Prevalence and incidence of drug use among college students: An 8-year longitudinal analysis

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Abstract

Background—Drug use among college students is associated with adverse academic and health outcomes, and risks to personal safety.

Objectives—This study utilizes data from a longitudinal study to estimate annual prevalence, cumulative lifetime prevalence, and incidence of ten types of drug use during the eight years after college entry and the average age of onset of each drug used.

Methods—Participants (N=1,253; 52% female) were young adults who were originally enrolled as first-time, first year students at a university in the mid-Atlantic US. Annual personal interviews gathered data about the use of seven illicit drugs and three prescription drugs used nonmedically. Annual follow-up rates ranged from 76% to 91%.

Results—Marijuana was the most commonly used drug in every year of the study, with the highest annual prevalence estimates in Year 3 ($47\%_{wt}$). In Year 8, when the modal age of participants was 25, $29\%_{wt}$ used marijuana during the past year. Nonmedical use of prescription drugs was more prevalent during college than in the later years of the study. Although the prevalence of cocaine and ecstasy use was low (cumulative prevalence estimates of $17\%_{wt}$ and $13\%_{wt}$ respectively), incidence for these drugs were particularly high in the later years of the study.

Conclusion—Drug use is prevalent among college students, and drug use persists among young adults, even after many have graduated college. More attention should be directed at identifying and intervening with students at risk for drug use to mitigate possible academic, health, and safety consequences.

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Keywords

College students; drug use; longitudinal studies; nonmedical prescription drug use; substance use

Introduction

Excessive drinking and drug use among college students are associated with adverse academic and health outcomes, and risks to personal safety (1–6). In contrast to the amount of attention that has focused on patterns of excessive drinking during college, fewer studies have examined the course of illicit drug use behavior during college. National cross-sectional data estimate that approximately one in four college students in the US have used marijuana or some other drug during the past month (7,8). While some students enter college with a prior history of drug use, others initiate substance use during college. In an earlier report, we described the annual prevalence and incidence of drug use during the first two years of college among a longitudinal cohort of 1,253 traditional age college students recruited from a single large public university (9). Findings suggested that while substance use patterns can continue during the transition from high school to college, many individuals initiate use after college entry. Research has shown that about one-third of college students have used marijuana prior to college entry, and about 9% to 25% initiate use after entering college (10–12). College students who initiate alcohol and marijuana use prior to college entry are more likely to become regular marijuana users and use other illicit drugs during college (13). Initiation after college entry is often attributed to changes in substance use attitudes and intentions during the transition from high school to college (11).

During college, undergraduate students are at risk for either starting or continuing to use drugs for a variety of reasons. First, the availability of illicit drugs appears to be widespread, with the majority of college students reporting easy access to and opportunity to use marijuana and prescription stimulants (8,9,14,15). Second, the ability for parents to exert a direct protective effect through supervision and monitoring of whereabouts and activities decreases substantially during the college years, at least for students who live away from home (16). Third, perceptions that substance use is normative for college students plays a role in perpetuating drug use behaviors (17,18). Finally, low to moderate perceived risk of consequences is also associated with drug use. Since 2006, substantial declines in the perceived risk of marijuana use have been observed. For example, the percentage of 23- to 26-year-olds who reported that regular use of marijuana carried "great risk" decreased from 56% in 2006 to 35% in 2014 (8). Similar decreases have been observed for 18-year-olds (7,8). These decreasing trends in perceived risk appear to parallel increases in use. The prevalence of past-year marijuana use among students attending either two- or four-year colleges increased from 30% in 2006 to 34% in 2014 (8), and marijuana use increases after high school for young adults who attend four-year colleges (19).

Despite the belief by many students that drug use during college is benign, concern regarding college student drug use has been raised because of its potential negative impact on educational achievement including gaps in enrollment, prolonged time to graduation, and

failure to graduate (2,20–23). Additional adverse outcomes of drug use include dependence, risky driving behaviors, and poorer physical and mental health (1,6,24–28).

Very few longitudinal prospective studies have focused on understanding drug use patterns during the years after college. The purpose of the current study is to extend our prior findings by examining longer-term trends in annual prevalence and incidence during the eight-year period following college entry in a well-characterized sample of college students (9,29). This information is useful for understanding the magnitude of college student drug use as well as informing the timing of interventions. Specifically, the present study aimed to describe: 1) the annual prevalence of use of ten types of drugs; 2) the cumulative lifetime prevalence of each drug used; 3) the incidence (i.e., "new cases") of drug use; and 4) the age of onset of each drug used.

Methods

Study design

Data were derived from the College Life Study, a longitudinal study of health risk behaviors among a single cohort of college students, who were followed up annually with personal interviews regardless of continued college attendance (9,29).

