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Time since first cannabis use and 12-month prevalence of cannabis use disorder among youth and emerging adults in the United States

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Abstract

Aim: This study estimated whether and how the 12-month prevalence of cannabis use disorder among U.S. youth aged 12–17 and emerging adults aged 18–25 varied by time since first cannabis use.

Design: Repeated cross-sectional survey data from the 2015–2017 National Surveys on Drug Use and Health (NSDUH).

Setting: United States.

Participants: 101,000 NSDUH participants aged 12–25.

Measurements: Past 12-month cannabis use disorder was assessed using DSM-IV criteria.

Findings: Among youth, the lifetime prevalence of cannabis use was 15.3% (95% CI=14.86%–15.65%). Among emerging adults, the lifetime prevalence of cannabis use was 52.4% (95% CI=51.77%–53.01%). The adjusted 12-month prevalence of cannabis use disorder among youth with lifetime cannabis use was 10.9% (95% CI=9.24%–12.75%) in the first year after starting cannabis use, 15.3% (95% CI=13.68%–17.12%) in the second year, 17.7% (95% CI=15.55%–19.97%) in the third year, and 20.6% (95% CI=18.23%–23.17%) in the fourth year and beyond, which was consistently higher after the first year (linear trend only: $p<0.0001$). The adjusted 12-month prevalence of cannabis use disorder among emerging adults with lifetime use ranged from 5.6% (95% CI=4.26%–7.23%) in the first year after starting cannabis use, 7.7% (95% CI=6.45%–9.17%) in the second year, 9.1% (95% CI=7.81%–10.57%) in the third year, to 10.5% (95% CI=9.87%–11.12%) in the fourth year and beyond, which was consistently higher after the first year (linear trend only: $p<0.0001$). Within each timeframe since first cannabis use, the adjusted 12-month prevalence of cannabis use disorder was higher among youth lifetime users than their emerging adult counterparts.

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Conclusions: Among youth and emerging adults in the US, prevalence of cannabis use disorder appears to increase with time since initiation of use. This increase appears to be steeper for youth than emerging adults.

Keywords

Cannabis use initiation; first cannabis use; cannabis use disorders; time since first cannabis use

INTRODUCTION

Cannabis use among young people (youth aged 12–17 and emerging adults aged 18–25) is associated with numerous adverse outcomes, including deleterious effects on brain development, school performance, and mental disorders [1–4]. Heavy cannabis use and cannabis use disorder (CUD) increase the risk of unemployment, low income, and emergency department visits and hospitalization [1, 5]. However, increasing numbers of jurisdictions in the U.S. and internationally have legalized cannabis use for medical purposes or recreational use. This changing landscape of cannabis legalization [6] has stimulated the development of a substantial body of research. Some research has examined the impact of cannabis legalization on the prevalence of cannabis use and CUD [7–11] and trends in medical cannabis use [8]. Researchers have found that early onset of cannabis use is associated with increased risk of CUD [9–11] and that youth are more vulnerable to the harmful effects of cannabis than adults [4, 12]. Importantly, much less is known about the prevalence of CUD among young people since the time of their first cannabis use, although cannabis is one of most common drugs used by this population [9–11].

von Sydow and colleagues examined the course of cannabis use and CUD in the 1990s in a German sample of people aged 14–24 at baseline [13]. They found that although cannabis use was widespread, the probability of developing CUD over 4 years was low (8%), and that 57% of those with cannabis abuse became non-users or users without CUD within a year [13]. Based on 4- and 10-year follow-up of this same German community sample, Perkonig and colleagues reported that among young people, cannabis use was fairly stable and rates of remission were relatively low [14], and Behrendt and colleagues found that almost 30% of cases with cannabis abuse as well as 20% of all cases with cannabis dependence occurred at 1 year after first cannabis use, and the duration of transition from first cannabis use to CUD occurred faster than for alcohol and nicotine [15]. Using the 2000–2001 National Household Surveys on Drug Abuse data, it was estimated that 3.9% of U.S. cannabis users aged 12 or older were cannabis dependent within 24 months after starting cannabis use [16]. Based on the 2003 National Survey on Drug Use and Health (NSDUH) data, one study reported that during the first year since first cannabis use, U.S. youth were at higher risk of developing past-year CUD than U.S. adults aged 22–26 [17]. Using Wave 1 (2001) and Wave 2 (2004) of the National Epidemiologic Surveys on Alcohol and Related Conditions (NESARC) data, Feingold and colleagues found that 67% of U.S. adults with CUD at baseline remitted at a 3-year follow up [18]. Also using Waves 1 and 2 of NESARC data, another study found that the cumulative probability estimate of transition from first cannabis use to cannabis dependence was 8.9% among adult cannabis users [19]. In addition, a study of 600 Dutch

frequent cannabis users (use ≥ 3 days per week) aged 18–30 during 2008–2012 found that the 3-year cumulative incidence of cannabis dependence was 37.2% [20].

