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Drug involvement during and after college: Estimates of opportunity and use given opportunity

Hannah K. Allen^a, Kimberly M. Caldeira^a, Brittany A. Bugbee^a, Kathryn B. Vincent^a, Kevin E. O'Grady^b, and Amelia M. Arria^a

^aCenter on Young Adult Health and Development, University of Maryland School of Public Health, Department of Behavioral and Community Health, 2387 School of Public Health Building, College Park, MD 20742, USA

^bDepartment of Psychology, University of Maryland, 3109 Biology-Psychology Building, College Park, MD 20742, USA

Abstract

Background—College students perceive widespread availability of drugs and prescription medications for nonmedical use on campus, but less is known about the relationship between opportunity to use, use, and use given opportunity of these drugs during and after college. The current study describes annual trends in (1) opportunity to use, (2) use, and (3) use given opportunity of eight drugs and three prescription medications used nonmedically over seven years.

Methods—Data were derived from a longitudinal cohort study of 1,253 first-year college students (52% female, 72% non-Hispanic white) at one large, public university. Annually, past-year opportunity to use and use were assessed for marijuana, hallucinogens, inhalants, cocaine, ecstasy, amphetamines, methamphetamine, heroin, and nonmedical use of prescription stimulants, analgesics, and tranquilizers. Binary variables were created to represent opportunity to use, use, and use given opportunity for each drug.

Results—Participants had the greatest opportunity to use marijuana compared with other drugs during the study period, but there was a significant decline in the opportunity to use marijuana over time. Notably, opportunity for both drugs other than marijuana and prescription medications used nonmedically consistently declined, while use given opportunity remained relatively stable over time.

Conclusions—These findings suggest that changes in drug use are driven by changes in opportunity to use, even during the post-college years. Greater opportunity to use and use of all drugs during the college years in comparison with the post-college years confirms the high-risk nature of the college environment.

Keywords

college students; drug use; longitudinal studies; opportunity to use; substance use

1. Introduction

Drug use is often depicted as a progression from opportunity to use a drug (i.e., being offered a chance to try it), to initiation, to regular use. Exposure opportunity has been widely accepted as a critical step on the pathway to drug use, as it is the earliest stage of involvement. Research has demonstrated that different patterns of drug use are related to differences in availability and opportunity (Anthony, 2002). Several landmark studies have examined this transition from opportunity to use and found that it is very rapid for some individuals (Van Etten and Anthony, 1999; Van Etten et al., 1997). Other research has found that drug use often follows a sequence from opportunity and use of marijuana to use of other drugs, such as hallucinogens and cocaine (Wagner and Anthony, 2002; Wilcox et al., 2002).

Existing research on this topic has utilized mostly cross-sectional designs and samples of adolescent populations, and several of these studies have been conducted in settings outside the United States (Andreas and Pape, 2015; Benjet et al., 2007; Caris et al., 2009; Crum et al., 1996; Neumark et al., 2012; Pettigrew et al., 2012). Among adolescents, opportunity to use marijuana ranges from 17% to 39% (Andreas and Pape, 2015; Caris et al., 2009; Neumark et al., 2012; Siegel et al., 2015), with 70% of adolescents who have had the opportunity to use marijuana reporting a transition to marijuana use (Caris et al., 2009). Studies examining drugs in addition to marijuana have found that about one third of adolescents have had the opportunity to use, with 18% using given the opportunity (Benjet et al., 2007; Neumark et al., 2012). In comparison with adolescents, the prevalence of drug use opportunity is greater among young adults and adults (Stenbacka et al., 1993; Van Etten et al., 1997; Wells et al., 2011), emphasizing a need for more research among these populations.

College students are at particularly high risk for drug use, and several studies have documented the high prevalence of drug use on college campuses (Arria et al., 2008; Gledhill-Hoyt et al., 2000; Johnston et al., 2015; Mohler-Kuo et al., 2003). Nationally, it is estimated that almost one quarter of college students used some type of drug during the past month (Johnston et al., 2015; Substance Abuse and Mental Health Services Administration, 2015). Despite this high prevalence, few studies have focused on the early stages of college students' involvement with drug use, namely opportunity to use. Instead, the majority of research in this area has focused on perceived availability of drugs, which is an indirect measure of opportunity. These findings have shown that young adults and college students perceive drugs and prescription medications for nonmedical use to be widely available (DeSantis et al., 2008; Johnston et al., 2015).

