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The association of Ecstasy use and academic achievement among adolescents in two U.S. national surveys

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Abstract

The association of ecstasy (3, 4-methylenedioxymethamphetamine, MDMA) use with low academic achievement was examined in two nationally representative surveys of adolescents. We tested whether associations with low academic achievement were of similar magnitude or of stronger magnitude for ecstasy versus marijuana use (without ecstasy use), alcohol/tobacco use (without other drug use) and non-drug use in adolescence. Data from the adolescents in the 2002–2005 National Survey of Drug Use and Health (NSDUH, n= 65,294) and from the 2001–2003 Youth Risk Behavior Survey (YRBS, n= 27,592) were analyzed via weighted logistic regression models. Ecstasy, marijuana, and alcohol/tobacco use were associated with moderate and low academic achievement among adolescents in both surveys. Moreover, ecstasy was more strongly associated with low academic achievement and reporting that school gave no grades than alcohol/tobacco in both samples and than marijuana (NSDUH sample only). Prevention programs should inform adolescents that ecstasy use might impair their academic achievement.

Keywords

Ecstasy (MDMA) use; Marijuana use; Adolescence; Academic Achievement

1. Introduction

Studies have shown that low academic achievement is associated with illegal drug use, particularly with marijuana use (Kandel and Davies, 1996; Sanders, Field, Diego, 2001; Lynskey & Hall, 2000; Jeynes, 2002; Cox, Zhang, Johnson, Bender, 2007); however, little is know about its associations with ecstasy (3,4-methylenedioxymethamphetamine, MDMA) use. Prevalence of ecstasy use among adolescents has increased in recent years. Data from the Monitoring the Future study (MTF) show that ecstasy use peaked among 12th grade students in 2001 (12% lifetime and 9% past year). In 2007 6.5% and 4.4% of 12th grade students had already used ecstasy in their lifetime and in the past year, respectively; these rates are still of concern and show a new cumulative increase in ecstasy use in the past couple of years (Johnston, O'Malley, Bachman, & Schulenberg, 2007). Indeed, while there is indication that hallucinogen use in general has decreased over the past several years, the number of persons who first used ecstasy in the past 12 months increased from 2005 to 2006 and the past-year

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prevalence of ecstasy increased among young people (Substance Abuse and Mental Health Services Administration (SAMSHA), 2007). The most recent National Survey on Drug Use and Health (NSDUH) showed that 1.9% of adolescents aged 12–17 years old were lifetime ecstasy users in 2006 (SAMSHA, 2007). This study aims to estimate the association of ecstasy use with low academic achievement; but since the vast majority of ecstasy users have a history of marijuana use (Martins, Mazzotti, Chilcoat, 2005; Martins, Ghandour, Chilcoat, 2007; Martins, Storr, Alexandre, Chilcoat, 2008), we sought to test the association of ecstasy use above and beyond the association of marijuana use with low academic achievement.

Kandel and Davies (1996) analyzed data from adolescents in 53 New York state schools and found that those who used illegal drugs (marijuana, cocaine and or crack) showed deficits in school performance. Using data from the Mississippi 2003 Youth Risk Behavior Survey (YRBS), Cox and colleagues (2007) showed that marijuana use was associated with low academic achievement (defined in their study as students with mostly C's or below). Sanders, Field & Diego (2001) showed that both marijuana and cocaine were associated with low academic achievement in a small sample of 80 high school seniors from a suburban private school. Jeynes (2002) used data from the 1992 National Education Longitudinal Survey (NELS) and found that adolescents who used marijuana and/or cocaine had poorer performances on standardized tests. Pacula, Ringel, & Ross, (2003) used data from the 1988 NELS to examine the relationship between marijuana and performance on standardized tests. They conducted both longitudinal and cross-sectional analyses. Their results indicate that marijuana was associated with a 15 percent decrease in performance on standardized math tests for the 10 and 12th graders; but most of the negative impacts of marijuana in their cross-sectional analyses disappeared when they controlled for individual differences. Using data from the 2000 NELS, Chatterji (2006) has shown that marijuana and cocaine use in high school were associated with reductions in the number of schooling years completed. Roebuck, French, and Dennis (2004) used data from the 1997 and 1998 National Household Survey on Drug Use (NHSDA) and found that marijuana use was positively associated with school dropout and the number of days skipped from school. Yamada, Kendrix & Yamada (1996) used data from the National Longitudinal Survey of Youth (NLSY79) to investigate the impact of marijuana and alcohol use on high school graduation. They found significant adverse effects of current alcohol and marijuana use on high school graduation rates. Bray, Zarkin, Ringwalt, and Qi, (2000) examined whether the relationship between the initiation of marijuana use and the decision to drop out of high school varied with the age of dropout or with multiple substance use. They used data from four longitudinal surveys of students in a southeastern U.S. public school system. Their results were stable and indicate that the odds of dropping out for marijuana users were 2.3 times that of non-users. Thus, it seems that illegal drug use not only affects academic achievement but also influences high school graduation rates and increase the number of school drop-outs. However, to date, no study has investigated the association between low academic achievement and ecstasy use.