Participants

Participants were recruited at college entry from a large, public university in the mid-Atlantic region of the US. An initial online screening survey was conducted in 2004 during summer orientation prior to college entry, targeting the entire incoming cohort of first-time, first-year students ages 17 to 19, 89% of whom participated. The resulting screened sample (N=3,291) constituted the sampling frame for the longitudinal study. To ensure representativeness, the sampling frame was stratified into 24 cells by race (White, Black/African-American, Asian, other), sex (male, female), and drug use [trichotomized from screening data as (a) lifetime use of ecstasy, (b) lifetime use of any other illicit drug or prescription drug nonmedically but not ecstasy, and (c) never used any drugs], and samples were selected within each cell. To ensure adequate statistical power for analyses of substance use, individuals in the 16 drug use cells were oversampled at 100% probability, and all others at 40%. Cell sizes ranged from n=16 (Black/African-American, male, non-users of drugs) to n=201 (White, female, used drugs but not ecstasy). The two-hour baseline assessment was completed during the first year of college (N=1,253; 87% response rate). Follow-up rates for subsequent annual assessments were high (91% in Year 2, n=1,142; 76% in Year 8, n=1,037). Informed consent was obtained, and the study was approved by the university's institutional review board. Participants received cash incentives for each assessment they completed. Modal ages at each assessment were 18 through 25, corresponding to study Years 1 through 8. Participants were demographically similar to the target population of students at the university from which they were sampled (72% white, 52% female). We have previously published details on sampling and recruitment procedures (9,29).

Measures

Lifetime and past-year drug use—At baseline, participants were asked how many times during their lifetime they had used each of seven different illicit drugs (i.e., marijuana, hallucinogens, inhalants, cocaine, ecstasy, amphetamine/methamphetamine, and heroin) and three types of prescription drugs (stimulants, analgesics, and tranquilizers) nonmedically. At each follow-up assessment, participants were asked how many times during the past year they had used each of the seven illicit drugs and nonmedically used each of the three classes of prescription drugs.

Age at onset of first drug use—At baseline, participants were asked how old they were the first time they used each drug, if ever. For individuals whose first use of a given drug occurred after baseline, age at onset was automatically coded as the age at the first assessment when use was reported.

Incidence of drug use—Incidence was computed as the number of individuals who used a given drug for the first time during the specified assessment year, divided by the number of individuals who had never used that drug in their lifetime based on all prior assessments.

Statistical analyses

Descriptive statistics were used to tabulate estimates of lifetime and annual prevalence for each drug of interest. Data were weighted for sampling and attrition to approximate the original sampling frame of screened students (N=3,291), which represented the vast majority (89%) of the entire incoming cohort of students in 2004. Weighting procedures were developed as an extension of the sampling procedures using the same stratification variables from the screening data (i.e., race, sex, drug use). Accordingly, sampling weights for baseline data were computed as the inverse probability of selection for all participants within each race-sex-drug use cell [see (9)]. For example, the number of White, female, non-users of drugs in the sampling frame was 538, of whom 134 (24.9%) were represented in the longitudinal sample; applying the resulting sampling weight (4.0149) to the same 134 sampled individuals yields the original number of screened students in that cell (n=538). For each follow-up assessment, we have continued using a similar procedure, in which we account for both the sampling design and attrition by computing inverse probabilities as the number of individuals in a given cell of the sampling frame, divided by the number of individuals in that cell who participated in a given assessment (15,25,30). For cumulative lifetime prevalence, missing data were counted as non-use, and therefore results are presented as minimum estimates of actual lifetime prevalence. The analysis of cumulative lifetime prevalence uses all available data through Year 8, regardless of age at onset. For the analysis of age at onset, results were truncated at age 24 to ensure that all participants had equal time to use each drug. This decision was based on the minimum age of participants at Year 8 (i.e., 4% were still 24 years old, although the modal age was 25). Thus, for the small minority who reported onset of one or more drugs between ages 25 and 27 (<5% of sample), such use is reflected in the analyses on cumulative lifetime prevalence by study year, but not in the analyses on age at onset.

Results

Annual prevalence of drug use

Marijuana was the most commonly used drug among this sample during and after college (see Figure 1). Almost half of incoming students ($45\%_{wt}$) had used marijuana at least once during the past year, with the annual prevalence peaking at $47\%_{wt}$ in Year 3. By Year 8, when the modal age of the sample was 25, the prevalence of marijuana use was $29\%_{wt}$. Annual prevalence peaked in Year 3 for nonmedical prescription stimulant, analgesic, and tranquilizer use ($21\%_{wt}$, $10\%_{wt}$, and $7\%_{wt}$ respectively), as well as hallucinogens ($8\%_{wt}$). Annual prevalence of cocaine peaked slightly later ($9\%_{wt}$ in Year 4). By contrast, low prevalence estimates were observed consistently for inhalants ($3\%_{wt}$), amphetamines/ methamphetamine ($<1\%_{wt}$ annually), and heroin ($<1\%_{wt}$ annually). Annual prevalence for most drugs was lowest near the end of the study interval, with the exception of cocaine and ecstasy, both of which had their nadir at baseline ($3\%_{wt}$ and $2\%_{wt}$ respectively). Ecstasy was the only drug for which prevalence peaked in the last year of the study ($5\%_{wt}$).