The rationale to focus on drug use opportunity in the current study is guided by a socio-ecological theoretical framework. The likelihood that an individual will use a drug results from the combination of a multitude of inter-related influences. At an interpersonal level, drug-using peers are a risk factor for drug use (Beman, 1995; Newcomb et al., 1986; Oetting and Beauvais, 1987). At a broad environmental level, availability and ease of access define drug use opportunity, and shared environments subject young people to simultaneous drug exposure (de Alarcón and Rathod, 1968). This environmental influence has been studied among youth growing up in disadvantaged, urban areas (Crum et al., 1996; Storr et al.,

2004) and most notably in a twin study by Gillespie, Neale, and Kendler (2009). When examining genetic and environmental risks for marijuana use, results showed that environmental risk factors associated with marijuana availability explained the majority of the variance in marijuana initiation and abuse, highlighting the relationship between the environment, drug availability, and drug use. Although it has been found that the neighborhood environment influences opportunity to use drugs (Crum et al., 1996; Storr et al., 2004), direct opportunities to use drugs within college environments (e.g., offers) have received much less attention in the research literature. Furthermore, few studies have examined drug use opportunities among college graduates. Interestingly, a cross-sectional study of adolescents found that drug use given opportunity was greater among older adolescents when compared with younger adolescents (Benjet et al., 2007), suggesting a possible age-related trend that should be further explored among young adult populations.

The current study investigates drug use opportunity among a well-characterized sample of college students who were recruited during their first year of college and assessed annually for eight years. In this study, drug use opportunity is defined as having received a direct offer to use a drug, which builds upon prior work on more indirect measures of exposure opportunity, including perceived availability (i.e., how easy it would be to obtain a drug) and passive opportunity (i.e., being present where other people are using the drug). Prior research utilizing this sample of young adults examined exposure opportunity and use given opportunity during the first two years of the study, when the majority of participants were enrolled in college (Arria et al., 2008). By sophomore year of college, the majority of students had the opportunity to use marijuana, about half had the opportunity to use prescription stimulants nonmedically, and more than 20% had the opportunity to use hallucinogens, prescription analgesics nonmedically, ecstasy, and cocaine at some point during their lifetime. These analyses also showed that for cocaine, heroin, and nonmedical use of prescription stimulants, the first opportunity usually occurred at or after age 18, suggesting that opportunity to use such drugs often does not occur until college. Use given opportunity among this cohort has varied by drug; for example, almost half of those with the opportunity to use prescription stimulants nonmedically used them during college (Garnier-Dykstra et al., 2012), whereas about one third did so for cocaine (Kasperski et al., 2011). Among students who did not use marijuana prior to college entry, about two-thirds had the opportunity to use marijuana during college, half of whom went on to initiate use during the four years of college (Pinchevsky et al., 2012). The present analyses extend these prior findings by examining drug use opportunity and use given opportunity of eight drugs and three prescription medications used nonmedically during the post-college years, presenting trends and linking pre- and post-college experiences.

2. Methods

2.1. Study design

Data for this study come from the College Life Study, a longitudinal prospective study of college students from a large, public university in the Mid-Atlantic region of the United States. In the summer of 2004, all incoming first-year students were screened for demographic characteristics and drug use. A sampling frame of about 80% of the first-year

class was stratified into groups based on lifetime drug use, and students who had used a drug or nonmedically used a prescription drug at least once prior to college entry were sampled at 100% probability. A 40% random sample was selected from the remaining students. This purposive oversampling ensured a sample of students with increased risk for using drugs during college as compared with the general population. The study was approved by the university's IRB and informed consent was obtained. More detail on study recruitment and design is provided in earlier publications (Arria et al., 2008; Vincent et al., 2012).

2.2. Participants

Participants were 1,253 first-time, first-year college students. A two-hour in-person baseline assessment was conducted (Year 1) with follow-up assessments administered annually for the next seven years (Years 2 through 8). The study's age requirement was 17 to 19 years old at Year 1, and the modal ages for each study year were 18 (Year 1) to 25 (Year 8). The present study used data from assessments administered in Years 2 through 8, with sample sizes ranging from 1,142 in Year 2 to 951 in Year 8. Follow-up rates were high, ranging from 91% in Year 2 to 76% in Year 8. Given the study's focus on the college years, data on opportunity and use collected in Year 1 were excluded because past-year measurements included drug use experience prior to college entry.

