

## Methamphetamine and Club Drug Use among Indiana Students in Grades 6-12

Jon Agle<sup>†</sup> · Susan Samuel · Carole E Nowicke

Indiana Prevention Resource Center, Department of Applied Health Science,  
Indiana University, Bloomington, Indiana, USA

### 국문초록

**연구목적:** 본 연구는 미국 인디애나 주에 소재하는 중학교와 고등학교 학생들 사이의 methamphetamine, MDMA, GHB, and Rohypnol과 같은 약물사용 특성을 파악하고 청소년 약물사용과 관련된 성과 학교 환경에 대한 인지된 안전도 특성을 분석하였다.

**연구방법:** 본 분석에 사용된 데이터는 Indiana Prevention Resource Center (IPRC)에서 2007 년도에 수행한 음주, 흡연, 약물사용 설문조사(ATOD) 응답자료로서 인디애나 주에 거주하고 있는 6-12 학년 사이의 학생들을 편의추출하여 조사가 가능했던 158,632명의 응답을 얻었다.

**연구결과:** 로지스틱 회귀분석에서 조사한 4개 약물을 사용하는 학생들의 관심도는 교실에 있을 때, 복도에서 혼자 있을 때, 방과후 활동을 위해 학교에 남아있을 때 불안전하다고 느끼는 약물 미사용자보다 더 높은 경향을 보였다. GHB, MDMA, Rohypnol을 사용한다고 응답한 학생이 여자보다 남자에서 더 많았고 상관관계분석 결과, 메탐페타민을 비롯한 네 가지 약물 사용의 상호간 상관도가 모두 유의미 하게 높았다.

**Key words:** Methamphetamine, Club drugs, Safety, Adolescence, School

### I. Introduction

Methamphetamine has long been established as a highly dangerous substance, producing negative effects often extending far beyond physical morbidity of use to include such diverse issues as child safety, criminal involvement, and toxic waste generation (Cohen, Sanyal, Reed, 2007; Haight et al.,

2005; Gleghorn et al., 1998). Users also experience numerous negative health outcomes (ONDCP, 2007b). The extent of these effects has been documented here to emphasize the tremendous potential for harm that these substances hold. This list of outcomes is somewhat extensive, but it serves to reinforce the significant morbidity associated with these substances. Long term

접수일 : 2009년 11월 18일, 수정일 : 2009년 12월 3일, 채택일 : 2009년 12월 9일

† 교신저자 : Agle Jon(Indiana Prevention Resource Center, Indiana University, 501 N Morton ST Suite #110,  
Bloomington, IN 47404, USA)  
E-mail: jagley@indiana.edu

use of methamphetamine may lead to increased blood pressure, extreme weight loss, anxiety, confusion, insomnia, violent behavior, paranoia, delusions (NIDA, 2009), increased respiration, hyperthermia, rapid irregular heart-beat, dental problems (Donaldson & Goodchild, 2006), hepatitis, HIV/AIDS, and other social problems (Volkow, 2006). Withdrawal symptoms of methamphetamine may include anxiety, fatigue, aggression, depression, and intense craving for the drug (NIDA, 2006).

The term “club drugs” is a category referring to a variety of substances that are popular among teenagers and young adults at clubs, bars, concerts, and at all-night dance parties (NIDA, 2007). MDMA/Ecstasy (methylenedioxymethamphetamine), Rohypnol (flunitrazepam), GHB (gamma-hydroxybutyrate), and ketamine (ketamine hydrochloride) have been termed “club drugs” by the National Institute on Drug Abuse (ONDCP, 2007). Much like use and abuse of methamphetamine, use and abuse of club drugs can produce a very large number of adverse physical effects, including: confusion, anxiety, depression, hyperthermia, energizing effects, muscle tension, involuntary teeth clenching, nausea, blurred vision, feeling faint, tremors, rapid eye movement, chills or sweating, insomnia, distortion effect of time and space, hallucinations, low blood pressure, drowsiness, dizziness, confusion, upset stomach, damage to the central nervous system, impaired motor function, and even death. Withdrawal symptoms of club drug use may include fatigue, loss of

appetite, depression, difficulty in concentrating, insomnia, tremors, sweating, and craving for the drugs (DEA, 2006; NIDA, 2006; Ruffner, 2004; Mathias, 2003; Hanson, 2001).