Cumulative lifetime prevalence and median age of initiation of drug use

Figure 2 displays the changes in cumulative lifetime prevalence for each drug. By the last year of the study, approximately $68\%_{wt}$ of the sample had used marijuana, representing a 37% increase from the start of college. For nonmedical use of prescription stimulants, large increases in prevalence were observed between baseline and the first and second years of college and by the last year close to one-third of the sample had engaged in nonmedical prescription stimulant use. Similar patterns of large increases in prevalence during college can be seen for cocaine use and nonmedical use of prescription analgesics and tranquilizers. Between baseline and the last year of the study, cocaine, ecstasy and nonmedical prescription tranquilizer use all increased by a factor of approximately four. Median age of initiation of use was earliest for marijuana (age 17) and amphetamines/methamphetamine (age 18) and latest for ecstasy (age 21). For all other drugs, median age of initiation was 19 or 20 (see Figure 3).

Incidence

The risk for starting to use several drugs did not attenuate substantially until after the third or fourth year of the study (see Table 1). Marijuana use had the highest incidence estimate during all study years, with the exception of Year 8. The incidence of use for amphetamines/ methamphetamine and heroin remained consistently under $1\%_{wt}$.

Post hoc examination of frequency of use among users

Our primary analyses examined prevalence of use during the eight-year period and did not distinguish between a user who used once during the past year and someone who used more frequently. To gain a better understanding of the frequency of use among the sample, a *post hoc* analysis was conducted for two years of data—Years 4 and 8—as an illustration (see Figure 4). As can be seen, a minority of marijuana users used only once during the past year, and slightly more than half used more than 11 times during the past year in both Years 4 and 8, respectively. For cocaine, the overall number of users is small, making interpretation of

the data somewhat difficult. Nonetheless, 12.8% of users used only once in Year 4 as compared with 34.1% in Year 8.

Discussion

Among this longitudinal study of a large college student sample, about two-thirds (68%$_{wt}$) had used marijuana at least once in their lives by age 25, and one-third (35%$_{wt}$) had used prescription stimulants nonmedically. With the exception of marijuana use, most individuals who ever used a drug during college began after college entry. Whereas adolescence and young adulthood have been noted to be high-risk periods for drug use initiation, these data suggest that for college students, incident use continues to occur well into the 20s. This was especially noteworthy for ecstasy, for which incidence exhibited very little fluctuation over time. Although methodological differences preclude meaningful comparisons with estimates from other studies of substance use, such as the National Survey on Drug Use and Health and Monitoring the Future, these findings are consistent with the notion that young adults have considerable access to and experience with illicit drugs both during and after college.

Trends in the annual prevalence of drug use among this sample should be considered in the context of differences in drug availability and drug use opportunity over time. While information on actual availability of drugs on college campuses is scarce, prior research has documented high levels of perceived availability of drugs and prescription medications for nonmedical use among college students and college-aged young adults (8,14). In addition, previous analyses of the current sample have found that opportunity to use drugs declines after college graduation, while use given opportunity remains relatively stable throughout the college and post-college years (31). Taken together, these findings suggest that trends in drug use prevalence are strongly associated with changes in opportunity and availability, providing a possible environmental explanation for the relatively higher prevalence estimates of substance use during the college years as compared with the later years of the study.

The finding that marijuana use was already prevalent among this sample by the time they entered college points to the possibility that college entry might be an advantageous time to screen students for prior drug use. Prior evidence from this cohort and elsewhere suggests that high school substance use is an important predictor of substance use problems during college and young adulthood, including the development of heavier use patterns and dependence involving both alcohol and other drugs (13,26,32–35). The transition from high school to college provides an opportunity for interventions that are focused on correcting misperceptions about the normative nature of drug use, especially given the observation that prescription drugs were used nonmedically by a minority of students every year of the study.

On the other hand, it is encouraging that so many individuals in this sample delayed the onset of drug use until their 20s, as delaying the onset of drug use is regarded as an important strategy for reducing the likelihood of developing chronic or heavy patterns of use or dependence (36). Nevertheless, given that young adulthood remains a high-risk period for the development of substance use disorders, findings highlight the need to continue drug prevention and intervention efforts throughout college to focus on identifying and intervening at the earliest point possible. Previous studies have focused on the impact of

drug use patterns on post-college health and employment outcomes (1,6,37), and findings of increased risk for adverse health outcomes and post-college unemployment among college student substance users reinforce the notion that early intervention can promote student health and maximize academic potential.

The finding that a minority of students among this sample are engaging in nonmedical prescription drug use and all forms of illicit drug use with the exception of marijuana has implications for dispelling the myth that substance use during college is an inevitable "rite of passage." Correcting these misperceptions might be an important component of intervention strategies to reduce these forms of drug use. Perceptions of marijuana use might even be higher than the estimates presented here and therefore these data might even be useful to correct beliefs about the widespread nature of marijuana use during college.