The sample was 52% female and 72% non-Hispanic white. About three quarters of the sample (74%) had a mother's education level of a bachelor's degree or higher, and 78% had a father's education level of a bachelor's degree or higher. The mean family income was \$73,426, and 81% of the sample had completed their bachelor's degree by Year 5.

2.3. Measures

2.3.1. Demographics—Data were collected in Year 1 on participant sex, race/ethnicity, mother's education level, and father's education level. Neighborhood income was estimated from publicly available data based on participant's home zip code during their last year of high school (MelissaDATA, 2003).

2.3.2. Drug use opportunity—At each assessment in Years 2 through 8, participants were asked, "In the past 12 months, on how many days were you offered [marijuana, inhalants, hallucinogens, cocaine, heroin, ecstasy]?" and "In the past 12 months, on how many days were you offered any of the following prescription medications [stimulants, analgesics, or tranquilizers] for nonmedical use?" Dichotomous variables were created to represent opportunity (yes or no) for each drug. In addition, dichotomous variables for other drug (not marijuana) opportunity and prescription medication opportunity were computed by combining inhalant, hallucinogen, cocaine, heroin, and ecstasy opportunity, and prescription stimulant, analgesic, and tranquilizer nonmedical opportunity, respectively. Similar annual measures of amphetamine and methamphetamine were assessed in Years 3 through 8, but were not included in the combination variable because they were not assessed in Year 2. Age at first opportunity was assessed at baseline and later combined with subsequent follow-up data to derive a cumulative age at first opportunity variable, reflecting the participant's age at the assessment in which their first opportunity occurred or their self-reported baseline response, whichever came first. It is possible that a participant could have used a drug

without reporting a direct offer. The proportion of users who fall into this category can be computed by subtracting the number of users given opportunity from the number of users, then divided by the number of users.

2.3.3. Drug use—Each year, participants were asked, “In the past 12 months, on how many days have you used [marijuana, inhalants, hallucinogens, cocaine, heroin, amphetamines, methamphetamine, ecstasy]?” and “In the past 12 months, on how many days have you used prescription [stimulants, analgesics, or tranquilizers] nonmedically?” Dichotomous variables were created to represent use or non-use for each drug. As with opportunity, use was assessed in Years 3 through 8 for amphetamines and methamphetamine, and Years 2 through 8 for all other drugs.

2.3.4. Use given opportunity—A dichotomous variable for use given opportunity was created for each drug in each year. Individuals who both had opportunity and used a particular drug during a given study year were classified as “used given the opportunity”. In addition, dichotomous variables for use of drugs other than marijuana given the opportunity and nonmedical prescription medication use given opportunity were computed by combining inhalant, hallucinogen, cocaine, heroin, and ecstasy use given opportunity, and prescription stimulant, analgesic, and tranquilizer nonmedical use given opportunity, respectively. As above, amphetamines and methamphetamine were excluded from this combination variable because they were not assessed in Year 2.

2.4 Statistical analyses

Prevalence estimates for opportunity and use were computed using sampling weights that accounted for attrition and the overrepresentation in the sample of individuals who used at least one drug or nonmedically used a prescription drug during high school (as per our sampling design). By contrast, given that use given opportunity was computed within the subset of the sample who had the opportunity to use a given drug, estimates of the probability of use given opportunity were unweighted, which is consistent with prior literature that supports unweighted analyses of causal effects (i.e., the effect of opportunity on use (Dickens, 1990; Solon et al., 2013)). Estimates representing cumulative opportunity, cumulative use, and age at first opportunity for each drug during Years 2 through 8 were weighted for sampling only. For each drug, the cumulative prevalence estimates represent the weighted number of participants who had the opportunity to use, or used, a given drug at least once by Year 8, divided by the weighted number of students in the sampling frame. Cumulative use given opportunity was computed in a similar fashion, but with the number of students with lifetime opportunity as the denominator. In order to examine trends in opportunity and use given opportunity throughout the study period, data were analyzed using a generalized estimating equations (GEE) approach. Opportunity and use given opportunity values for each study year were obtained from the estimated marginal means, with opportunity estimates weighted for sampling. Orthogonal polynomial contrasts (Kirk, 2013) were used to test for trends in both opportunity and use given opportunity for marijuana, drugs other than marijuana, and prescription medications used nonmedically.