When methamphetamine and club drugs are taken along with alcohol, sedatives, or depressants, the combination can incapacitate users and cause amnesia (NIDA, 2006). These symptoms have a very high potential for harm: in 2005 alone, hospital emergency department visit estimates numbered 109,655 for methamphetamine use, 11,287 for MDMA use, and 1,036 for GHB use (DAWN, 2005).

This paper is intended to: (1) provide a brief summary of research related to club drug and methamphetamine use; (2) assess the extent to which club drug use and methamphetamine use are correlated among students in Indiana; (3) assess the perceived safety of Indiana students who reported using club drugs or methamphetamine in the 12 months prior to survey administration; and (4) discuss the potential implications of the findings.

## II. Current Literature and Impetus for the Study

To date, most studies on club drugs or methamphetamine have focused on adults and other specific populations, such as Asian American youth (Hunt, Evans, Wu & Reyes, 2005), young men (Clatts, Goldsamt & Yi, 2005), rave attendees (Yacoubian & Peters, 2007), medical students (Horowitz, Galanter, Dermatis & Franklin, 2008) and delinquent

youth (Krebs & Steefey, 2005). There are relatively few studies of this type that examine broader populations, although a few such studies exist in the literature (SAMHSA, 2002). Other examples of generalized data do suggest that youth are using “harder” drugs including methamphetamine and club drugs. A survey of 23,780 middle school students in New York City reports an overall rate of lifetime club drug use of 3% (Goldsamt, O’Brien, Clatts & McGuire, 2005). This study also predicts that lifetime alcohol users are more than four times likely to use club drugs than marijuana, which lends further credence to the relevance of studying this topic. Both the Youth Risk Behavior Surveillance (YRBS) (CDC, 2006) and Monitoring the Future (MTF) (Johnston, O’Malley, Bachman & Schulenberg, 2006) surveys report lifetime and annual prevalence of methamphetamine and club drug use among students in grades 9 – 12 in the United States. For the 2005 YRBS, lifetime prevalence for methamphetamine ranged from 5.7% (9<sup>th</sup>) to 6.7% (11<sup>th</sup>), and rates of use for MDMA ranged from 5.8% (9<sup>th</sup>) to 6.7% (12<sup>th</sup>). For the 2006 MTF survey, the annual prevalence data is provided.

<Table 1> Annual prevalence of methamphetamine and club drugs: MTF 2006

Drug	8 <sup>th</sup>	10 <sup>th</sup>	12 <sup>th</sup>
	Grade	Grade	Grade
Methamphetamine	1.8%	1.8%	2.5%
MDMA	1.4%	2.8%	4.1%
GHB	0.8%	0.7%	1.1%
Rohypnol	0.5%	0.5%	1.1%
Ketamine	0.9%	1.0%	1.4%

Frequency data generated from a sample of 19,084 youth shows that 20% of them had used at least one club drug in their lifetime (Wu, Schlenger & Galvin, 2006). The sample was extracted from the National Survey on Drug Use and Health (SAMHSA, 2002) to study the concurrent use of methamphetamine, MDMA, LSD, GHB, ketamine, and Rohypnol among American youth ages 16-23 years. The authors found that specific “user groups” differ depending on the substance use by variables such as age, location, and socioeconomic status; for example, females who were 16-17 years of age were more likely to have used methamphetamine than males. Similar results have been reported in other studies (Yacoubian et al., 2003). The researchers think that the data generated by these large studies is sufficient cause for a baseline examination of methamphetamine and club drug use in the large sample of students featured in the Indiana Prevention Resource Center’s (IPRC) Alcohol, Tobacco, and Other Drug (ATOD) Use Survey (Gassman et al., 2007). The ATOD survey features a comparison between Indiana youths in grades 8, 10, and 12 and national prevalence data for 2006, revealing that Indiana students reported higher prevalence rates for methamphetamine (10<sup>th</sup> and 12<sup>th</sup>), MDMA (8<sup>th</sup> and 10<sup>th</sup>), GHB (10<sup>th</sup>), and Rohypnol (8<sup>th</sup> and 10<sup>th</sup>) than the corresponding national rates (Gassman et al., 2007). In addition, because user groups and patterns of use have differed along several categories, including gender (Dluzen & Liu, 2008), the researchers think that the large sample of

Indiana youth represented in the ATOD survey will provide data that is especially relevant to prevention practitioners in Indiana.