That marijuana use and ecstasy use might be associated with low academic achievement is consistent with Jessor and Jessor's problem behavior theory that indicates drug use and disruptive behaviors share a common etiology (Jessor and Jessor, 1977, Jessor, 1987, Jessor, 1998). In a review of several cross-sectional and longitudinal studies that investigated the association of marijuana use with low academic achievement, Lynskey and Hall (2000) propose that marijuana use and low academic achievement co-occur either due to common risk factors or because early marijuana use 'increases the chances of adopting an unconventional lifestyle characterized by affiliations with delinquent and substance-using peers and disengagement from conventional social roles including completing education and obtaining employment' (p.1628). Adverse effects of marijuana and ecstasy use might be associated with low academic achievement; several studies have shown that ecstasy can cause acute adverse effects that include: difficulty concentrating, anxiety, depressed mood, increased elation,

dissociation feelings, delusions, and confusion (Morland, 2000; Liechti, Gamma, & Vollenweider, 2001; Tancer and Johansen, 2003; Verheyden, Henry, & Curran, 2003). In this paper we take an approach analogous to Cox, Zhang, Johnson, Bender (2007) to explore the association between low academic achievement and ecstasy use above and beyond that for marijuana. We hypothesized that ecstasy users would have stronger associations with low academic achievement than marijuana users, alcohol/tobacco users (who did not use other drugs) and non-drug users. Thus, we estimate these associations for four mutually exclusive groups of adolescents (similar to Martins et al., 2008a) : 1) non-drug users (who never used any type of illegal drug), 2) alcohol/tobacco users (who never used other drugs), 3) lifetime marijuana users (defined as respondents that used marijuana at least once but had never used ecstasy prior to the interview), and 4) lifetime ecstasy users (defined as respondents that used ecstasy at least once independent of their marijuana use status). We use data from two nationally representative surveys of adolescents: the National Survey of Drug Use and Health and the Youth Risk Behavior Survey. Therefore, the specific aims of this study are to: 1) test whether low academic achievement is associated with ecstasy use in adolescence; and 2) test whether associations with low academic achievement are of similar magnitude or of stronger magnitude for ecstasy versus marijuana use, alcohol/tobacco use, or non-drug use in adolescence.

2. Methods

2.1. National Survey on Drug Use and Health (NSDUH) Sample and Measures

We analyzed data from the 2002 (n=54,079), 2003 (n=55,230), 2004 (n=55,602), and 2005 (n=55,905) National Survey on Drug Use and Health (NSDUH) public use data files. The NSDUH is sponsored by the Substance Abuse and Mental Health administration (SAMHSA) and is designed to provide estimates of the prevalence of extramedical use of legal drugs and of illegal drugs in the household population of the United States 12 years of age and older (SAMSHA, 2003, 2004, 2005, 2006). The survey employs a 50 state design with an independent multistage area probability sample for each of the 50 states and the District of Columbia. African-American, Hispanics, and young people were over sampled to increase the precision of estimates for these groups. The response rate was about 91% for household screening in 2002–2005, and 71%–79% (2002–2005) for completed interviews.

Survey items were administered by computer-assisted personal interviewing conducted by an interviewer (CAPI) and audio computer-assisted self-interviewing (ACASI). Use of ACASI was designed to provide respondents with a highly private and confidential means of responding to questions and to increase the level of honest reporting of illegal drug use and other sensitive behaviors (SAMSHA, 2003, 2004, 2005, 2006). Respondents were offered a $30 incentive payment for participation in the survey. Detailed information about the sampling and survey methodology in the NSDUH are found elsewhere (SAMSHA, 2003, 2004, 2005, 2006). In this study the data analyses were restricted to the 65,294 adolescent respondents who were either non-drug users, or alcohol/tobacco users only, or marijuana or ecstasy users (those who used other drugs but not ecstasy and marijuana were excluded, n=7,591).

All respondents provided information about their drug experiences and other socio-demographic data. To assess lifetime ecstasy use in the NSDUH questionnaire the following question is asked: ‘Have you ever, even once, used ‘Ecstasy’, also known as MDMA?’ To assess lifetime marijuana use respondents answered: ‘Have you ever, even once, used marijuana or hashish?’ Based on the responses to these questions adolescents were divided into 4 mutually exclusive groups: 1) non-drug users; 2) alcohol/tobacco users (who did not use other drugs) 3) lifetime marijuana users (who could have used alcohol, tobacco and other drugs but did not use ecstasy); and 4) lifetime ecstasy users (who could have used alcohol, tobacco, marijuana and other drugs, 90% of the ecstasy users had already used marijuana) similar to the strategy adopted in Martins et al. (2008a). All adolescent respondents who used cocaine, heroin,

hallucinogens, inhalants, opioid analgesics, stimulants or sedatives but who were non-marijuana or non-ecstasy users (n=7,591) were excluded from the analyses to keep the non-drug using group as a 'pure non-drug user group' and to ensure that those in the alcohol/tobacco group did not use other drugs.