3. Results

3.1. Opportunity

As seen in Table 1, participants had the greatest exposure to marijuana in comparison with all other drugs during all seven years, but there was a substantial decline in students having the opportunity to use marijuana from Year 2 (71%_{wt}) to Year 8 (48%_{wt}). All other drugs followed a similar declining trajectory from Years 2 through 8, with participants reporting the highest opportunity in Years 2 and 3 for the majority of drugs. This trend differed for cocaine, for which opportunity was most prevalent in Year 4 (24%_{wt}).

The left side of Figure 1 shows the estimates of opportunity to use marijuana, drugs other than marijuana, and prescription medications nonmedically. Estimates were greatest for opportunity to use marijuana, followed by prescription medications and drugs other than marijuana. This remained the case until Years 6 through 8, when opportunity to use drugs (not including marijuana) exceeded opportunity for nonmedical use of prescription medications. Opportunity to use drugs other than marijuana remained at its peak and relatively stable through Year 4, when participants were still enrolled in college, before beginning to decline. Opportunity to use prescription medications nonmedically began declining earlier, in Year 3. Cumulatively by Year 8, 85%_{wt} of participants had the opportunity to use marijuana and 62%_{wt} had the opportunity to use prescription stimulants nonmedically at least once during the study period (see Table 2).

3.2 Age at first opportunity

The mean age of first opportunity among participants who had ever had the opportunity to use a drug was about 16 for marijuana and about 18 or 19 for all other drugs (see Table 3A). For every drug besides marijuana, the first opportunity to use was during college between ages 18 and 21 for the majority of participants. About 67%_{wt} of the entire sample had the opportunity to use marijuana prior to coming to college, and only 10%_{wt} of the sample never had the opportunity to use marijuana before or during the study period (see Table 3B). From ages 18 to 21, 43%_{wt} of the sample had their first opportunity to use prescription stimulants nonmedically.

3.3. Use given opportunity

Among those who had the opportunity to use marijuana in Year 2, the majority (75%) used marijuana during that same year. In contrast to all other drugs, marijuana use given opportunity remained the highest through all seven years and declined through Year 8 (except for a slight increase between Years 6 and 7). Use of other drugs given the opportunity was relatively stable (see Figure 1). As shown in Table 1, use given opportunity was highly differentiated by drug but was consistently greater for marijuana and prescription stimulants, analgesics, and tranquilizers and lower for heroin, amphetamines, and methamphetamine. Ecstasy was the only drug for which use given opportunity steadily increased, from 17% in Year 2 to 47% in Year 8. There was a small proportion of users who used a drug without reporting a direct offer. Interestingly, this proportion is greater for nonmedical use of prescription analgesics, stimulants, and tranquilizers as well as inhalants (17.4%, 8.5%, 7.8%, and 11.1%, respectively) than the other drugs (with the exception of

heroin where the small number of users precluded meaningful analysis). This finding most likely reflects that some individuals are able to access these particular drugs in different ways (e.g., approaching a person who has a prescription to share or sell the medication or by buying a product that could be used as an inhalant).

As seen in Figure 1, for both drugs other than marijuana and nonmedical prescription medications, opportunity consistently declined over time while use given opportunity remained relatively stable throughout the study period. By contrast, both opportunity and use given opportunity declined for marijuana. By Year 8 (modal age 25), 81% of participants who had the opportunity to use marijuana did so during at least one study year (see Table 2). More than half of all participants with the opportunity to nonmedically use prescription stimulants (56%), analgesics (53%), and tranquilizers (58%) went on to use these drugs by Year 8, and almost half of those offered hallucinogens (44%), cocaine (45%), and inhalants (44%) used these drugs by the end of the study period.