As recently as 2006, though, some researchers interested in club drug use have suggested that correlates of use are not well documented and that “little is known about... whether poly drug use is more common among users” (Lampien, McGhee & Martin, 2006). There are some studies that are smaller in scope that indirectly address this concern:

Krebs and Steffey (2005) provide data that is narrowly targeted, but still informative. Their study of 119 youth offenders who were attending a Juvenile Basic Training Camp (JBTC) program reveals that 55% were lifetime club drug users (Krebs & Steffey, 2005). Among those lifetime club drug users, substances abused include methamphetamine (57%), ecstasy (34%), GHB and ketamine (8%), and Rohypnol (3%). Interestingly, 54% of respondents reported using alcohol or other drugs before doing something illegal, and 51% reported selling illegal drugs. Another ethnographic study of 36 young adults with an average age of 21 years old from central Ohio finds that 30.5% of respondents are lifetime methamphetamine users, 61% are lifetime ketamine users, and 22% are lifetime GHB users (McCaughan, Carlson, Falck, & Siegal, 2005). These data suggest that an examination of concurrent or polydrug use related to methamphetamine, Rohypnol, GHB, and MDMA may also be of great use to practitioners hoping to tailor prevention

programs.

Finally, recent studies have established a link between methamphetamine, club drug use, and violence/safety issues. While “empirical evidence concerning patterns of violence is sparse,” there appears to be a complex relationship between methamphetamine use and violence, with methamphetamine use situated as a risk factor (Baskin-Sommers & Sommers, 2006). There is also evidence that “perceived fear of neighborhood environment is positively associated with drug use behavior” (Theall, Sterk & Elifson, 2009). To the researchers’ knowledge, few studies related to perceived fear of *school* environments have been published, and, consequently, examination of students’ perceived safety and its relationship to methamphetamine and club drug use is warranted.

Decades of research findings have contributed to the message that parents, teachers, school counselors, and prevention professionals need to take steps to protect adolescents and young adults in Indiana and the United States from the adverse effects of methamphetamine and club drug use (Lineberry & Bostwick, 2006). Prior studies in the literature also establish a reasonable basis to examine methamphetamine and club drug use in tandem and in the context of gender and perceived safety in school. It must also be emphasized that prevention can be effective in the context of these substances; data supporting concrete drug use or gender association is important insofar as it allows such prevention programs

to target participants more accurately. At least one experimental study of “preventive intervention programs” among adolescents has shown significant reduction in methamphetamine use during late high school years (Spoth, Clair, Shin & Redmond, 2006). Furthermore, some of the data reported in the literature suggests that examination of concurrent drug use could have significant effects on prevention initiatives beyond the immediate potential for targeted substance use reduction. Consequently, the researchers designed this study to better understand the relationship between methamphetamine, club drugs, gender, and safety among Indiana students participating in the ATOD survey. To the extent that a relationship between methamphetamine and club drug use can be established, and to the extent that gender and perceived safety can be shown to be associated with methamphetamine and club drug use, schools and public health professionals will be able to provide programs that better target behaviors and correlates of negative drug use outcomes, which is a best practice approach to this work (Merrell & Buchanan, 2006). There is substantial evidence in the literature suggesting that youth are an appropriate research population for methamphetamine and club drug use, and, furthermore, that poly drug use and correlates of use are appropriate considerations for this population (Lampien, McGhee & Martin, 2006).

### III. Methods

This study used data collected as part of the 2007 Indiana Prevention Resource Center’s (IPRC) seventeenth annual Alcohol, Tobacco, and Other Drug (ATOD) use survey. Hence, data collection methodology is identical to that of the survey (Gassman et al., 2007). Subjects of this study were Indiana students in grades 6–12 who attended public or private schools in the spring of 2007. The written survey consists of a series of questions about drug use including alcohol, tobacco, marijuana, methamphetamine, MDMA, GHB, Rohypnol, binge drinking, consequences of drug use, peer perceptions, safety and security school environment, personal safety issues, participation in after-school activities, and gambling activities. The survey collects National Outcomes Measures (NOMs) data of the various drugs for: thirty day prevalence of use, perceived risk of harm, age of first use, and perception of peer disapproval. A total of 175,712 students participated in the study, providing 158,632 usable surveys. The unusable surveys were discarded due to issues such as no grade-level reported (3,894), refusal to answer majority of the questions (6,909), and failing an error-check protocol (6,277).