To assess academic achievement all adolescents interviewed in the NSDUH answered: 'What were your grades for the last semester or grading period you completed?' Response options available were: "1) an 'A+', 'A' or 'A-minus' average; 2) a 'B+', 'B' or 'Bminus' average; 3) a 'C+', 'C' or 'C-minus' average; 4) a 'D', or less than a 'D' average; 5) My school does not give these grades". For the purpose of this study academic achievement was recoded as: 1) Average A or B grades, 2) Average C grades, 3) Average D or less, 4) My school does not give these grades, and 5) Missing.

2.2. Youth Risk Behavior Survey (YRBS) Sample and Measures

We also analyzed data from the 2001 (n=13,601) and 2003 (n=15,214) national school-based Youth Risk Behavior Survey (CDC, 2001, 2003). The 2001 and 2003 Youth Risk Behavior Surveys are part of the Youth Risk Behavior Surveillance System (YRBSS), which is an epidemiologic surveillance system that was established by the Centers for Disease Control and Prevention (CDC) to monitor the prevalence of youth behaviors that most influence health. The YRBS focuses on priority health-risk behaviors established during youth that result in the most significant mortality, morbidity, disability, and social problems during both youth and adulthood. The survey employed a three-stage cluster sample design to produce a nationally representative sample of students in grades 9–12. Schools with substantial number of African-American and Hispanic students were oversampled. Survey procedures were designed to protect the students' privacy by allowing for anonymous and voluntary participation. Students complete the self-administered questionnaire in their classrooms during a regular class period, and record their responses directly on a computer-scannable booklet or answer sheet. Parental permission was obtained before survey administration. In 2001and 2003 school response rate was 75% and 81% respectively and student response rate was 83% in both years, resulting in an overall response rate of 63% for 2001 and 67% for 2003 (CDC, 2001, 2003). The questionnaire used in the YRBS surveys has high reliability with three-fourths of the items having kappas=61–100% (Brenner, Collins, Kann, Warren et al., 1995). Detailed information about the sampling and survey methodology in the YRBS can be found elsewhere (CDC, 2004). In this study the data analyses were restricted to the 27,592 adolescent respondents (2001-n=13,008; 2003-n=14,584) who were either non-drug users, or alcohol/tobacco users only, or marijuana or ecstasy users (those who used other drugs but not ecstasy and marijuana were excluded, n=1,223)

To assess lifetime ecstasy use in the YRBS questionnaire the following question is asked: 'During your life how many times have you used ecstasy (also called MDMA)?' To assess lifetime marijuana use respondents answered: 'During your life how many times have you used marijuana?' Response options available for ecstasy were: 0 times, 1or 2 times, 3 to 9 times, 10 to 19 times, 20 to 39 times, 40 or more times; for marijuana they also include the options: 40 to 99 times and 100 or more times. We recoded both questions into dichotomous yes/no variables. Based on the recoded responses to these questions adolescents were divided into 4 mutually exclusive groups: 1) non-drug users; 2) alcohol/tobacco users (who did not use other drugs) 3) lifetime marijuana users (who could have used alcohol, tobacco and other drugs but did not use ecstasy); and 4) lifetime ecstasy users (who could have used alcohol, tobacco, marijuana and other drugs, 80% of the ecstasy users were marijuana users), similar to the strategy adopted in Martins et al. (2008a). In the YRBS analyses all adolescent respondents who used cocaine, heroin, inhalants, methamphetamine, steroids or hallucinogens but who were non-marijuana and non-ecstasy users (n=1,223) were excluded from the analyses to keep

the non-drug using group as a 'pure non-drug user group' and to ensure that those in the alcohol/tobacco group did not use other drugs.

To assess academic achievement all adolescents interviewed in the YRBS answered: 'During the past 12 months how would you describe your grade in school?' Response options available were: "1) Mostly A's, 2) Mostly B's, 3) Mostly C's, 4) Mostly D's, 5) Mostly F's, 6) None of these grades, 7) Not sure." For the purpose of this study academic achievement was recoded as: 1) Average A or B grades, 2) Average C grades, 3) Average D or less, 4) None of these grades/Not sure (combined because only 76 adolescents answered 'none of these grades', 5) Missing.

2.3. Statistical analyses

We conducted separate analyses for the NSDUH and the YRBS data. Data were weighted to reflect the complex design of the NSDUH and the YRBS samples and were analyzed by Stata 10.0 software (StataCorp, 2007). We used Taylor series estimation methods (Stata 'svy' commands) to obtain proper standard error estimates for the cross-tabulations and logistic regressions. After basic contingency table analyses, we conducted a series of weighted unadjusted multinomial logistic regressions to test for the association of demographics with marijuana and ecstasy use (outcome variable: 0-non-drug users; 1-lifetime alcohol/tobacco users, 2-lifetime marijuana users; and 3-lifetime ecstasy users). Then we conducted a series of weighted unadjusted and adjusted (adjusted for demographics) multinomial logistic regressions to test for the association between marijuana and ecstasy use (outcome variable: 0-non-drug users; 1-lifetime alcohol/tobacco users, 2-lifetime marijuana users; and 3-lifetime ecstasy users) with school grades. In all models, to ensure generalizability of the findings, missing data on any of the covariates was included as a separate category (results were adjusted by demographics and survey year). Results are presented via Odds Ratio (OR), adjusted Odds Ratio (aOR) and 95% confidence intervals (CI).