3.4. Trends over time

A trend analysis (see Table 4) revealed a significant ($p<0.05$) linear decline in opportunity to use marijuana, drugs other than marijuana, and prescription medications nonmedically. Significant higher-order (notably quadratic and cubic) changes indicated that decline in opportunity to use did not occur in a steady or uninterrupted fashion. With contrast estimates of $\beta=-0.20$ ($SE=0.018$; marijuana), $\beta=0.02$ ($SE=0.025$; drugs other than marijuana), and $\beta=-0.02$ ($SE=0.027$; prescription medications used nonmedically), only marijuana use given opportunity had a significant linear decline over time. Drugs other than marijuana and prescription medication use given opportunity displayed significant higher-order trends.

4. Discussion

This study yielded several noteworthy findings. First, and not surprisingly, at any age, more participants had opportunities to use marijuana than any other drug. By age 25 (Year 8), 85%_{wt} of participants had the opportunity to use marijuana. These results are consistent with the widespread perception among young adults that marijuana is very easily obtainable (Johnston et al., 2015), which might be attributable to the recent legalization and medicalization of marijuana. Although marijuana opportunity remained high both during and after college, it declined substantially from age 19 to age 25. One possible explanation for this decline is that, as young adults age, they are less likely to expose themselves to situations where they would be offered marijuana. This explanation is applicable to other drugs as well, as the trends in opportunity to use for all drugs mirrored the decline observed for marijuana.

The observed declines in opportunity to use both drugs and prescription medications nonmedically support and extend previous findings that perceived availability of some drugs among adults decreases with age (Johnston et al., 2015). For all drugs, the peak opportunity to use occurred during the earlier years of the study, when the majority of participants were still enrolled in college. Although this study provides new estimates of drug use opportunity and the prevalence of drug use given the opportunity during and after college, more research is needed to explore the social contexts in which these opportunities occur and the risk

factors that distinguish individuals who use from those who do not use, given the opportunity. The finding that a substantial percentage of college students have the opportunity to use drugs during college emphasizes the critical need for university-level prevention efforts to reduce drug use on college campuses and ultimately mitigate its adverse effects on academic performance, health, and safety.

During all seven years of this study, marijuana use given opportunity surpassed use given opportunity of all other drugs, and use given opportunity was consistently greater for nonmedical prescription medications than for drugs other than marijuana. This finding might reflect underlying differences in perceived harm (Johnston et al., 2015). It is equally plausible that the perceived “benefits” might be greater for certain prescription medication classes than for other drugs. For example, the perceived academic benefits of prescription stimulants are often cited as a motive for using this class of drug (Garnier-Dykstra et al., 2012; Teter et al., 2006).

While use given opportunity remained stable or declined over time for most drugs, it increased substantially for ecstasy, from 17% in Year 2 to 47% in Year 8. It is unclear why this increase occurred, especially given the stability of ecstasy opportunity and use among this sample. Within each study year, the numbers of participants who used ecstasy and used given the opportunity were similar, indicating that participants rarely used ecstasy unless they were offered, especially post-college. Similar to the nonmedical use of prescription medications, this trend might indicate concomitant changes in perceived risks and benefits associated with ecstasy use. Prior research among other young adult samples has shown that the perceived harm of trying ecstasy remains relatively steady from ages 18 to 30 (Johnston et al., 2015).

Results for marijuana confirmed our expectation that use given opportunity would decline with age, yet by contrast, use given opportunity exhibited relative stability over time for both prescription medications and most drugs other than marijuana—and even increased in the case of ecstasy. These findings suggest that opportunity is highly influential for drug use, even in the post-college years, but also highlight the possibility that drug-specific heterogeneity might exist in the degree to which changes in use are driven by changes in opportunity as opposed to other factors. Multiple risk factors should be examined in relation to use given opportunity—and for multiple drugs—in future longitudinal studies. Further research is also needed to understand the nature of post-college drug opportunities and use. It is likely that individuals who continue to use drugs in the post-college period are more likely to meet criteria for drug dependence and therefore more likely to be in situations where drugs are being offered.