Several limitations of the study must be noted. Our sample was limited to students at a single university, and although we regard the university as typical of other large publicly-funded universities, the results might not be generalizable to students attending other types of colleges, or colleges in other geographic regions, where drug use availability might differ. Additionally, the sample was limited to one cohort of students who started college during the same year. The annual prevalence of using illicit drugs other than marijuana has decreased slightly among high school seniors since 2004 (38), when this cohort started college, and findings therefore might differ for young adults who attended college during other years. Although we statistically adjusted for attrition, we cannot say how much drug use might have occurred during the years when participants missed an assessment; thus, results should be understood as minimum estimates of drug use. Missing data were minimal among our sample with follow-up rates exceeding 76% of the original 1,253 participants in any year, and annual response rates exceeding 89% each year. The present study did not examine the persistence of use or thoroughly investigate the frequency of use among users. More research is needed to understand the persistence of use for marijuana, nonmedical prescription drugs, and cocaine among young adults. Furthermore, future studies should aim to investigate differences between infrequent versus frequent users during the young adult years. Finally, although our longitudinal design was advantageous for accurately capturing the onset of drug use during and after college, we cannot rule out the possibility that recall bias might have influenced results, especially for individuals whose first use of a substance occurred several years prior to college entry.

Nevertheless, the study also has counterbalancing strengths, including its large sample size and high follow-up rates throughout an eight-year interval during which participants were highly mobile and unstable with respect to living arrangements and employment. Moreover, with our longitudinal design it was possible to assess use of a comprehensive array of drugs annually via personal interviews, including prescription drugs used nonmedically, which represents an important advancement over prior cross-sectional studies.

This study contributes significantly to existing knowledge of the prevalence and initiation of use of a wide range of substances among college students both during and after college. Future research will explore the factors that predict persistence of drug use during the post-college period.

Acknowledgments

References

1. Arria AM, Caldeira KM, Bugbee BA, Vincent KB, O'Grady KE. Marijuana use trajectories during college predict health outcomes nine years post-matriculation. Drug Alcohol Depend. 2016; 159:158–165. [PubMed: 26778758]

2. Arria AM, Caldeira KM, Bugbee BA, Vincent KB, O'Grady KE. The academic consequences of marijuana use during college. Psychol Addict Behav. 2015; 29(3):564–575. [PubMed: 26237288]

3. Hingson RW, Zha W, Weitzman ER. Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. J Stud Alcohol Drugs Suppl. 2009; 16:12–20.

4. Palmer RS, McMahon TJ, Moreggi DI, Rounsaville BJ, Ball SA. College student drug use: Patterns, concerns, consequences, and interest in intervention. J Coll Stud Dev. 2012; 53(1):124–132.

5. Kertesz SG, Pletcher MJ, Safford M, Halanych J, Kirk K, Schumacher J, Sidney S, Kiefe CI. Illicit drug use in young adults and subsequent decline in general health: The Coronary Artery Risk Development in Young Adults (CARDIA) Study. Drug Alcohol Depend. 2007; 88(2–3):224–233. [PubMed: 17137732]

6. Caldeira KM, O'Grady KE, Vincent KB, Arria AM. Marijuana use trajectories during the post-college transition: Health outcomes in young adulthood. Drug Alcohol Depend. 2012; 125(3):267–275. [PubMed: 22464050]

7. Substance Abuse and Mental Health Services Administration. Results from the 2014 National Survey on Drug Use and Health: Detailed tables. Rockville, MD: US Department of Health and Human Services, Office of Applied Studies; 2015.

8. Johnston, LD., O'Malley, PM., Bachman, JG., Schulenberg, JE., Miech, RA. Monitoring the Future national survey results on drug use, 1975–2014: Volume 2, college students and adults ages 19–55. Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2015.

9. Arria AM, Caldeira KM, O'Grady KE, Vincent KB, Fitzelle DB, Johnson EP, Wish ED. Drug exposure opportunities and use patterns among college students: Results of a longitudinal prospective cohort study. Subst Abus. 2008; 29(4):19–38.

10. Pinchevsky GM, Arria AM, Caldeira KM, Garnier-Dykstra LM, Vincent KB, O'Grady KE. Marijuana exposure opportunity and initiation during college: Parent and peer influences. Prev Sci. 2012; 13(1):43–54. [PubMed: 21870157]

11. Stewart MW, Moreno MA. Changes in attitudes, intentions, and behaviors toward tobacco and marijuana during U.S. students' first year of college. Tob Use Insights. 2013; 6:7–16. [PubMed: 24761133]

12. Suerken CK, Reboussin BA, Sutfin EL, Wagoner KG, Spangler J, Wolfson M. Prevalence of marijuana use at college entry and risk factors for initiation during freshman year. Addict Behav. 2014; 39(1):302–307. [PubMed: 24455784]

13. Mohler-Kuo M, Lee JE, Wechsler H. Trends in marijuana use and other illicit drug use among college students: Results from four Harvard School of Public Health College Alcohol Study Surveys: 1993–2001. J Am Coll Health. 2003; 52(1):17–24. [PubMed: 14717576]

14. DeSantis AD, Webb EM, Noar SM. Illicit use of prescription ADHD medications on a college campus: A multimethological approach. J Am Coll Health. 2008; 57(3):315–323. [PubMed: 18980888]

15. Garnier-Dykstra LM, Caldeira KM, Vincent KB, O'Grady KE, Arria AM. Nonmedical use of prescription stimulants during college: Four-year trends in exposure opportunity, use, motives, and sources. J Am Coll Health. 2012; 60(3):226–234. [PubMed: 22420700]

16. Sessa FM. The influence of perceived parenting on substance use during the transition to college: A comparison of male residential and commuter students. J Coll Stud Dev. 2005; 46(1):62–74.