3. Results

3.1. Description of the NSDUH Sample

Among the adolescents on the NSDUH sample, 26% were alcohol/tobacco users (who never used other drugs), 19% were marijuana users (who never used ecstasy) and almost 3% were ecstasy users (who could have used marijuana, Table 1). Among those in the marijuana use only group, 38% had used marijuana 20 or more times in the past year, 23% had used marijuana 3–19 times in the past year, 14% had used marijuana only once or twice in the past year, and 25% had only used marijuana prior to the past year (lifetime frequency is not available). A larger proportion of ecstasy users were girls (56%) as compared to non-drug users (50%), alcohol/tobacco users (49%) and marijuana users (46%), most alcohol/tobacco, marijuana, and ecstasy users were 15 years of age and older while most non-drug users were aged 14 years old or younger. The great majority of the sample was White and ecstasy users, marijuana users and alcohol/tobacco users were more likely to be White than African-American as compared to non-drug users. Almost all marijuana and ecstasy users had used alcohol and tobacco (>90%). A larger proportion of ecstasy users had used other illegal drugs as compared to marijuana users (Table 1).

3.2 Academic achievement and drug use in the NSDUH sample

Table 2 shows the association between alcohol/tobacco use (without other drug use), marijuana use (without ecstasy use) and ecstasy use with academic achievement in the NSDUH adolescent sample. A larger proportion of non-drug users had higher average grades in school (average A's or B's) in the last semester as compared to alcohol/tobacco, marijuana and ecstasy users. Though 15% of the non-drug users reported average grade of C in the last school semester,

22% of the alcohol/tobacco users and 30% of both marijuana and ecstasy users reported average grade of C in the last school semester. While only 3% of the non-drug users reported average grades of D or less in the last school semester, almost 6% of the alcohol/tobacco users, 11% of the marijuana users and 16% of the ecstasy users reported average grades of D or less, respectively, in the last school semester. The proportion of respondents that mentioned that their school did not give grades varied from 2% among alcohol/tobacco users to almost 4% among ecstasy users. Alcohol/tobacco users were two more likely than non-drug users to report moderate (average grade of C) and low grades (average grades of D or less) in the last school semester, adjusted for demographics and survey year. Marijuana users were three and six times more likely than non-drug users to report moderate (average grade of C) and low grades (average grades of D or less) in the last school semester, adjusted for demographics and survey year. Ecstasy users were four and twelve times more likely than non-drug users to report moderate and low grades, respectively, in the last school semester, adjusted for demographics and survey year. Both marijuana and ecstasy users were more likely to say that their school does not give grades as compared to non-drug users, adjusted for demographics and survey year. To test whether associations changed across time, we tested for interactions between academic achievement and survey year and they were all non-significant. We found similar results when we ran analyses stratified by age groups (12–14 year-olds, and 15–17 year-olds) and by gender (data not shown, available upon request)

3.3. Description of the YRBS Sample

Among the adolescents on the YRBS sample, 22% were alcohol/tobacco users, 34% were marijuana users and almost 11% were ecstasy users (Table 3). Among those in the marijuana use only group, 41% had used marijuana 20 or more times in their lifetime; 34% had used marijuana 3–19 times in their lifetime, and 25% had used marijuana only once or twice. Boys constituted a larger proportion of marijuana users (53%) and ecstasy users (55%) compared to non-drug users (48%) and alcohol/tobacco users (47%), most alcohol/tobacco, marijuana and ecstasy users were among those age 16 years of age and older as compared to non-drug users. The great majority of the sample was White and ecstasy users were more likely to be White than African-American as compared to non-drug users. Almost all ecstasy and marijuana users had used alcohol and tobacco (>90%). A larger proportion of ecstasy users had used other illegal drugs as compared to marijuana users Table 3).

3.2 Academic achievement and drug use in the YRBS sample

Table 4 shows the association between alcohol/tobacco use (without other drug use), marijuana use (without ecstasy use) and ecstasy use with academic achievement in the YRBS sample. A larger proportion of non-drug users had higher average grades in school average A's or B's) in the last year as compared to alcohol/tobacco, marijuana and ecstasy users. Though 14% of the non-drug users reported average grade of C in the last school year, 20% of the alcohol/tobacco users, and 30% of both marijuana and ecstasy users reported average grade of C in the same period. While 2% of the non-drug users reported average grades of D or less in the last school year, 4%, 10% and 15% of the alcohol/tobacco, marijuana and ecstasy users, respectively, reported average grades of D or less in the last school year. The proportion of those who said that their school does not give grades varied from less than 4% among alcohol-tobacco users to almost 7% of the ecstasy users. Alcohol/tobacco users were almost two times more likely than non-drug users to report moderate (average C's) and low grades (average grades of D or less) in the last school year, adjusted for demographics and survey year. Marijuana users were three and seven times more likely than non-drug users to report moderate (average C's) and low grades (average grades of D or less) in the last school year, adjusted for demographics and survey year. Ecstasy users were four and twelve times more likely than non-drug users to report moderate and low grades in the last school year, adjusted for demographics and survey year. Both marijuana and ecstasy users were more likely to say that their school