Findings must be viewed in the context of the study’s limitations. Given that this sample was from one large public university, the findings might not be generalizable to other university settings. Results are subject to recall bias, as with all self-report studies. The use of a past-year measure of opportunity leaves potential for an underestimation of participants’ opportunity to use drugs, as annual assessments were not always given on the same date each year. This opportunity measure did not specify who had offered the drug, which would have provided more information on the context of opportunity on college campuses. To

simplify the analytic strategy, we used dichotomous variables for opportunity, use, and use given opportunity, which precluded examination of the frequency of these variables. This study did not examine individual characteristics and potential risk factors associated with drug use opportunity or use given opportunity, which have been the focus of several prior studies (Andreas and Pape, 2015; Caris et al., 2009; Neumark et al., 2012; Stenbacka et al., 1993; Storr et al., 2011; Van Etten and Anthony, 1999; Van Etten and Anthony, 2001; Van Etten et al., 1999). Such risk factors might operate differently among college student and young adult populations, and therefore, the next step in this research will be to examine factors influencing opportunity and/or use given opportunity for various drugs. Future research should also differentiate between active and passive drug use opportunity, as this study only focused on direct opportunity (i.e., offers) and did not include instances where participants were present in a situation where other students were using a drug and they could have chosen to use as well.

Despite these limitations, the present study advances our understanding of trends over time of drug use opportunity and use given opportunity in a well-characterized longitudinal sample of young adults. The high follow-up rates achieved strengthen our confidence in the findings. Moreover, the results fill a gap in the literature regarding opportunity and use given opportunity of a wide range of drugs among college students.

Findings demonstrate the need for continued action to decrease the availability and mitigate the consequences of drugs on college campuses. Colleges and universities have an important role to play in adopting environmental strategies that limit opportunity and availability, as well as individual strategies that change students' perceptions about such drugs (e.g., perceived risks, benefits, and norms) and build refusal skills. Yet results also highlight the need to sustain such strategies post-college into young adulthood. While college is a convenient time to screen for drug use and target high-risk students, prevention strategies in workplace and primary care settings might be useful for targeting young adults post-college graduation.

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Figure 1.

Trends in opportunity to use and use given opportunity during all seven years of study.

Note. Prescription medication opportunity includes the opportunity to use prescription stimulants, analgesics, and tranquilizers nonmedically. Other drug opportunity includes the opportunity to use inhalants, hallucinogens, cocaine, heroin, and ecstasy. Opportunity to use and use given opportunity values are estimated marginal means. Use given opportunity data are unweighted, and opportunity to use data are weighted to account for sampling design. Opportunity to use and use given opportunity values are not comparable, and the side-by-side presentation is merely meant to compare the shape of trends over time.