What has not been well studied is whether the prevalence of CUD among U.S. young people varies by time since their first cannabis use. With the increasing legal and social acceptance, greater availability, and declining risk perceptions of cannabis use [7–11] as well as continued increases in cannabis potency over time [21] and its association with increases in CUD [22], examining this topic takes on public health and clinical significance. Using recent U.S. nationally representative data on cannabis use and CUD, we examined the following questions:

1. What are the lifetime prevalences of cannabis use among youth and emerging adults in the U.S.?
2. What are the 12-month prevalences of cannabis use and CUD among young people with lifetime cannabis use in the U.S.?
3. Whether and how do sociodemographic characteristics and behavioral health indicators of young people in the U.S. with lifetime cannabis use vary by time since first cannabis use?
4. Whether and how do the 12-month prevalences of CUD vary by time since first use among young people in the U.S. with lifetime cannabis use?

METHODS

Data Source

We examined data from persons aged 12–25 who participated in the 2015–2017 NSDUH, conducted by the Substance Abuse and Mental Health Services Administration. NSDUH provides nationally representative data on cannabis use and CUD among the U.S. civilian, noninstitutionalized population aged 12 or older. The NSDUH data collection protocol was approved by the Institutional Review Board at RTI International. The annual mean weighted response rate of the 2015–2017 NSDUH was 54.3%. Details regarding NSDUH methods are provided elsewhere [23].

Measures

NSDUH collected lifetime and past 12-month use of cannabis, tobacco, alcohol, cocaine, heroin, hallucinogens, and inhalants as well as past 12-month misuse of prescription stimulants, sedatives/tranquilizers, and opioids. Among respondents with lifetime cannabis use, NSDUH collected their initiation date (the specific year, month, and day when cannabis was used for the first time in life) and survey interview date (specific year, month, and day). We estimated the time since first cannabis use based on the time length between cannabis initiation date and the NSDUH survey interview date.

NSDUH also collected age of first alcohol use among respondents with lifetime alcohol use and age of first tobacco use among respondents with lifetime tobacco use. NSDUH provided estimates on past 12-month major depressive episode and specific substance use disorders (i.e., cannabis, alcohol, cocaine, heroin, hallucinogens, inhalants, and prescription

stimulants, tranquilizers/sedatives, and opioids) based on assessments of individual diagnostic criteria from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* [24]. Past-month nicotine dependence among cigarette smokers was assessed using the Nicotine Dependence Syndrome Scale [25]. These measures have demonstrated good reliability and validity [26–27]. NSDUH collected information on respondents' age, sex, race/ethnicity, and family income.

Statistical Analyses

First, we estimated the lifetime prevalences of cannabis use among young people and the 12-month prevalences of cannabis use among young people with lifetime cannabis use. Second, we estimated the 12-month prevalences of CUD among young people with past 12-month and lifetime cannabis use, respectively. Third, we estimated weighted percentage distributions of sociodemographic characteristics and behavioral health indicators among young lifetime cannabis users by time since first cannabis use and tested how they varied by time since first cannabis use based on chi-square tests. Fourth, bivariable and multivariable logistic regression models were applied to examine whether and how the 12-month prevalences of CUD varied by time since first cannabis use among young people with lifetime cannabis use. For the multivariable models, we tested both linear and quadratic trends in the adjusted 12-month prevalence of CUD with time since first cannabis use. Multicollinearity and potential interaction effects between examined factors were assessed and were not identified in final multivariable models. SUDAAN [28] software was used for all analyses to account for the complex sample design and sampling weights of NSDUH data.

RESULTS

Based on 101,000 sampled persons aged 12–25 from the 2015–2017 NSDUH, among youth aged 12–17, the lifetime prevalence of cannabis use was 15.3% (95% CI=14.86–15.65). Among youth with lifetime cannabis use, the 12-month prevalence of cannabis use was 80.9% (95% CI=79.75%–81.91%). Among youth with past 12-month cannabis use, the 12-month prevalence of CUD was 19.5% (95% CI=18.26%–20.72%). Among youth with lifetime cannabis use, the 12-month prevalence of CUD was 15.7% (95% CI=14.74%–16.78%).