does not give grades as compared to non-drug users, adjusted for demographics and survey year. We found similar results when we ran analyses stratified by age groups (12–14 year-olds, and 15–17 year-olds) and by gender (data not shown, available upon request).

4. Discussion

This study shows that ecstasy use, marijuana use and alcohol/tobacco use were associated with moderate and low academic achievement among adolescents in two different nationally representative surveys, the NSDUH and the YRBS. Both marijuana and ecstasy use were more strongly associated with moderate and low academic achievement than alcohol/tobacco use. Marijuana use and ecstasy use were associated with reporting that school did not give grades, but alcohol/tobacco use was not. Moreover, ecstasy use was more strongly associated with low academic achievement and reporting that school gave no grades than marijuana use in the NSDUH sample (while confidence magnitude of association was stronger, confidence intervals overlapped in the YRBS sample), and associations of both marijuana use (without ecstasy use) and ecstasy use (who could have used marijuana) were stronger with low academic achievement than with moderate academic achievement.

Our findings resemble findings from Cox, Zhang, Johnson, Bender‘s study (2007) regarding the association between marijuana use and academic achievement among adolescents, but extend the investigation into the association of drug use and academic achievement in adolescence by examining the association of ecstasy use with academic achievement in adolescence above and beyond the association of academic achievement with marijuana use. It is possible that ecstasy users in adolescence represent a subgroup of adolescents who have already progressed further in the “drug use gateway pathway”, since it is well established that marijuana initiation typically precedes the initiation of other illegal drugs, including ecstasy (Fergusson and Horwood, 2000; Fergusson, Boden, Horwood, 2006; Kandel, 2003; Martins, Ghandour, Chilcoat, 2007; Martins, Storr, Alexandre, Chilcoat, 2008b), and marijuana use is more “acceptable and normative” among the adolescent population. On the other hand, during the past decade ecstasy use became more easily accepted by conventional adolescents, and, as such, is not restricted to adolescents who have already tried a variety of other drugs and have more deviant behaviors (Parker, Aldridge, & Measham, 1998; Baggot, 2002; Martins, Mazzotti, Chilcoat, 2005.

Because the data we used in this study is cross-sectional, it is not possible to imply whether ecstasy use lead to low academic achievement or vice-versa. Studies that focus on illegal drug use and low academic achievement have argued that illegal drug use can lead to low academic achievement, and vice-versa, or both can occur due to an underlying vulnerability (Kandel and Davies, 1996; Sanders, Field, Diego, 2001; Lynskey & Hall, 2000; Jeynes, 2002; Cox Zhang, Johnson, Bender, 2007. Only future longitudinal studies will be able to better explain the relationship of ecstasy use with low academic achievement. In longitudinal studies it would be particularly important to monitor ecstasy use among adolescents with moderate academic achievement in order to investigate whether ecstasy use leads them to become low academic achievers.

Interestingly, marijuana use and ecstasy use were associated with reporting that school did not give grades, but alcohol/tobacco use was not. One can hypothesize that these adolescents who use marijuana and ecstasy were not willing to disclose their grades because they had a poor academic performance, or even, they could represent a small subgroup of marijuana and ecstasy users that already present with drug use-related memory problems. Whether these hypotheses hold true remains to be investigated in future studies.

Our study has several strengths, which include the large sample sizes of the NSDUH and YRBS data, as well as the generalizability of the NSDUH adolescent data to the adolescent non-institutionalized population in the US and of the YRBS data to the adolescent school-based population in the US. However, our study has several limitations: 1) our subjects might be under-reporting their drug use (Morral, McCaffrey, & Chien, 2003); 2) ecstasy users in our study might refer to ecstasy as tablets/capsules that do not contain pure MDMA but might contain other substances (Baggott et al., 2000); 3) data on peer drug use and parental monitoring (factors that might be related to academic achievement) were not available.

Notwithstanding these limitations, we believe that our study contributes to the literature of the associations of illegal drugs and low academic achievement during adolescence. School drug use prevention programs should develop interventions that target adolescents with low academic achievement, while both parents and teachers need to assess whether students who begin to fail in school are using illegal drugs. Furthermore, prevention programs should inform adolescents that ecstasy use might impair their academic achievement.