Table 1

Opportunity to use, use, and use given opportunity by drug and study year

Marijuana		Prescription Stimulants		Hallucinogens		Prescription Analgesics		Cocaine		Ecstasy		Prescription Tranquilizers		Inhalants		Heroin		Amphetamines		Methamphetamine	
<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt	<i>n</i>	%wt
%wt Opportunity																					
Year 2	922	70.9	522	38.7	385	24.8	311	20.3	299	18.8	211	14.3	153	9.4	6.2	18	1.3	-	-	-	-
Year 3	881	70.3	509	41.5	334	24.2	293	21.9	332	22.0	234	17.3	168	11.5	6.1	23	1.6	65	5.0	20	1.4
Year 4	844	68.4	404	32.5	337	24.5	212	14.6	336	23.8	223	16.6	144	9.6	6.0	13	1.1	35	3.0	6	0.3
Year 5	710	61.3	313	27.1	249	20.1	167	13.0	280	20.9	165	12.7	131	10.2	4.3	11	1.0	33	2.8	12	0.9
Year 6	631	55.0	202	16.4	172	14.5	134	10.7	231	18.2	144	12.0	128	10.1	3.8	8	0.5	25	2.0	13	1.0
Year 7	558	49.4	160	12.9	148	12.4	111	9.5	206	16.4	140	11.4	91	7.1	3.6	6	0.5	19	1.7	3	0.3
Year 8	523	48.2	144	12.0	117	9.8	75	6.8	174	14.3	122	9.9	79	6.0	2.6	3	0.3	11	1.1	7	0.8
%wt Use																					
Year 2	695	45.8	281	17.9	137	7.9	168	10.2	106	5.8	38	2.0	73	4.3	2.8	2	0.1	-	-	-	-
Year 3	654	46.9	304	20.5	120	8.3	157	10.3	146	8.7	60	3.6	104	6.9	2.1	6	0.5	8	0.6	2	0.1
Year 4	598	44.4	235	16.8	114	8.1	124	8.8	141	9.0	59	4.1	82	5.4	2.6	2	0.2	3	0.2	0	0.0
Year 5	481	37.7	184	13.9	103	7.8	100	7.7	115	7.7	52	3.4	71	4.6	2.3	0	0.0	2	0.2	1	0.1
Year 6	401	32.8	131	9.8	81	6.2	84	6.4	88	6.1	53	4.3	70	5.1	1.7	2	0.1	1	0.1	1	0.1
Year 7	370	31.1	106	8.2	57	4.4	71	5.4	72	4.9	58	4.3	53	3.9	2.3	2	0.1	1	0.1	0	0.0
Year 8	332	28.6	84	6.6	61	5.5	45	3.5	82	5.8	60	4.6	37	2.5	1.8	0	0.0	2	0.1	0	0.0
% Use Given Opportunity																					
Year 2	692	75.1	234	44.8	130	33.8	142	45.8	104	34.8	36	17.1	68	44.7	39.2	2/18	11.1	-	-	-	-
Year 3	651	73.9	252	49.5	112	33.5	133	45.4	143	43.1	58	24.8	91	54.2	33.3	6/23	26.1	6/65	9.2	2/20	10.0
Year 4	590	69.9	179	44.3	111	32.9	99	46.7	140	41.7	56	25.1	72	50.0	34	43.0	1/13	3/35	8.6	0/6	0.0
Year 5	476	67.0	149	47.6	95	38.2	70	41.9	114	40.7	51	30.9	61	46.6	29	49.2	0/11	1/33	3.0	1/12	8.3
Year 6	395	62.6	107	53.0	76	44.2	65	48.5	86	37.2	51	35.4	61	47.7	17/44	38.6	1/8	1/25	4.0	1/13	7.7
Year 7	362	64.9	82	51.3	54	36.5	55	49.5	72	35.0	58	41.4	43	47.3	21	47.7	2/6	1/19	5.3	0/3	0.0
Year 8	323	61.8	67	46.5	56	47.9	33	44.0	79	45.4	57	46.7	33	41.8	17/29	58.6	0/3	2/11	18.2	0/7	0.0

Note. Opportunity and use percentages are weighted (%wt) for sampling and attrition, and use given opportunity values are unweighted. All *n*'s are unweighted. Use given opportunity estimates represent the percentage of the sample who had the opportunity to and used a drug within a given study year. Prescription stimulants, analgesics, and tranquilizers refer to nonmedical use. Years 2 through 8 correspond to modal ages 19 through 25, respectively. Results based on small denominators (*n*<20) are reported as fractions rather than percentages.

Table 2

Cumulative opportunity to use, use, and use given opportunity from Year 2 (age 19) through Year 8 (age 25)

	Opportunity		Use		Use Given Opportunity	
	<i>n</i>	% _{wt}	<i>n</i>	% _{wt}	<i>n</i>	%
Marijuana	1081	84.8	875	61.5	872	80.7
Nonmedical Use of Prescription Stimulants	817	62.0	496	32.0	454	55.6
Hallucinogens	619	43.2	279	18.1	269	43.5
Cocaine	602	40.5	270	15.5	268	44.5
Nonmedical Use of Prescription Analgesics	579	40.1	368	23.6	304	52.5
Ecstasy	495	34.4	177	10.8	171	34.5
Nonmedical Use of Prescription Tranquilizers	393	26.0	245	14.6	226	57.7
Inhalants	238	15.5	117	7.2	104	43.7
Heroin	59	3.9	12	0.8	11	18.6

Note. Cumulative opportunity and use percentages are weighted (%wt) to account for sampling design. *N*'s are unweighted. Cumulative use given opportunity reflects the amount of participants who had the opportunity to use and used the same drug during at least one study year throughout all seven years of the study.