Among emerging adults aged 18–25, the lifetime prevalence of cannabis use was 52.4% (95% CI=51.77–53.01). Among emerging adults with lifetime cannabis use, the 12-month prevalence of cannabis use was 63.6% (95% CI=62.86%–64.41%). Among emerging adults with past 12-month cannabis use, the 12-month prevalence of CUD was 15.4% (95% CI=14.69%–16.19%). Among emerging adults with lifetime cannabis use, the 12-month prevalence of CUD was 9.8% (95% CI=9.34%–10.32%).

Tables 1–2 show that among young people with lifetime cannabis use, sociodemographic characteristics (except for survey year among lifetime cannabis users aged 12–17) and behavioral health indicators (except for past-year inhalant use or use disorders) varied by their time since first cannabis use. For example, among the 12–17 year olds who started using cannabis within the past 12 months, 52.2% reported never using tobacco, but among

the 12–17 year olds who started using cannabis more than 3 years before, only 17.6% reported never using tobacco (Table 1). Similarly, among the 18–25 year olds who started using cannabis within the past 12 months, 44.8% reported never using tobacco, but among the 18–25 year olds who started using cannabis more than 3 years before, only 10.9% reported never using tobacco (Table 2). With time since first cannabis use, both youth and emerging adults were more likely to have alcohol use disorder, nicotine dependence, cocaine use disorder, hallucinogen use or use disorder, prescription stimulant use disorder, prescription tranquilizer/sedative use disorder, and opioid use disorder.

Among youth with lifetime cannabis use (Table 3), the 12-month prevalence of CUD was 15.7% (95% CI=14.74%–16.78%). It was 8.8% (95% CI=7.44%–10.25%) during the first year after starting cannabis use, 14.7% (95% CI=13.01%–16.54%) during the second year, 19.1% (16.79%–21.72%) during the third year, and 25.3% (22.61%–28.24%) during the fourth year and beyond. The prevalence was consistently higher after the first year since starting cannabis use ($p<0.0001$ for the overall linear trend).

Among emerging adults with lifetime cannabis use (Table 3), the 12-month prevalence of CUD was 9.8% (95% CI=9.34%–10.32%). It was 4.2% (95% CI=3.16%–5.52%) during the first year since starting cannabis use, 7.1% (95% CI=5.91%–8.52%) during the second year, 9.7% (8.30%–11.27%) during the third year, and 10.7% (10.06%–11.29%) during the fourth year and beyond. The prevalence was consistently higher after the first year since starting cannabis use ($p<0.0001$ for the overall linear trend).

After controlling for the significant covariates shown in Table 1, the adjusted estimates were still similar to unadjusted prevalences above (Table 3). Among youth with lifetime cannabis use, the adjusted 12-month prevalence of cannabis use disorder was 10.9% (95% CI=9.24%–12.75%) in the first year after starting cannabis use, 15.3% (95% CI=13.68%–17.12%) in the second year, 17.7% (95% CI=15.55%–19.97%) in the third year, and 20.6% (95% CI=18.23%–23.17%) in the fourth year and beyond. The prevalence was consistently higher after the first year since starting cannabis use, showing a significant linear trend only ($p<0.0001$) (i.e., no significant quadratic trend was found, $p=0.1794$).

Among emerging adults with lifetime cannabis use, after controlling for significant covariates showed in Table 2, the adjusted 12-month prevalence of CUD ranged from 5.6% (95% CI=4.26%–7.23%) in the first year after starting cannabis use, 7.7% (95% CI=6.45%–9.17%) in the second year, 9.1% (95% CI=7.81%–10.57%) in the third year, to 10.5% (95% CI=9.87%–11.12%) in the fourth year and beyond (Table 3). The prevalence was consistently higher after the first year since starting cannabis use, showing a significant linear trend only ($p<0.0001$) (i.e., no significant quadratic trend was found, $p=0.3752$).

In addition, the non-significant interaction effects between time since first cannabis use and survey year on the 12-month prevalence of CUD for both youth with lifetime cannabis use and emerging adults with lifetime cannabis use indicate that among young lifetime cannabis users, the associations between the 12-month prevalence of CUD and the time since first cannabis use remained similar during 2015–2017. Survey year was not associated with 12-month CUD either in the multivariable analyses for both examined young populations and

was excluded from the final multivariable models. Finally, within the same timeframe since first cannabis use, both unadjusted and adjusted 12-month prevalences of CUD were significantly higher among youth lifetime cannabis users than among their emerging adult counterparts.