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Table 1

Demographics of the 12–17 year-old total sample, of non-drug users (non-Alcohol/Tobacco, Marijuana and Ecstasy users), of lifetime alcohol/tobacco users (who did not use other drugs), and of lifetime Ecstasy and Marijuana Users, NSDUH, 2002–2005

	Total	No Drug Use	Alcohol/Tobacco Use (no other drug Use)		Marijuana Use (no Ecstasy Use)		Ecstasy Use[¶]	
	n=65,294	n=33,497	n=17,015		N=13,039		n=1,743	
		%wgt	%wgt	OR (95%CI)[†]	%wgt	OR (95%CI)[†]	%wgt	OR (95%CI)[†]
		52.3	26.0		19.1		2.6	
		col %wgt	col %wgt		col %wgt		col %wgt	
Gender	33,297	50.2	51.2	1.0	53.9	1.0	44.1	1.0
Male	31,997	49.8	48.8	1.0 (0.9–1.0)	46.1	0.9 (0.8–0.9)	55.9	1.3 (1.1–1.5)
Female								
Age								
12–14 years old	32,578	69.0	37.5	1.0	19.1	1.0	14.0	1.0
15 years old	10,912	13.5	20.9	2.9 (2.7–3.1)	20.6	5.5 (5.1–6.1)	15.2	5.6 (4.4–7.0)
16 years old	10,910	10.0	20.6	3.8 (3.5–4.1)	27.9	10.1 (9.2–11.0)	28.4	14.0 (11.5–7.1)
17 years old	10,894	7.5	21.0	5.1 (4.7–5.6)	32.4	15.6 (14.2–17.2)	42.4	27.9 (23.1–.7)
Race/ethnicity								
White	41,896	60.0	64.2	1.0	64.6	1.0	72.4	1.0
African-American	8,830	15.9	13.4	0.8 (0.7–0.8)	14.4	0.8 (0.7–0.9)	5.8	0.3 (0.2–0.4)
Hispanic	9,516	16.4	16.8	1.0 (0.9–1.0)	16.1	0.9 (0.9–1.0)	15.0	0.8 (0.6–0.9)
Other	5,052	7.7	5.6	0.6 (0.5–0.6)	4.9	0.6 (0.5–0.6)	6.8	0.7 (0.5–1.0)
Population density								
MSA with 1 million people or more (urban)	24,551	49.1	44.5	1.0	44.8	1.0	46.9	1.0
MSA with less than 1 million people (urban)	25,412	34.1	34.8	1.1 (1.1–1.2)	36.1	1.2 (1.1–1.2)	36.1	1.1 (0.9–1.3)
Not in MSA (non-urban)	15,331	16.8	20.7	1.4 (1.3–1.4)	19.1	1.2 (1.1–1.3)	17.0	1.1 (0.9–1.3)
Survey year								
2002	15,923	23.8	25.2	1.0	25.4	1.0	35.4	1.0
2003	16,328	24.4	25.0	1.0 (0.9–1.0)	25.8	1.0 (0.9–1.1)	24.7	0.7 (0.6–0.8)
2004	16,330	25.3	24.5	0.9 (0.9–1.0)	25.1	0.9 (0.9–1.0)	23.4	0.6 (0.5–0.7)
2005	16,713	26.5	25.3	0.9 (0.8–1.0)	23.7	0.8 (0.8–0.9)	16.5	0.4 (0.3–0.5)
Other drug use								

	Total	No Drug Use	Alcohol/Tobacco Use (no other drug Use)		Marijuana Use (no Ecstasy Use)		Ecstasy Use[¶]	
Cocaine	1,770	---	---	---	8.3	1.0	42.9	8.3 (7.1–9.7)
Heroin	237	---	---	---	0.7	1.0	8.0	13.2 (9.0–9.5)
Inhalants	3,772	---	---	---	21.7	1.0	42.4	2.7 (2.3–3.1)
Hallucinogens[§]	2,715	---	---	---	12.0	1.0	60.8	11.3 (9.8–13.1)
Opioid analgesics[*]	4,746	---	---	---	27.9	1.0	64.7	4.8 (4.1–5.5)
Stimulants[*]	2,197	---	---	---	11.2	1.0	38.5	4.9 (4.3–5.6)
Sedatives[*]	443	---	---	---	2.1	1.0	8.6	4.4 (3.3–5.9)
Tranquilizers[*]	1,938	---	---	---	10.1	1.0	40.3	6.0 (5.2–6.9)

[¶] Only 166 (9.7%wgt) ecstasy users were non-marijuana users.

[†] Base-category: Non-drug users (non-alcohol/tobacco, marijuana & ecstasy users). For analyses of other drug use comparison group is marijuana users.

% wgt: weighted proportions.

[§] Hallucinogens other than Ecstasy.

[*] Non-medical use.

Table 2

Odds Ratio[†] estimates of academic achievement among 12–17 year-old non-drug users (non-Alcohol/Tobacco, Marijuana and Ecstasy users), of lifetime alcohol/tobacco users (who did not use other drugs), and lifetime Marijuana and Ecstasy users, NSDUH, 2002– 2005.