Because the 175,712 students compose a convenience sample, the researchers performed demographic comparisons between the sample and the population of youth in grades 6 through 12 in Indiana. Compared to the statewide population, the sample contained

fewer males (49.0 vs. 54.4 percent), fewer African-Americans (7.7 vs. 11.8 percent), and fewer students in grades 7, 9, 11, and 12. The sample also contained more Hispanics (7.0 vs. 5.2 percent), more Asian, American Indian, and other multicultural students (9.2 vs. 7.9 percent), and more students in grades 8 and 10. This limits the extent to which the results of this study can be generalized to these populations. However, a large percentage of school corporations (59.3%) participated in the survey, and the data produced by the survey is "consistent with other prevention studies," (Gassman et al., 2007) including those which use probability sampling, such as the MTF survey (Johnston et al., 2006). This inductively suggests a measure of validity at the state level.

The questionnaire was designed to offer consistency of measurements over time, and measured statistics were comparable to those established for nationally conducted drug use (MTF & YRBS) surveys. The internal reliability coefficients (Cronbach's alpha) for lifetime, annual, monthly, and age of first at first use are 0.90, 0.89, 0.84, and 0.86 respectively. The original survey instrument was developed in 1991 and pilot tested to establish reliability and validity. The instrument was revised in 1995, 1998, 2002, & 2005. Each time the instrument was revised it was pilot tested by the target audience at a local school in Indiana. The drugs of interest to this study (methamphetamine, MDMA, GHB, and Rohypnol) were added to the instrument in

2002. During the development of the survey, the basic questionnaire was reviewed by a panel of experts for content validity, subjected to six months of pilot testing, and reviewed by focus groups of school aged youth. The survey questionnaire is based on the questionnaires developed for the National Household Survey on Drug Abuse and the National Institute on Drug Abuse's MTF national school survey. The items on the survey are directly comparable to items on the national surveys. The IPRC survey uses non-random sampling procedures and the questionnaire items are selected to fulfill the contractual obligation agreement between the IPRC and the Indiana State Department of Health's Division of Mental Health and Addiction to provide statistical data for statewide planning purposes.

The survey consists of 27 sections (such as substance use, age of first time ATOD use, perceived safety, and perceived risk of substance use behavior) and students are given 30 minutes to answer the questions. Information on how to administer the survey, along with training video tapes, and confidential envelopes are sent to a contact person at each school or corporation. The contact person then trains the teacher/s to administer the survey. To maintain the confidentiality of the survey, the teacher/s who administer the survey are seated and do not interfere with the students unless they talk to one another while completing the survey. Students are informed that participation in the survey is completely voluntary, that results are confidential, and

that there are no penalties for failing to take part or for not responding to specific items. Students are instructed to place the survey in a special envelope provided by survey administrator. No individual information is collected except grade level, gender, ethnic background, and school code.

In November 2006, invitation packets for the ATOD 2007 survey were sent to 2,774 public and non-public school principals. The invitation packet consisted of an invitation letter, a memorandum of understanding, a statement on parental consent, an application form, a list of frequently asked questions, a stamped self addressed envelope, and a blank survey form. Participation in the survey was open to all public and private school corporations.

The schools or corporations had 7-8 weeks to respond with an application and a signed memorandum of understanding. The school or corporation was asked to select a survey administration date between March 12 and April 20, 2007. There are 305 school corporations in Indiana and 181 school corporations took part in the 2007 survey yielding a corporation participation rate of 59.3%.

Specific questions used to measure the annual prevalence of methamphetamine, MDMA, GHB, and Rohypnol use take the form: "How many times in the last year have you used..." with the response options being "Never, 1-5 times, 6-19 times, 20-40 times, and More than 40 times." For dichotomized data, all "Never" responses were coded as "No use in the last 12

months" and all other responses were coded as "At least 1 instance of use in the last 12 months." Additional questions on alcohol and marijuana (included in some analyses for the purpose of comparison) follow the same format. Questions used to measure perceived safety take the form "In your school, how safe do you feel... [While in class]; [Alone in the hallways]; [Staying for after-school activities]" with the response options being "Very Safe, Somewhat Safe, Somewhat Unsafe, and Very Unsafe." For dichotomized data, all "Very Safe" and "Somewhat Safe" responses were coded as "Safe" and all "Somewhat Unsafe" and "Very Unsafe" responses were coded as "Unsafe." All statistical analyses were performed using SPSS version 16.0 with alpha level of .05. Correlation analyses were two-tailed.