DISCUSSION

Using recent nationally representative data, this study demonstrates how the 12-month prevalence of CUD among U.S. youth and emerging adults with lifetime cannabis use varies by time since first cannabis use. With the increasing legal and social acceptance and declining perceived harmfulness of cannabis use, our results provide important insight into the short window from cannabis initiation to CUD among substantial proportions of young cannabis users.

We find that a longer time since first cannabis use is associated with increased risk of 12-month prevalence of CUD. Our results indicate that 1 in 5 youth and 1 in 10 young adults who started using cannabis more than 3 years ago had CUD in the past 12 months. For both youth and emerging adults with lifetime cannabis use, we find significant linear trends in the 12-month prevalence of CUD with time since first cannabis use. No quadratic trends are found, indicating that there is no evidence of peaking or down-turn in the 12-month prevalence of CUD with time since first cannabis use for both examined young populations. We also find that among young lifetime cannabis users, the associations between the 12-month prevalence of CUD and the time since first cannabis use remained similar during 2015–2017. Thus, our results highlight the importance of early identification of problematic cannabis use and provision of treatment for young people with CUD in the U.S.

Moreover, we found that 12-month prevalence of CUD is higher among youth lifetime users than among their emerging adult counterparts during each examined timeframe since first cannabis use. Our results not only confirm an earlier study [17] that within the first year since starting cannabis use, U.S. youth were at higher risk of developing CUD than U.S. young adults, but also present further evidence on other timeframes beyond just first year since starting cannabis use. Our findings underscore the critical importance of adolescence as a major developmental period of high risk for CUD when intervention is a particularly urgent need.

Furthermore, the 12-month prevalence of CUD reported in our study is higher and more persistent than what previous studies [13, 16, 18–19] have reported. We found that for both youth and emerging adults with lifetime cannabis use, 12-month prevalences of CUD increased over time since the onset of cannabis use and were higher and more persistent than what previous studies reported based on a German sample aged 14–24 collected in the 1990s [13], 2000–2001 U.S. samples aged 12 or older [16], and 2001 and 2004 U.S. samples aged 18 or older [18–19]. In addition to age differences of the study populations, other factors may help explain different results between our study and previous studies, such as increasing legal and social acceptance, greater availability, declining risk perceptions of cannabis use [7–11], and continued increases in cannabis potency over time [21].

To our knowledge, this is the first study presenting detailed evidence on how sociodemographic characteristics and behavioral health indicators varied by time since first cannabis use among young people in the U.S. Our results show that with time since first cannabis use, both youth and emerging adults are more likely to have alcohol use disorder, nicotine dependence, cocaine use disorder, hallucinogen use or use disorder, prescription stimulant use disorder, prescription tranquilizer/sedative use disorder, and opioid use disorder. These results are consistent with our previous research showing that CUD often co-occurs with mental illness and other substance use problems [8, 10, 11]. Thus, when one behavioral problem is identified, clinicians must carefully look for other related problems. Importantly, it is much easier to treat CUD and other substance use disorders during their formative stages than after they have become severe and chronic conditions.

Behrendt and colleagues have reported that the duration of transition from first cannabis use to CUD occurs faster than for alcohol and nicotine [15]. Our results are consistent with such a rapid transition and underscore the urgent need for targeting primary prevention efforts for youth and emerging adults before cannabis use initiation, as well as the importance of early secondary prevention for those who have initiated cannabis use but not yet progressed to CUD.

Our findings comparing youth with emerging adults are consistent with prior research that earlier age of initiation of cannabis use is associated with higher prevalence of CUD [1–2, 9–11]. Thus, it is critical to prevent or delay cannabis use initiation among young people. Public education and effective evidence-based preventive (or treatment) interventions are needed to reduce the risk and adverse outcomes of cannabis use and CUD [1–2]. The high prevalence (20.6%) of adjusted 12-month CUD during the fourth year and beyond since first cannabis use among youth aged 12–17 suggests that the timing of cannabis use prevention needs to start no later than middle school. Our results support the implementation of interventions that have demonstrated their effectiveness in reducing onset of cannabis use by young people [29].

In summary, our results do not support perceptions that cannabis is non-addictive [30], and suggest that CUD among youth and young adults in the U.S. does not have the high spontaneous remission rates documented in other populations [13, 18]. Moreover, our results are important for policymakers who are considering whether and how to modify laws related to cannabis and for clinicians who care for young patients with cannabis use.