17. Kilmer JR, Walker DD, Lee CM, Palmer RS, Mallett KA, Fabiano P, Larimer ME. Misperceptions of college student marijuana use: Implications for prevention. J Stud Alcohol. 2006; 67(2):277–281. [PubMed: 16562410]

18. Martens MP, Page JC, Mowry ES, Damann KM, Taylor KK, Cimini MD. Differences between actual and perceived student norms: An examination of alcohol use, drug use, and sexual behavior. J Am Coll Health. 2006; 54(5):295–300. [PubMed: 16539222]

19. Fleming CB, White HR, Haggerty KP, Abbott RD, Catalano RF. Educational paths and substance use from adolescence into early adulthood. J Drug Issues. 2012; 42(2):104–126.

20. Arria AM, Garnier-Dykstra LM, Caldeira KM, Vincent KB, Winick ER, O'Grady KE. Drug use patterns and continuous enrollment in college: Results from a longitudinal study. J Stud Alcohol Drugs. 2013; 74(1):71–83. [PubMed: 23200152]

21. Suerken CK, Reboussin BA, Egan KL, Sutfin EL, Wagoner KG, Spangler J, Wolfson M. Marijuana use trajectories and academic outcomes among college students. Drug Alcohol Depend. 2016; 162:137–145. [PubMed: 27020322]

22. Hunt J, Eisenberg D, Kilbourne AM. Consequences of receipt of a psychiatric diagnosis for completion of college. Psychiatr Serv. 2010; 61(4):399–404. [PubMed: 20360280]

23. Breslau J, Lane M, Sampson N, Kessler RC. Mental disorders and subsequent educational attainment in a US national sample. J Psychiatr Res. 2008; 42(9):708–716. [PubMed: 18331741]

24. Caldeira KM, Arria AM, O'Grady KE, Vincent KB, Wish ED. The occurrence of cannabis use disorders and other cannabis-related problems among first-year college students. Addict Behav. 2008; 33(3):397–411. [PubMed: 18031940]

25. Arria AM, Caldeira KM, Vincent KB, Garnier-Dykstra LM, O'Grady KE. Substance-related traffic-risk behaviors among college students. Drug Alcohol Depend. 2011; 118(2–3):306–312. [PubMed: 21601379]

26. Kohn C, Saleheen H, Borrup K, Rogers S, Lapidus G. Correlates of drug use and driving among undergraduate college students. Traffic Inj Prev. 2014; 15(2):119–124. [PubMed: 24345012]

27. Benotsch EG, Martin AM, Koester S, Mason MJ, Jeffers AJ, Snipes DJ. Driving under the influence of prescription drugs used nonmedically: Associations in a young adult sample. Subst Abus. 2015; 36(1):99–105. [PubMed: 24965058]

28. Benotsch EG, Koester S, Martin AM, Cejka A, Luckman D, Jeffers AJ. Intentional misuse of over-the-counter medications, mental health, and polysubstance use in young adults. J Community Health. 2014; 39(4):688–695. [PubMed: 24338111]

29. Vincent KB, Kasperski SJ, Caldeira KM, Garnier-Dykstra LM, Pinchevsky GM, O'Grady KE, Arria AM. Maintaining superior follow-up rates in a longitudinal study: Experiences from the College Life Study. Int J Mult Res Approach. 2012; 6(1):56–72.

30. Kasperski SJ, Vincent KB, Caldeira KM, Garnier-Dykstra LM, O'Grady KE, Arria AM. College students' use of cocaine: Results from a longitudinal study. Addict Behav. 2011; 36(4):408–411. [PubMed: 21196083]

31. Allen HK, Caldeira KM, Bugbee BA, Vincent KB, O'Grady KE, Arria AM. Drug involvement during and after college: Estimates of opportunity and use given opportunity. Drug Alcohol Depend. in press.