#### IV. Results

For the 2007 ATOD survey, 1,815 students in grades 6 - 12 reported having used methamphetamine at least once in the past 12 months. In the same timeframe and for the same sample, 2,815 students reported having used MDMA, 729 students reported having used GHB, and 1,087 students reported having used Rohypnol (See Table 2). Of these students, 2,433 used only 1 substance (methamphetamine, MDMA, GHB, or Rohypnol) in the past 12 months, 693 used exactly 2 substances, 296 used exactly 3 substances, and 523 used all 4 substances.

Correlation analysis indicates a strong,

significant ( $p < .001$ ) association between methamphetamine, GHB, MDMA, and Rohypnol use among Indiana students in grades 6 - 12. In each case, bivariate correlation values were above .500, which is an accepted benchmark for a “strong” correlation (Cohen & Cohen, 1983). Because of the unanimity of strength and significance of the associations between methamphetamine, GHB, MDMA, and Rohypnol, the researchers have provided correlation data for the use of these substances and the use of more commonly used substances, alcohol and marijuana, for the purposes of comparison. Bivariate correlation analysis suggests significant ( $p < .001$ ) but small ( $R < .300$ ) and, in one case, moderate ( $.300 < R < .500$ )

associations between each of the four substances of interest and marijuana and alcohol. It should be noted, however, that the correlation between alcohol and marijuana use was both strong and significant (see Table 3).

Logistic regressions were performed with dichotomized use of methamphetamine, MDMA, GHB, and Rohypnol selected as the dependant variables. In each case, gender, feeling safe while in class, feeling safe alone in the hallways, and feeling safe staying for after-school activities were chosen as independent variables. Each of the safety variables was also dichotomized for ease of interpretation.

Indiana students in grades 6 - 12 who

<Table 2> Number of respondents who reporting using methamphetamine or a “club drug” during the past 12 months

At least 1 use in the past 12 months	Number of Respondents	% of Respondents
Methamphetamine	1,815	1.3
MDMA	2,815	1.9
GHB	729	0.5
Rohypnol	1,087	0.8

Note: Percentages based on the number of responses for each individual drug.

<Table 3> Correlations between annual methamphetamine, MDMA, GHB, Rohypnol, alcohol, and marijuana use.

Substance	Methamphetamine	MDMA	GHB	Rohypnol	Alcohol	Marijuana
Methamphetamine	1.000					
MDMA	0.576***	1.000				
GHB	0.574***	0.575***	1.000			
Rohypnol	0.585***	0.599***	0.796***	1.000		
Alcohol	0.213*	0.255*	0.138*	0.164*	1.000	
Marijuana	0.285*	0.341**	0.182*	0.216*	0.611***	1.000

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



reported having used any of the four substances used as dependant variables at least once in the past 12 months at the time of survey administration tended to feel less safe than students who did not report having used any of the four substances while in class, while alone in the hallways, and while staying for after-school activities. Odds Ratios (OR) were above 2.00 and in one case above 3.00 for perceived safety in class and while staying for after-school activities, while they were between 1.47 and 2.00 for perceived safety while staying for after-school activities. Additionally, students who used methamphetamine, MDMA, GHB, or Rohypnol at least once in the last 12 months at the time of survey administration were more likely to be male than female (see Table 4).

## V. Discussion

Analysis of data generated by the IPRC's 2007 ATOD survey provides several contributions to current substance abuse prevention literature. Logistic regression

demonstrates that students who had used methamphetamine, MDMA, GHB, or Rohypnol at least once in the past 12 months at the time of survey administration were more likely to be male than female. This is consistent with studies of adult club users, among whom a similar association has been found (Fendrich et al., 2003). However, in the context of methamphetamine use, this is an interesting finding, since previous studies have identified subsections of the adolescent population among which methamphetamine users are more likely to be female (Wu, Schlenger & Galvin, 2006), and other studies of adolescents have noted that males are more likely to use methamphetamine than females (Oetting et al., 2000). It is conceivable that the mean age of initiation acts as a confounding variable in this case; one study of clients of a treatment system found that the average age of methamphetamine use initiation is 18.98 years (Brecht et al., 2004), which falls outside of the typical age of students in grades 6 - 12. This seems to be an area in which more study is warranted.