This study has several limitations. NSDUH excluded homeless persons not living in shelters or those residing in institutions, which may lead to underestimated prevalence of CUD because homeless people and incarcerated people usually have higher prevalence of substance use disorders compared to general adult population [31–33]. However, an earlier clinical validation study assessed CUD among youth using the NSDUH instrument and the Pittsburgh Adolescent Alcohol Research Center's Structured Clinical Interview (PAARC-SCID) and found sensitivity (0.84) was higher than specificity (0.60), suggesting that there appeared to be more false positives than false negatives among youth.²⁷ Furthermore, because of the cross-sectional nature of NSDUH data and the related limitations of NSDUH questionnaires, this study could not establish either temporal or causal relationships.

Additionally, we cannot examine the median time from initiation of cannabis use to initiation of CUD because NSDUH only collected past 12-month CUD, and it is unknown when CUD started. Finally, NSDUH is a self-reported survey and is subject to recall and social desirability biases.

Despite these limitations, we find that a longer time since first cannabis use is associated with increased risk of past 12-month CUD, which was higher among youth lifetime users than among their emerging adult counterparts during each examined timeframe since first cannabis use. Our results underscore the urgent need for targeting prevention for young people before first cannabis use and indicate the significance of early screening for and treatment of CUD among U.S. youth and emerging adults.

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Table 1.

Weighted percentage distributions (standard errors) of sociodemographic characteristics and behavioral health indicators among lifetime cannabis users aged 12–17, by time since first cannabis use (N=8,200)

Sociodemographic characteristics and behavioral health indicators	Total lifetime cannabis users aged 12–17 N=8,200	Time since first cannabis use				p value
		12 months n=2,500	>12 months, 24 months n=2,500	>24 months, 36 months n=1,500	>36 months n=1,700	
Total	100.0	31.4 (0.65)	30.5 (0.66)	18.6 (0.54)	19.6 (0.55)	N/A
Survey year						
2015	34.3 (0.69)	32.8 (1.20)	34.8 (1.20)	35.2 (1.61)	35.3 (1.57)	0.3817
2016	32.3 (0.70)	33.5 (1.20)	31.6 (1.11)	33.5 (1.55)	30.1 (1.47)	
2017	33.4 (0.72)	33.8 (1.26)	33.5 (1.18)	31.3 (1.57)	34.6 (1.53)	
Age						
12–15	34.1 (0.71)	47.4(1.27)	36.5 (1.28)	24.2 (1.42)	18.7 (1.27)	<0.0001
16–17	65.9 (0.71)	52.6 (1.27)	63.5 (1.28)	75.8 (1.42)	81.3 (1.27)	
Gender						
Male	51.4 (0.67)	45.9 (1.27)	49.3 (1.27)	53.3 (1.65)	61.7 (1.55)	<0.0001
Female	48.6 (0.67)	54.1 (1.27)	50.7 (1.27)	46.7 (1.65)	38.3 (1.55)	
Race/ethnicity						
NH white	53.2 (0.73)	56.6 (1.30)	52.7 (1.27)	52.2 (1.61)	49.3 (1.60)	0.0323
NH black	14.3 (0.50)	13.5 (0.85)	13.8(0.87)	13.9 (1.04)	16.5 (1.18)	
Hispanic	25.1 (0.68)	22.2 (1.16)	26.2 (1.21)	26.2 (1.46)	26.6 (1.52)	
NH other	7.5 (0.36)	7.7 (0.67)	7.3 (0.62)	7.7 (0.80)	7.6 (0.80)	
Family Income						
<\$20,000	18.4 (0.60)	13.6 (0.92)	18.9 (1.02)	19.7 (1.38)	24.0 (1.38)	<0.0001
\$20,000–\$49,999	30.1 (0.69)	29.2 (1.23)	28.9 (1.14)	31.6 (1.46)	31.9 (1.47)	
\$50,000–\$74,999	14.9 (0.51)	14.4 (0.86)	15.1 (0.91)	15.7 (1.15)	14.7 (1.14)	
\$75,000	36.7 (0.78)	42.9 (1.28)	37.2 (1.24)	33.1 (1.58)	29.5 (1.56)	
Age of first alcohol use						
<11	8.8 (0.40)	5.4 (0.53)	7.1 (0.62)	8.4 (0.96)	17.2 (1.20)	<0.0001
12–17	74.7 (0.65)	72.9 (1.11)	75.9 (1.17)	78.3 (1.34)	72.2 (1.40)	
never use	16.6 (0.55)	21.7 (1.07)	17.1 (0.99)	13.9 (1.12)	10.6 (0.97)	
Age of first tobacco use						
<11	10.1 (0.41)	5.0 (0.53)	8.2 (0.72)	9.6 (1.00)	21.6 (1.27)	<0.0001
12–17	53.7 (0.72)	42.8 (1.23)	55.4 (1.36)	61.9 (1.54)	60.8 (1.55)	
never use	36.2 (0.68)	52.2 (1.26)	36.4 (1.32)	28.5 (1.47)	17.6 (1.22)	
PY MDE						
Yes	23.3 (0.59)	23.9 (1.10)	26.5 (1.13)	20.7 (1.40)	20.0 (1.22)	0.0014
No	73.7 (0.61)	73.4 (1.14)	70.5 (1.17)	75.5 (1.46)	77.3 (1.26)	
Unknown	3.0 (0.24)	2.7 (0.43)	3.1 (0.45)	3.8 (0.59)	2.7 (0.44)	
PY alcohol use disorder						
Yes	11.1 (0.46)	7.9 (0.68)	10.0 (0.72)	13.4 (1.10)	15.7 (1.23)	<0.0001
No	88.9 (0.46)	92.1 (0.68)	90.0 (0.72)	86.6 (1.10)	84.3 (1.23)	