32. Kaynak Ö, Meyers K, Caldeira KM, Vincent KB, Winters KC, Arria AM. Relationships among parental monitoring and sensation seeking on the development of substance use disorder among college students. Addict Behav. 2013; 38(1):1457–1463. [PubMed: 23017733]

33. Newcomb MD, Bentler PM. Drug use, educational aspirations, and work force involvement: The transition from adolescence to young adulthood. Am J Community Psychol. 1986; 14(3):303–321. [PubMed: 3739981]

34. Wechsler H, Dowdall GW, Davenport A, Castillo S. Correlates of college student binge drinking. Am J Public Health. 1995; 85(7):921–926. [PubMed: 7604914]

35. Arria AM, Kuhn V, Caldeira KM, O'Grady KE, Vincent KB, Wish ED. High school drinking mediates the relationship between parental monitoring and college drinking: A longitudinal analysis. Subst Abuse Treat Prev Policy. 2008; 3(6):1–11. [PubMed: 18218147]

36. Chen CY, Storr CL, Anthony JC. Early-onset drug use and risk for drug dependence problems. Addict Behav. 2009; 34(3):319–322. [PubMed: 19022584]

37. Arria AM, Garnier-Dykstra LM, Cook ET, Caldeira KM, Vincent KB, Baron RA, O'Grady KE. Drug use patterns in young adulthood and post-college employment. Drug Alcohol Depend. 2013; 127(1–3):23–30. [PubMed: 22743161]