	No drug use	Alcohol/Tobacco use (no other drug use)			Marijuana use (no Ecstasy use)			Ecstasy use[¶]		
	Prevalence (n)	Prevalence (n)	Crude	aOR (demo)[††]	Prevalence (n)	Crude	aOR (demo)[††]	Prevalence (n)	Crude	aOR (demo)[††]
			OR (95%CI)	aOR (95%CI)		OR (95%CI)	aOR (95%CI)		OR (95%CI)	aOR (95%CI)
Academic Achievement										
Average A or B (high)	66.9 (22,546)	61.6 (10,418)	1.0	1.0	49.5 (6,520)	1.0	1.0	45.1 (776)	1.0	1.0
Average C (moderate)	14.8 (4,984)	21.5 (3,757)	1.6 (1.5,17)	1.6 (1.5–1.7)	29.6 (3,777)	2.7 (2.5–2.9)	2.9 (2.7–3.1)	29.3 (507)	2.9 (2.5,3.4)	3.9 (3.3–4.6)
Average D or less (low)	3.1 (1,053)	5.6 (995)	2.0 (1.7–2.2)	2.2 (2.0–2.5)	11.2 (1,521)	4.9 (4.3–5.5)	6.2 (5.3–7.1)	15.7 (282)	7.6 (6.2–9.2)	12.4 (10.0–15.2)
School does not give grades	3.0 (958)	2.2 (341)	0.8 (0.7–0.9)	1.0 (0.8–1.2)	2.3 (259)	1.0 (0.9–1.2)	1.5 (1.2–1.8)	3.6 (52)	1.7 (1.1–2.6)	3.1 (1.9–4.8)
Missing	12.2 (3,956)	9.1 (1,514)	0.8 (0.7–0.9)	1.0 (0.9–1.1)	7.4 (962)	0.8 (0.7–0.9)	1.2 (1.1–1.3)	6.3 (126)	0.8 (0.6–1.0)	1.3 (1.0–1.7)

[†] Base-category: Non-drug users (non-alcohol/tobacco, marijuana & ecstasy users). Results are from multinomial logistic regression model with categorical outcome. (0-non-drug use, 1-alcohol/tobacco use [no other drug use], 2-marijuana use [no ecstasy use], 3- ecstasy use).

[††] Adjusted Odds ratio: model includes demographics (gender, age, race, population density, and survey year).

[¶] Only 166 (9.7%wgt) ecstasy users were non-marijuana users.

Table 3

Demographics of the total sample, of non-drug users (non-Alcohol/Tobacco, Marijuana and Ecstasy users), of lifetime alcohol/tobacco users (who did not use other drugs), and of lifetime Ecstasy and Marijuana Users, YRBS, 2001–2003.

	Tota	No Drug Use	Alcohol/Tobacco Use (no other drug Use)		Marijuana Use (no Ecstasy Use)		Ecstasy Use[¶]	
	n=27,592	n=5,649	n=9,206		n=10,043		N=2,695	
		%wgt	%wgt	OR (95%CI) [†]	%wgt	OR (95%CI) [†]	%wgt	OR (95%CI)[†]
		21.9	33.3		34.1		10.8	
		col %wgt	col %wgt		col %wgt		col %wgt	
Gender								
Male	13,673	48.4	46.9	1.0	53.0	1.0	54.5	1.0
Female	13,803	51.3	52.8	1.1(1.0–1.2)	46.6	0.8 (0.8–0.9)	44.8	0.8 (0.7–0.9)
Missing	116	0.3	0.3		0.4		0.7	
Age								
14 years old or less	2,468	16.8	12.3	1.0	7.0	1.0	10.3	1.0
15 years old	6,103	30.5	26.1	1.2 (1.0–1.3)	22.6	1.8 (1.5–2.1)	19.7	1.1 (0.8–1.3)
16 years old	7,150	25.4	25.5	1.4 (1.1–1.6)	27.5	2.6 (2.2–3.1)	26.7	1.7 (1.3–2.3)
17 years old	7,300	18.2	22.6	1.7 (1.4–2.0)	27.1	3.6 (2.9–4.5)	27.0	2.4 (1.8–3.3)
18 years old or more	4,495	8.7	13.3	2.1 (1.7–2.6)	15.6	4.3 (3.6–5.2)	15.9	
Missing	76	0.4	0.2		0.2		0.4	
Race/ethnicity								
White	12,337	62.5	63.9	1.0	63.0	1.0	67.2	1.0
African-American	6,018	15.2	13.4	0.9 (0.7–1.0)	15.1	1.0 (0.8–1.2)	6.0	0.4 (0.2–0.5)
Hispanic	6,914	11.6	14.6	1.2 (1.1–1.4)	14.9	1.3 (1.1–1.5)	15.9	1.3 (0.9–1.9)
Other	2,018	9.5	7.4	0.8 (0.6–0.9)	6.3	0.7 (0.5–0.8)	10.0	1.0 (0.7–1.4)
Missing	305	1.2	0.7		0.7		0.9	
Region of the country								
NE	3,129	15.2	13.9	1.0	15.8	1.0	23.3	1.0
MW	4,268	22.0	23.9	1.2 (0.9–1.5)	20.5	0.9 (0.7–1.2)	15.6	0.5 (0.2–1.0)
S	13,676	41.3	44.0	1.2 (0.9–1.4)	45.6	1.1 (0.8–1.4)	41.6	0.7 (0.3–1.4)
W	6,519	21.5	18.2	0.9 (0.7–1.2)	18.1	0.8 (0.6–1.1)	19.5	0.6 (0.3–1.4)
Population density								
Urban	10,476	29.8	26.8	1.0	31.0	1.0	31.6	1.0