Sociodemographic characteristics and behavioral health indicators	Total lifetime cannabis users aged 12–17 N=8,200	Time since first cannabis use				p value
		12 months n=2,500	>12 months, 24 months n=2,500	>24 months, 36 months n=1,500	>36 months n=1,700	
Total	100.0	31.4 (0.65)	30.5 (0.66)	18.6 (0.54)	19.6 (0.55)	N/A
PM nicotine dependence						
Yes	6.1 (0.33)	2.0 (0.37)	4.5 (0.52)	7.2 (0.83)	14.1 (1.10)	<0.0001
No	93.9 (0.33)	98.0 (0.37)	95.5 (0.52)	92.8 (0.83)	85.9 (1.10)	
PY cocaine use disorder						
Yes	3.4 (0.27)	0.97 (0.28)	1.7 (0.30)	3.5 (0.62)	10.1 (1.00)	<0.0001
No	96.6 (0.27)	99.0 (0.28)	98.3 (0.30)	96.5 (0.62)	89.9 (1.00)	
PY hallucinogen use/use disorder						
Yes	11.4 (0.43)	5.0 (0.54)	9.0 (0.69)	15.5 (1.10)	21.4 (1.30)	<0.0001
No	88.6 (0.43)	95.0 (0.54)	91.0 (0.69)	84.5 (1.10)	78.7 (1.30)	
PY inhalant use/use disorder						
Yes	4.9 (0.30)	5.1 (0.53)	4.4 (0.51)	5.2 (0.71)	4.9 (0.68)	0.7194
No	95.1 (0.30)	94.9 (0.53)	95.6 (0.51)	94.8 (0.71)	95.1 (0.68)	
PY Rx. tranquilizer/ sedative use disorder						
Yes	1.9 (0.21)	1.1 (0.27)	1.7 (0.33)	1.9 (0.49)	3.8 (0.62)	0.0020
No	98.1 (0.21)	98.9 (0.27)	98.3 (0.33)	98.1 (0.49)	96.2 (0.62)	
PY Rx. stimulant use disorder						
Yes	9.7 (0.44)	6.0 (0.70)	9.1 (0.74)	11.6 (1.10)	14.6 (1.11)	<0.0001
No	90.4 (0.44)	94.0 (0.70)	90.9 (0.74)	88.4 (1.10)	85.4 (1.11)	
PY opioid (Rx. opioid or heroin) use disorder						
Yes	2.3 (0.21)	1.7 (0.31)	2.0 (0.36)	2.4 (0.50)	3.5 (0.56)	0.0397
No	97.7 (0.21)	98.3 (0.31)	98.0 (0.36)	97.6 (0.50)	96.5 (0.56)	

Note: Data from 2015–2017 National Surveys on Drug Use and Health (NSDUH).

¹. SAMHSA requires that any description of overall sample sizes based on the restricted-use NSDUH data files be rounded to the nearest 100 to minimize potential disclosure risk. NH=Non-Hispanic; PY=past year (12-month); PM=past-month; Rx=prescription; MDE=major depressive episode.

Table 2.