38. Miech, RA., Johnston, LD., O'Malley, PM., Bachman, JG., Schulenberg, JE. Monitoring the Future: National survey results on drug use, 1975–2015: Volume I: Secondary school students. Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2016.
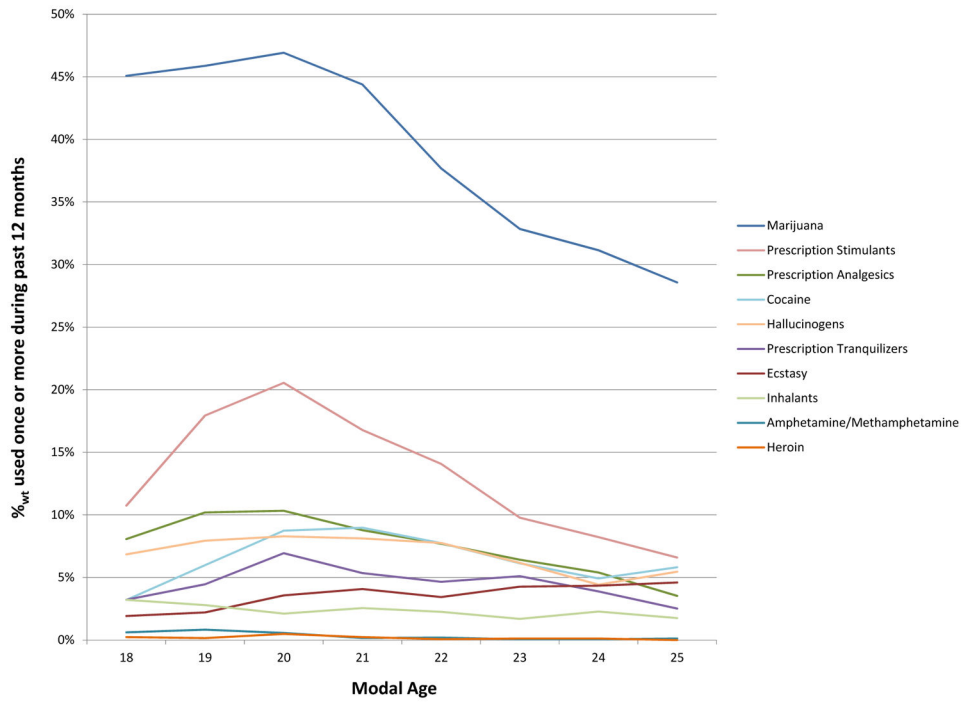
Figure 1.
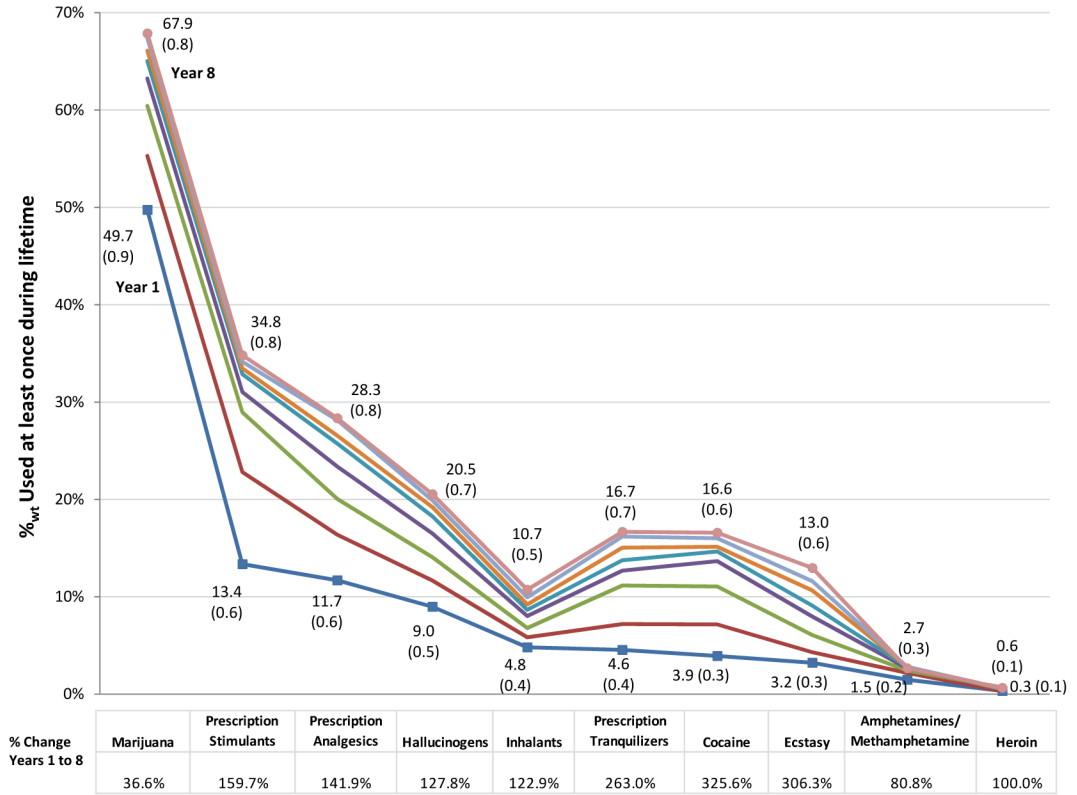Annual prevalence of drug use by year among the College Life Study sample (N_{wt}=3,285).
Note. Weighted for sampling and attrition. Data on prescription drugs reflect nonmedical use only. Data on amphetamines and methamphetamines were combined due to low prevalence.
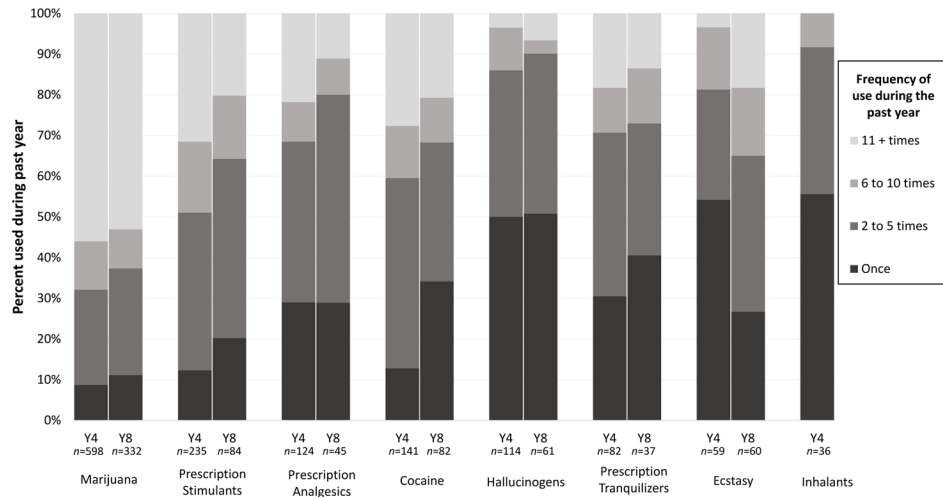
Figure 2.
Cumulative lifetime prevalence of drug use, by study year and type of drug (N_{wt}=3,285). *Note.* Data labels represent %$_{wt}$ (*SE*). Data were statistically weighted to adjust for sampling design and attrition at each wave. Squares denote lifetime prevalence in Year 1 (i.e., first year of college, ages 17 to 20). Circles denote lifetime prevalence in Year 8. Data on prescription drugs reflect nonmedical use only. Data on amphetamines and methamphetamines were combined due to low prevalence.
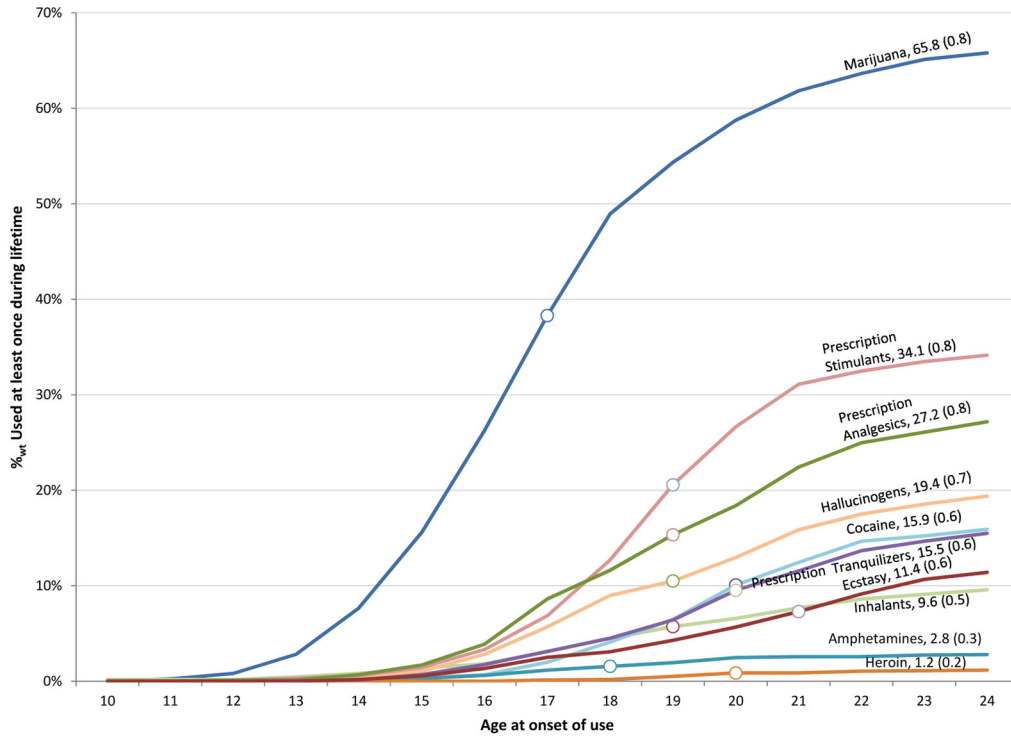
Figure 3.
Cumulative lifetime prevalence of drug use by age 24, by type of drug and age at onset of use (N_{wt}=3,285). Open circles denote the median age of onset for a given drug.
Note. Data labels represent %$_{wt}$ (*SE*). Weighted for sampling. Prevalence is estimated based on all 1,253 individuals in the original baseline sample through age 24, which was the maximum age that all participants had attained by Year 8, and therefore is not comparable to the results in Figure 1. Weighted cumulative lifetime prevalence by age 24 is reported in the label for each drug. Drug use onset that occurred at older ages is not shown in this figure because it was not assessed for every participant. Missing data were treated as non-use, and therefore results represent minimum estimates. Data on prescription drugs reflect nonmedical use only. Data on amphetamines and methamphetamines were combined due to low prevalence.