Students who reported at least one instance of methamphetamine, GHB, MDMA,

<Table 4> Logistic regression of dichotomized annual Methamphetamine, MDMA, GHB, and Rohypnol use and gender and perceived safety

Factor	Methamphetamine			MDMA			GHB			Rohypnol		
	$\beta$	S.E.	OR	$\beta$	S.E.	OR	$\beta$	S.E.	OR	$\beta$	S.E.	OR
Gender	-.07	.02	.94**	-.07	.02	.93***	-.12	.02	.88***	-.17	.02	.847***
Feel Safe While in Class	.90	.10	2.47***	.76	.09	2.14***	.90	.12	2.46***	1.25	.15	3.48***
Feel Safe Alone in the Hallways	.38	.10	1.47***	.40	.08	1.50***	.69	.12	2.00***	.67	.14	1.95***
Feel Safe Staying for After-School Activities	.95	.09	2.60***	.73	.08	2.07***	.98	.11	2.66***	1.0	.14	2.71***
Constant	-4.62	.03		-4.14	.02		-5.22	.04		-5.72	.05	

\*\*p < .01      \*\*\*p < .001

and GHB use in the last 12 months were also more likely to feel unsafe while in class, to feel unsafe while alone in the hallways, and to feel unsafe while staying for after-school activities. At least one study has suggested that methamphetamine use is a risk factor for violence among adolescents (Baskin-Sommers & Sommers, 2006), but, to the researchers' knowledge, there is very little data concerning substance use and abuse in the context of perceived safety in schools. Consequently, these findings suggest that the relationship between methamphetamine/club drugs and students' perceived safety at school should be studied further, especially the extent to which methamphetamine and club drug use might act as a proxy variable for other underlying predictors of perceptions of safety at school. Potential research trajectories might include work to determine whether the perception of being unsafe is related to authority figures (such as "fear of being caught") or to peers (such as "violent or other unsafe behavior by other users/dealers"). Interestingly, although students who reported at least 1 instance of methamphetamine or club drug use in the past 12 months were more likely to feel unsafe while alone in school hallways than students who did not, the OR for this construct is lower in all four cases than the OR for perceived safety in class or perceived safety while staying for after-school activities, with values ranging from a low of 1.47 to a high of 2.00. This is a contrast to other OR values, which range from a low of 2.07 (MDMA/Perceived safety while staying

for after-school activities) to a high of 3.48 (Rohypnol/Perceived safety while in class). This suggests that school hallways are in some way different from after-school activities and classrooms in terms of the extent to which students perceive that they are safe. Yet again, this is an area in which further study will be beneficial to health practitioners and school officials who are interested both in preventing methamphetamine and club drug use and in creating a school environment that is both safe and perceived to be safe.

In response to one study's call for further examination of poly drug use related to methamphetamine, MDMA, GHB, and Rohypnol (Lampien, McGhee & Martin, 2006), the researchers ran correlation analysis of students' reported use of these substances, including two "non-club drugs" for the purpose of comparison. In all cases, there was a significant, strong correlation between the use of methamphetamine, MDMA, GHB, and Rohypnol with one another; correlation values ranged from .574 to .796. While it might be supposed that such a significant, strong correlation would be found among most drugs, the data indicates that this is not the case. Correlations between methamphetamine, MDMA, GHB, and Rohypnol and marijuana and alcohol were either weak or moderate (though still significant), ranging from .138 to .341. This data serves as evidence of poly drug use among "club drug" users and methamphetamine users in grades 6 - 12, and further serves to identify the drugs among the often broad

category “club drugs” for which use is correlated more strongly. The ability to determine which drugs are used in concert with one another is valuable for school-based prevention initiatives, which often address environmental and contextual factors related to substance use and abuse. There are several nationally suitable programs that report pre-post-test measured reductions in drug use, including methamphetamine and club drugs, such as: LifeSkills Training; the Strengthening Families Program; The Strengthening Families Programs: For Parents and Youth 10 - 14; and Project Towards No Drug Abuse (NREPP, 2009). Such programs might be strengthened by the provision of this data in the event that they choose to incorporate content related to perceived safety or concurrent club drug and methamphetamine drug use into their curricula.

The survey was limited to the students of the school corporations that were willing to take part in the survey during the specified time frame. Some students may have stayed in class and participated in the survey even though they didn't want to due to fear of the teachers who administered the survey. The survey used non-random sampling procedures and therefore the generalizability of the findings is limited to the extent described in the Methods section. In spite of these limitations, the study has several strengths, notably the reliability and validity of the study and the large sample size. To the researchers' knowledge, it also exists as a unique study in the literature that examines

methamphetamine and club drug use among Indiana students. Again, the researchers wish to emphatically note that any data that can allow for specific population-level targeting and relevant information dissemination in adolescent prevention programs is valuable to prevention practitioners, school officials, and even health practitioners (Gahlinger, 2004).