Weighted percentage distributions (standard errors) of sociodemographic characteristics and behavioral health indicators among lifetime cannabis users aged 18–25, by time since first cannabis use (N=26,500)

Sociodemographic characteristics and behavioral health indicators	Total lifetime cannabis users aged 18–25 N=26,500	Time since first cannabis use				p value
		12 months n=1,600	>12 months, 24 months n=2,400	>24 months, 36 months n=2,800	>36 months n=19,700	
Total	100.0	6.2 (0.20)	9.4 (0.24)	10.8 (0.23)	73.6 (0.37)	N/A
Survey year						
2015	33.8 (0.45)	31.2 (1.45)	34.1 (1.30)	33.5 (1.18)	34.1 (0.49)	0.0362
2016	32.9 (0.44)	30.1 (1.56)	34.3 (1.33)	32.8 (1.11)	33.0 (0.46)	
2017	33.3 (0.50)	38.8 (1.78)	31.6 (1.31)	33.7 (1.18)	32.9 (0.52)	
Age						
18–21	44.7 (0.48)	77.6 (1.44)	72.9 (1.20)	72.7 (1.10)	34.3 (0.50)	<0.0001
22–25	55.3 (0.48)	22.4 (1.44)	27.1 (1.20)	27.3 (1.10)	65.7 (0.50)	
Gender						
Male	52.1 (0.36)	46.0 (1.59)	47.5 (1.29)	50.6 (1.21)	53.5 (0.43)	<0.0001
Female	47.9 (0.36)	54.0 (1.59)	52.5 (1.29)	49.4 (1.21)	46.5 (0.43)	
Race/ethnicity						
NH white	58.6 (0.47)	56.8 (1.65)	52.1 (1.30)	55.1 (1.23)	59.5 (0.51)	<0.0001
NH black	13.7 (0.31)	13.0 (1.04)	14.5 (0.89)	15.2 (0.89)	13.4 (0.34)	
Hispanic	20.2 (0.38)	18.7 (1.39)	19.0 (1.10)	21.8 (1.08)	20.2 (0.43)	
NH other	7.6 (0.23)	11.5 (1.14)	9.5 (0.80)	7.8 (0.67)	6.9 (0.24)	
Family Income						
<\$20,000	28.4 (0.60)	29.5 (1.67)	32.9 (1.46)	31.7 (1.23)	27.2 (0.57)	<0.0001
\$20,000–\$49,999	31.8 (0.43)	26.0 (1.37)	28.6 (1.16)	28.3 (1.05)	33.3 (0.49)	
\$50,000–\$74,999	14.0 (0.31)	13.9 (1.13)	11.5 (0.89)	11.7 (0.77)	14.7 (0.35)	
\$75,000	25.8 (0.45)	30.6 (1.60)	27.0 (1.21)	28.3 (1.14)	24.9 (0.48)	
Age of first alcohol use						
<11	4.0 (0.15)	1.2 (0.33)	1.5 (0.32)	2.5 (0.38)	4.8 (0.20)	<0.0001
12–17	68.8 (0.39)	49.8 (1.67)	56.4 (1.31)	61.6 (1.15)	73.1 (0.43)	
18–25	24.3 (0.34)	41.5 (1.65)	36.2 (1.24)	31.6 (1.09)	20.3 (0.38)	
never use	2.9 (0.13)	7.4 (0.80)	6.0 (0.61)	4.4 (0.49)	1.9 (0.13)	
Age of first tobacco use						
<11	5.4 (0.19)	1.5 (0.38)	1.7 (0.32)	2.0 (0.34)	6.6 (0.23)	<0.0001
12–17	53.0 (0.40)	22.4 (1.32)	33.5 (1.25)	40.4 (1.21)	60.0 (0.45)	
18–25	25.0 (0.34)	31.3 (1.49)	30.8 (1.25)	33.2 (1.15)	22.5 (0.38)	
never use	16.6 (0.32)	44.8 (1.59)	34.0 (1.24)	24.4 (1.00)	10.9 (0.32)	
PY MDE						
Yes	14.4 (0.28)	18.1 (1.19)	15.4 (0.95)	14.6 (0.88)	13.9 (0.32)	0.0001
No	84.3 (0.30)	81.4 (1.20)	83.3 (0.97)	84.0 (0.93)	84.7 (0.33)	
Unknown	1.3 (0.10)	0.5 (0.17)	1.4 (0.30)	1.3 (0.31)	1.4 (0.12)	
PY alcohol use disorder						