Figure 4.
Frequency of drug use during the past year in Years 4 and 8, among users of each drug.
Note. Data on prescription drugs reflect nonmedical use only. Data for Inhalant use in Year 8 was not included due to an overall *n*<20. Data for Amphetamines/Methamphetamine and Heroin are not included due to overall n<5.

Table 1

Incidence of drug use during the first eight years of the College Life Study.

Type of Drug		Percent who starting using, among those who previously had never used							
	Overall (Years 2 to 8)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Marijuana	37.2 (1.2)	12.8 (0.8)	10.5 (0.8)	7.8 (0.7)	5.5 (0.7)	4.0 (0.6)	2.8 (0.5)	0.2 (0.1)
Prescription stimulants[a]	25.7 (0.8)	11.6 (0.6)	8.8 (0.6)	4.1 (0.4)	2.9 (0.4)	1.6 (0.3)	1.1 (0.2)	0.8 (0.2)
Prescription analgesics [a]	19.9 (0.7)	6.4 (0.5)	4.0 (0.4)	4.8 (0.4)	3.4 (0.4)	1.5 (0.2)	2.2 (0.3)	1.2 (0.2)
Cocaine	14.1 (0.6)	4.0 (0.3)	4.4 (0.4)	3.2 (0.3)	2.0 (0.3)	0.8 (0.2)	0.9 (0.2)	0.7 (0.2)
Hallucinogens	13.5 (0.6)	3.1 (0.3)	3.1 (0.3)	3.0 (0.3)	2.6 (0.3)	1.4 (0.2)	0.9 (0.2)	0.9 (0.2)
Prescription tranquilizers [a]	13.3 (0.6)	3.0 (0.3)	4.3 (0.4)	2.3 (0.3)	2.1 (0.3)	1.5 (0.2)	1.1 (0.2)	0.8 (0.2)
Ecstasy	10.7 (0.5)	1.3 (0.2)	2.4 (0.3)	2.2 (0.3)	1.5 (0.2)	2.1 (0.3)	1.1 (0.2)	1.3 (0.2)
Inhalants	6.5 (0.4)	1.4 (0.2)	1.1 (0.2)	1.3 (0.2)	0.9 (0.2)	0.8 (0.2)	0.8 (0.2)	0.4 (0.1)
Amphetamines/Methamphetamine	1.4 (0.2)	0.7 (0.1)	0.5 (0.1)	0.1 (0.0)	0.2 (0.1)	0.1 (0.0)	0.1 (0.0)	0.1 (0.1)
Heroin	0.5 (0.1)	0.2 (0.1)	0.4 (0.1)	0.2 (0.1)	0.1 (0.0)	0.1 (0.0)	0.1 (0.0)	0.0 (0.0)

Note. Results reported as % (*SE*). Incidence was computed as the number of individuals who used a given drug for the first time during the specified assessment year, divided by the number of individuals who had never used that drug in their lifetime based on all prior assessments. Data were statistically weighted to adjust for attrition and sampling design. Study Years 2 through 8 correspond to modal ages 19 through 25.

[a]Used nonmedically.