	Tota	No Drug Use	Alcohol/Tobacco Use (no other drug Use)		Marijuana Use (no Ecstasy Use)		Ecstasy Use[¶]	
Suburban	13,574	54.6	56.2	1.1 (1.0–1.4)	51.7	0.9 (0.7–1.1)	47.8	0.8 (0.5–1.3)
Rura	3,469	15.4	16.8	1.2 (0.9–1.6)	17.2	1.1 (0.8–1.4)	20.6	1.3 (0.5–3.1)
Missing	73	0.2	0.2		0.1		0.0	
Survey year								
2001	13,008	46.2	47.9	1.0	47.9	1.0	44.1	1.0
2003	14,584	53.8	52.1	0.9 (0.8–1.1)	52.1	0.9 (0.8–1.1)	55.9	1.1 (0.7–1.7)
Other drug use								
Cocaine	2,579	---	---	---	11.3	1.0	46.7	6.9 (4.8–9.8)
Heroin	756	---	---	---	2.0	1.0	22.6	14.5 (9.8–21.3)
Inhalants	2,444	---	---	---	17.9	1.0	37.0	2.7 (1.9–3.8)
Hallucinogens[§]	2,502	---	---	---	11.5	1.0	58.1	10.7 (7.2–16.0)
Methamphetamine	2,132	---	---	---	11.3	1.0	43.6	6.0 (4.3–8.5)
Steroids	1,133	---	---	---	5.9	1.0	24.0	5.0 (4.2–6.1)

[¶]380 (18.9%wgt) ecstasy users were non-marijuana users.

[†]Base-category: Non-drug users (non-alcohol/tobacco non-marijuana/ecstasy users). For analyses of other drug use comparison group is marijuana users.

% wgt: weighted proportions.

[§]Hallucinogens other than Ecstasy.

Table 4

Odds Ratio[†] estimates of academic achievement among non-drug users (non-Alcohol/Tobacco, Marijuana and Ecstasy users), of lifetime alcohol/tobacco users (who did not use other drugs), and lifetime Marijuana and Ecstasy users, YRBS, 2001–2003.

	No drug use	Alcohol/Tobacco use (no other drug use)			Marijuana use (no Ecstasy use)			Ecstasy use[¶]		
	Prevalence (n)	Prevalence (n)	Crude	aOR (demo)[††]	Prevalence (n)	Crude	aOR (demo)[††]	Prevalence (n)	Crude	aOR (demo)[††]
			OR (95%CI)	aOR (95%CI)		OR (95%CI)	aOR (95%CI)		OR (95%CI)	aOR (95%CI)
Academic Achievement										
Average A or B (high)	78.4 (4,239)	71.9 (6,397)	1.0	1.0	54.5 (5,287)	1.0	1.0	47.6 (1,296)	1.0	1.0
Average C (moderate)	14.0 (926)	20.0 (2,022)	1.6 (1.4–1.8)	1.6 (1.4–1.8)	30.1 (3,189)	3.1 (2.7–3.5)	3.2 (2.8–3.6)	30.4 (837)	3.6 (2.8–4.6)	4.0 (3.2–5.0)
Average D or less (low)	2.2 (157)	3.6 (351)	1.8 (1.3–2.4)	1.9 (1.4–2.6)	9.3 (934)	6.1 (4.5–8.1)	6.9 (5.1–9.2)	13.6 (367)	10.1 (7.0–14.6)	12.3 (8.6–17.6)
School does not give grade	4.1 (255)	3.5 (336)	0.9 (0.7–1.2)	1.0 (0.8–1.3)	4.8 (495)	1.7 (1.4–2.1)	2.0 (1.7–2.5)	6.7 (155)	2.7 (1.9–3.9)	3.4 (2.3–4.9)
Missing	1.3 (71)	1.0 (100)	0.8 (0.5–1.3)	1.0 (0.6–1.6)	1.3 (138)	1.4 (0.9–2.2)	2.0 (1.3–3.0)	1.7 (40)	2.2 (1.2–4.0)	3.1 (1.7–5.6)

[†] Base-category: Non-drug users (non-alcohol/tobacco, marijuana & ecstasy users). Results are from multinomial logistic regression model with categorical outcome. (0-non-drug use, 1-alcohol/tobacco use [no other drug use], 2-marijuana use [no ecstasy use], 3- ecstasy use).

[††] Adjusted Odds ratio: model includes demographics (gender, age, race, region of the country, population density., and survey year).

[¶] 380 (18.9%wgt) ecstasy users were non-marijuana users.

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