Table 3A
Age at first opportunity, among participants who ever had the opportunity (unweighted)

	Marijuana	Inhalants	Hallucinogens	Cocaine	Meth	Heroin	Stimulants	Analgesics	Tranquilizers	Ecstasy
% (<i>n</i>) <15	25.5 (301)	10.4 (39)	3.7 (28)	1.2 (8)	4.8 (16)	2.2 (2)	3.4 (31)	2.0 (14)	2.8 (14)	5.0 (32)
% (<i>n</i>) 15 to 17	59.0 (696)	34.7 (130)	41.5 (316)	25.0 (166)	36.4 (121)	27.5 (25)	32.6 (297)	41.9 (299)	32.1 (160)	39.3 (253)
% (<i>n</i>) 18 to 21	13.7 (162)	44.8 (168)	48.4 (369)	60.0 (399)	46.4 (154)	57.1 (52)	59.1 (539)	47.0 (335)	43.8 (218)	43.2 (278)
% (<i>n</i>) 22 or older	1.8 (21)	10.1 (38)	6.4 (49)	13.8 (92)	12.3 (41)	13.2 (12)	4.9 (45)	9.1 (65)	21.3 (106)	12.4 (80)
Total	100.0 (1180)	100.0 (375)	100.0 (762)	100.0 (665)	100.0 (332)	100.0 (91)	100.0 (912)	100.0 (713)	100.0 (498)	100.0 (643)
Mean (<i>SD</i>)	15.8 (2.1)	17.9 (2.9)	17.9 (2.1)	19.1 (2.2)	18.4 (2.5)	18.9 (2.3)	18.2 (2.1)	18.2 (2.3)	19.0 (2.8)	18.3 (2.7)

Table 3B

Age at first opportunity, among all participants (weighted for sampling design, $N_{wt}=3,285$)

	Marijuana	Inhalants	Hallucinogens	Cocaine	Meth	Heroin	Stimulants	Analgesics	Tranquilizers	Ecstasy
% _{wt} <15	17.7	2.6	1.8	0.4	1.0	0.1	1.5	0.9	0.7	1.9
% _{wt} 15 to 17	49.6	7.2	17.8	8.8	7.3	1.4	17.1	17.0	8.9	14.9
% _{wt} 18 to 21	19.8	10.6	27.1	25.8	10.9	3.8	42.9	23.5	13.7	20.1
% _{wt} 22 or older	3.0	3.1	4.9	7.7	3.0	0.7	4.0	5.8	7.9	5.9
% _{wt} Never	9.8	76.5	48.4	57.2	77.8	94.0	34.5	52.8	68.8	57.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note. Data on amphetamines and methamphetamines were combined under “meth” to reflect the earliest age at which participants had the opportunity to use either drug. Stimulants, analgesics, and tranquilizers were opportunity for nonmedical use only; does not include medically supervised use. For tabulating weighted results in Table 3B among the overall sample, missing follow-up data were treated as no opportunity; therefore, results represent minimum estimates.

Table 4

Results from a trend analysis of opportunity and use given opportunity over all seven years of study

	Opportunity			Use Given Opportunity		
	Marijuana	Other Drugs	Prescription Medications	Marijuana	Other Drugs	Prescription Medications
Linear	-0.24 (0.009)*	-0.15 (0.008)*	-0.30 (0.008)*	-0.20 (0.018)*	0.02 (0.025)	-0.02 (0.027)
Quadratic	-0.02 (0.006)*	-0.05 (0.006)*	0.00 (0.007)	0.02 (0.014)	-0.01 (0.022)	-0.03 (0.023)
Cubic	0.05 (0.006)*	0.02 (0.006)*	0.06 (0.006)*	0.02 (0.012)	0.04 (0.019)*	-0.03 (0.022)
Order 4	0.01 (0.006)	-0.01 (0.005)	-0.02 (0.006)*	-0.02 (0.011)	0.04 (0.019)*	-0.05 (0.022)*
Order 5	-0.01 (0.005)	-0.02 (0.005)*	0.01 (0.006)*	-0.01 (0.012)	0.02 (0.017)	0.00 (0.019)
Order 6	0.01 (0.005)	0.01 (0.005)	-0.02 (0.006)*	-0.01 (0.011)	0.02 (0.016)	0.00 (0.018)

* Significant at the $p < 0.05$ level.

Note. Values are polynomial contrast estimates and the associated standard errors using maximum likelihood estimation, the log link function, robust errors, and Huber-White sandwich estimators. Prescription medications represent opportunity and use given opportunity of nonmedical use of prescription stimulants, analgesics, and tranquilizers only.