## References

1. Baskin-Sommers A & Sommers I. Methamphetamine use and violence among young adults. *Journal of Criminal Justice* 2006;34:661-674.
2. Brecht M-L, O'Brien A, Mayrhoiser C & Anglin MD. Methamphetamine use behaviors and gender differences. *Addictive Behaviors* 2004;29:89-106.
3. Cohen J & Cohen P. Applied multiple regression/correlation analysis for the behavioral sciences. L. Erlbaum Associates, Hillsdale, N.J; 1983.
4. Cohen K, Sanyal N & Reed GE. Methamphetamine production on public lands: Threats and responses. *Society and Natural Resources* 2007;20:261-270.
5. Dluzen DE & Liu B. Gender differences in methamphetamine use and responses: A review. *Gender Medicine* 2008;5(1): 24-35.
6. Donaldson M & Goodchild JH. Oral health of the methamphetamine abuser. *American Journal of Health-System Pharmacy* 2006;63:2078-2082.
7. Drug Abuse Warning Network [DAWN].

- Drug-related emergency department visits for 2004-2006. 2005. Retrieved December 3, 2009, from: <https://dawninfo.samhsa.gov/data/>
8. Drug Enforcement Administration [DEA]. Drugs and chemicals of concern: 3, 4-Methylenedioxymethamphetamine. 2006. Retrieved December 17, 2008, from: [http://www.deadiversion.usdoj.gov/drugs\\_concern/mdma/mdma.htm](http://www.deadiversion.usdoj.gov/drugs_concern/mdma/mdma.htm).
  9. Fendrich M, Wislar JS, Johnson TP & Hubbell A. A contextual profile of club drug use among adults in Chicago. *Addiction* 2003;93:1693-1703.
  10. Gahlinger PM. MDMA, Ganna-Hydroxybutyrate (GHB), Rohypnol, and Ketamine. *American Family Physician* 2004;69(11):2619-2626.
  11. Gassman R, Jun MK, Samuel S, Martin EV, Lee J, Agle J, et al. Alcohol, Tobacco and other Drug Use by Indiana Children and Adolescents: The Indiana Prevention Resource Center Survey - 2007. IDAP Monograph No. 07-01. Bloomington, IN: Indiana Prevention Resource Center. 2007.
  12. Gleghorn AA, Marx R, Vittinghoff E & Katz MH. Association between drug use patterns and HIV risks among homeless, runaway, and street youth in Northern California. *Drug and Alcohol Dependence* 1998;51:219-227.
  13. Goldsamt LD, O'Brien J, Clatts CM & McGuire LS. The relationship between club drug use and other drug use: A survey of New York City middle school students. *Substance Use & Misuse* 2005; 40:1539-1555.
  14. Haight W, Jacobsen T, Black J, Kingery L, Sheridan K & Mulder C. "In these bleak days": Parent methamphetamine abuse and child welfare in the rural Midwest. *Children and Youth Services Review* 2005;27(8):949-971.
  15. Hanson, GR. Hearing before the Senate caucus on international narcotics control - "Looking the other way: Rave promoters and club drugs". 2001. Retrieved December 17, 2008, from: <http://www.drugabuse.gov/Testimony/12-4-01Testimony.html>.
  16. Horowitz A, Galanter M, Dermatis H & Franklin J. Use of and attitudes toward club drugs by medical students. *Journal of Addictive Diseases* 2008;27(4):35-42.
  17. Hunt G, Evans K, Wu E & Reyes A. Asian American youth, the dance scene, and club drugs. *Journal of Drug Issues* 2005;35:695-732.
  18. Johnston LD, O'Malley PM, Bachman JG & Schulenberg JE. Drug and alcohol press release and tables. Monitoring the Future national results on adolescent drug use: Overview of key findings. 2006. Retrieved December 17, 2008, from: <http://www.monitoringthefuture.org/data/06data.html#2006data-drugs>.
  19. Krebs CP & Steffey DM. Club drug use among delinquent youth. *Substance Use & Misuse* 2005;40:1363-1379.
  20. Lampinen TN, McGhee D & Martin I. Increased risk of "club" drug use among gay and bisexual high school students in British Columbia. *Journal of Adolescent Health* 2006;38(4):458-461.
  21. Lineberry TW & Bostwick JM.

