey was utilized, it is more likely that the respondents were forthcoming (Wang et al., 2005).

Some of the limitations of the present study were that it used a single item to measure the use of two synthetic cannabinoids and cathinones that were popular 3-4 years ago. The use of a single item limits our knowledge about frequency and variety of synthetics adolescents may be using. In addition, the popularity of these drugs has rapidly changed in recent years and other designer drugs are emerging and becoming more popular over time (e.g., designer opioids, ketamine, benzodiazepines). Although the schools comprised of a convenience sample of middle and high schools in the state of Maryland, they do make up a large percentage of schools in the state (i.e., 13 of 24 school districts). However, Maryland, in comparison to other U.S. states, has a relatively high average educational attainment level and greater economic opportunities. which could further differentiate our sample from students in other states. Further, causality cannot be established using this type of cross-sectional analysis. Finally, there are a number of non-school factors, such as community and family influences, which may also significantly contribute to these associations but were not assessed in this study.

4.1. Conclusion

Youth synthetic drug use is an emerging issue (Brewer & Collins, 2014; Miotto et al.,

2013). The findings of the current study suggest that many students identify substance use as a significant problem in their schools, find substances easily accessible, and underestimate their associated harms. The risks appear to be greatest for males and as youth advance in grade level.. Together, health and education sectors need to increase effective education regarding substance use to help prevent youth substance use. Findings also suggest that there are some similarities in risk factors for synthetic drug users and marijuana users; thus, prevention efforts used for marijuana may be effective for synthetic drug users too. Policies and programs should be implemented to help protect youth from gaining easy access to all harmful drugs, including a particular focus on new synthetic substances that may be less familiar to adults. Educators and practitioners need to know more about the common risk factors for synthetic drug use identified in the present study so that they can identify students in need of services and tailor prevention efforts to reduce rates of substance use.

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Table 1. *Sample Demographic Characteristics*

	Synthetic Drug Users ***(N* = 2,407*)***	**Total Sample** ***(N* = 59,218*)***
Mean Age (SD)	16.1 (2.4)	14.8 (1.9)
	N (%)	**N (%)**
Male	1,525 (63.4%)	29,661 (50.1%)
Race		
Native American/American Indian	103 (4.3%)	1,420 (2.4%)
White	995 (41.3%)	27,971 (47.2%)
Hispanic/Latino	243 (10.1%)	5,872 (9.9%)
Asian/Pacific Islander	125 (5.2%)	3,219 (5.4%)
Black/African American	670 (27.8%)	15,821 (26.7%)
Native Hawaiian or Other Pacific Islander	58 (2.4%)	327 (0.6%)
Other	213 (8.8%)	4,588 (7.7%)
Grade		
6^{th}	160 (6.6%)	10,842 (18.3%)
7^{th}	262 (10.9%)	9,835 (16.6%)
8^{th}	318 (13.2%)	8,507 (14.4%)
9^{th}	364 (15.1%)	8,688 (14.7%)
10^{th}	419 (17.4%)	8,203 (13.9%)
11^{th}	427 (17.7%)	7,396 (12.5%)
12^{th}	457 (19.0%)	5,747 (9.7%)
Type of Substance Used in last 30 days		
Tobacco	1,553 (64.5%)	3,647 (6.5%)
Alcohol	1,954 (81.2%)	10,819 (19.1%)
Marijuana	1,971 (82.0%)	7,041 (12.5%)
Prescription drugs	1,721 (71.9%)	3,410 (5.7%)
Synthetic drugs	----	2,407 (4.3%)
School Characteristics (*N* = 104 schools)		***M (SD)***
% Suspension		11.9 (10.6)
School Enrollment		1039.8 (428.8)
% Free and Reduced Priced Meals		40.9 (17.8)

Note. Synthetic drug use was defined as "K2, Spice, Bath Salts, or any other substances to get high". Prescription drug use included use of other medications for non-medical reasons.

Table 2. *Student Perceptions of School-wide Problematic Use, Accessibility of Substances, and Associated Health Risks*

Student Perceptions	% of Synthetic Drug Users (*N* = 2,407)	% of Total Sample (*N* = 59,218)
Use of substances in school is large problem or somewhat a problem		
Tobacco	61.8%	35.8%
Alcohol	60.7%	32.7%
Drug use	67.8%	40.8%
Availability of substances are fairly or very easy		
Cigarettes	76.1%	55.9%
Alcohol	77.6%	56.2%
Marijuana	76.4%	53.4%
Prescription drugs	67.2%	44.4%
Other drugs (cocaine, LSD, amphetamines)	65.9%	32.7%
Related health consequences of substances are no risk or slight risk		
Smoke 1-2 packs of cigarettes/day	45.1%	27.4%
Take 1-2 alcoholic drinks/day	54.5%	41.0%
Smoke marijuana regularly	61.1%	40.2%

Note. Prescription drug use included use of other medications for non-medical reasons.

Table 3. *HLM Results for 2-Level Model Examining Risk Factors for Synthetic Drug and Marijuana Use*

	Synthetic Drugs (K2, Spice, bath salts) (*N* = 55,488)	**Marijuana (*N* = 55,480)**
Individual Level	**AOR(CI)**	
Male	1.883(1.662,2.134)***	1.268(1.175,1.368)***
Grade	1.134(1.080,1.190)***	1.287(1.249,1.326)***
Black[a]	1.463(1.239,1.727)***	1.251(1.117,1.402)***
Hispanic[a]	1.455(1.120,1.889)**	1.233(1.044,1.457)*
Other[a]	1.880(1.616,2.188)***	1.150(1.008,1.313)*
Access to Drugs *(alcohol, cigarettes, marijuana, prescription drugs, & other drugs)*	1.131(1.113,1.149)***	1.112(1.101,1.124)***
Risk of Harm *(alcohol, smoking, marijuana)*	0.836(0.816,0.856)***	0.824(0.810,0.838)***
Perceptions of Prevalence of Drug Use *(marijuana, cocaine, smoking, alcohol use)*	1.158(1.128,1.190)***	1.084(1.066,1.103)***
School level		
Enrollment	0.952(0.931,0.973)***	1.003(0.991,1.016)
Suspensions (%)	0.993(0.982,1.003)	1.009(1.004,1.015)***
Free and Reduced Priced Meals (%)	0.993(0.987,1.000)*	0.998(0.994,1.002)
Urbanicity: City/Urban area	1.346(0.864,2.096)	1.036(0.859,1.248)

Note. AOR = Adjusted Odds Ratio. CI = 95% Confidence Interval. *p< .05, **p< .01, ***p< .001
[a]White is the reference group.