- Methamphetamine abuse: A perfect storm of complications. *Mayo Clinic Proceedings* 2006;81(1):77-84.
22. Mathias, R. Study suggests ketamine injection poses new disease risk for street youths. 2003. *NIDA Notes*;18, 4.
  23. McCaughan JA, Carlson RG, Falck RS & Siegal HA. From “Candy Kids” to “Chemi-Kids”: A typology of young adults who attend raves in the Midwestern United States. *Substance Use and Misuse* 2005;40:1503-1523.
  24. National Center for Chronic Disease Prevention and Health Promotion [CDC]. Youth Risk Behavior Surveillance - United States, 2005. 2006. Retrieved December 17, 2008, from: <http://www.cdc.gov/HealthyYouth/yrbs>.
  25. National Institute on Drug Abuse [NIDA]. NIDA InfoFacts: Rohypnol and GHB. 2006. Retrieved December 17, 2008, from: <http://www.nida.nih.gov/Infofacts/RohypnolGHB.html>.
  26. National Institute on Drug Abuse [NIDA]. NIDA community drug alert bulletin - Club Drugs. 2007. Retrieved December 17, 2008, from: <http://www.drugabuse.gov/ClubAlert/Clubdrugalert.html>.
  27. National Institute on Drug Abuse [NIDA]. NIDA InfoFacts: Methamphetamine. 2009. Retrieved December 3, 2009, from: <http://www.nida.nih.gov/InfoFacts/methamphetamine.html>.
  28. National Registry of Evidence-Based Programs and Practices [NREPP]. Interventions. 2009. Retrieved December 3, 2009, from: <http://www.nrepp.samhsa.gov/find.asp>.
  29. Oetting ER, Deffenbacher JL, Taylor MJ, Luther N, Beauvais F & Edwards RW. Methamphetamine use by high school students: Recent trends, gender and ethnicity differences, and use of other drugs. *Journal of Child and Adolescent Substance Abuse* 2000;10(1):33-50.
  30. Office of National Drug Control Policy [ONDCP]. Club drugs: Drug facts. 2007. Retrieved December 17, 2008, from: <http://www.whitehousedrugpolicy.gov/drugfact/club/index.html#overview>.
  31. Office of National Drug Control Policy [ONDCP]. Facts & figures, methamphetamine. 2007b. Retrieved December 17, 2008, from: <http://www.whitehousedrugpolicy.gov/drugfact/methamphetamine/index.html>.
  32. Ruffner PE. Ecstasy (MDMA). In Ginther, C. (Ed.), *Drug Abuse Sourcebook* (2<sup>nd</sup> ed.). Detroit: Omnigraphics, Inc. 2004.
  33. Spoth RL, Clair S, Shin C & Redmond C. Long-term effects of universal preventive interventions of methamphetamine use among adolescents. *Archives of Pediatrics & Adolescent Medicine* 2006;16:876-882.
  34. Substance Abuse and Mental Health Services Administration [SAMHSA]. Overview of findings from the 2002 National Survey on Drug Use and Health. 2002. Retrieved on December 3, 2009, from: <http://oas.samhsa.gov/nhsda/2k2nsduh/Overview/2k2Overview.htm#chap1>.
  35. Theall KP, Sterk CE & Elifson KW. Perceived neighborhood fear and drug use among young adults. *American Journal of Health Behavior* 2009;33(4):

- 353-365.
36. Volkow ND. NIDA Research report - MDMA abuse (Ecstasy). 2006. Retrieved December 17, 2008, from: <http://www.nida.nih.gov/Infofacts/ecstasy.html>.
  37. Wu L-T, Schlenger WE & Galvin DM. Concurrent use of methamphetamine, MDMA, LSD, ketamine, GHB, and flunitrazepam among American youths. *Drug and Alcohol Dependence* 2006;84: 102-113.
  38. Yacoubian GS & Peters RS. An exploration of recent club drug use among rave attendees. *Journal of Drug Education* 2007;37:145-161.
  39. Yacoubian GS, Boyle C, Harding CA & Loftus EA. It's a rave new world: Estimating the prevalence and perceived harm of ecstasy and other drug use among club rave attendees. *Journal of Drug Education* 2003;33:187-196.