Sociodemographic characteristics and behavioral health indicators	Total lifetime cannabis users aged 18–25 N=26,500	Time since first cannabis use				p value
		12 months n=1,600	>12 months, 24 months n=2,400	>24 months, 36 months n=2,800	>36 months n=19,700	
Total	100.0	6.2 (0.20)	9.4 (0.24)	10.8 (0.23)	73.6 (0.37)	N/A
Yes	17.3 (0.31)	12.0 (1.01)	13.5 (0.92)	15.1 (0.88)	18.5 (0.36)	<0.0001
No	82.8 (0.31)	88.0 (1.01)	86.5 (0.92)	84.9 (0.88)	81.5 (0.36)	
PM nicotine dependence						
Yes	16.0 (0.32)	4.5 (0.65)	5.8 (0.61)	7.7 (0.61)	19.5 (0.40)	<0.0001
No	84.0 (0.32)	95.5 (0.65)	94.2 (0.61)	92.3 (0.61)	80.5 (0.40)	
PY cocaine use disorder						
Yes	10.8 (0.29)	1.7 (0.43)	4.3 (0.54)	6.1 (0.62)	13.1 (0.36)	<0.0001
No	89.2 (0.29)	98.3 (0.43)	95.7 (0.54)	93.9 (0.62)	86.9 (0.36)	
PY hallucinogen use/use disorder						
Yes	13.0 (0.30)	4.5 (0.69)	9.5 (0.77)	11.1 (0.81)	14.5 (0.35)	<0.0001
No	87.0 (0.30)	95.5 (0.69)	90.5 (0.77)	88.9 (0.81)	85.5 (0.35)	
PY inhalant use/use disorder						
Yes	2.4 (0.13)	1.7 (0.40)	2.0 (0.45)	2.2 (0.36)	2.6 (0.15)	0.1332
No	97.6 (0.13)	98.4 (0.40)	98.0 (0.45)	97.8 (0.36)	97.4 (0.15)	
PY Rx. tranquilizer/ sedative use disorder						
Yes	1.3 (0.09)	*	0.5 (0.17)	0.9 (0.20)	1.6 (0.12)	<0.0001
No	98.7 (0.09)	99.8 (0.11)	98.5 (0.17)	99.1 (0.20)	98.4 (0.12)	
PY Rx. stimulant use disorder						
Yes	13.1 (0.30)	5.7 (0.68)	9.5 (0.79)	12.6 (0.79)	14.3 (0.36)	<0.0001
No	86.9 (0.30)	94.3 (0.68)	90.5 (0.79)	87.4 (0.79)	85.7 (0.36)	
PY opioid (Rx. opioid or heroin) use disorder						
Yes	2.3 (0.12)	0.3 (0.10)	0.8 (0.21)	1.1 (0.23)	2.8 (0.15)	<0.0001
No	97.7 (0.12)	99.7 (0.10)	99.2 (0.21)	98.9 (0.23)	97.2 (0.15)	

Note: Data from 2015–2017 National Surveys on Drug Use and Health (NSDUH).

¹. SAMHSA requires that any description of overall sample sizes based on the restricted-use NSDUH data files be rounded to the nearest 100 to minimize potential disclosure risk. NH=Non-Hispanic; PY=past year (12-month); PM=past-month; Rx=prescription; MDE=major depressive episode.

*. Estimate suppressed due to low statistical precision.

Table 3.

12-month prevalence of cannabis use disorder among lifetime cannabis users aged 12–25 by time since first cannabis use, weighted percentage (95% confidence interval), N=34,700^I

Among lifetime cannabis users aged 12–17	Total	Time since first cannabis use				p value for the overall linear trend only
	N=8,200	12 months n=2,500	>12 months, 24 months n=2,500	>24 months, 36 months n=1,500	>36 months n=1,700	
Unadjusted CUD	15.7 (14.74–16.78)	8.8 (7.44–10.25)	14.7 * (13.01–16.54)	19.1 * (16.79–21.72)	25.3 * (22.61–28.24)	<0.0001
adjusted CUD		10.9 (9.24–12.75)	15.3 * (13.68–17.12)	17.7 * (15.55–19.97)	20.6 * (18.23–23.17)	<0.0001
Among lifetime cannabis users aged 18–25	Total	Time since first cannabis use				p value for the overall linear trend
	N=26,500	12 months n=1,600	>12 months, 24 months n=2,400	>24 months, 36 months n=2,800	>36 months n=19,700	
Unadjusted CUD	9.8 (9.34–10.32)	4.2 (3.16–5.52)	7.1 * (5.91–8.52)	9.7 * (8.30–11.27)	10.7 * (10.06–11.29)	<0.0001
adjusted CUD		5.6 (4.26–7.23)	7.7 * (6.45–9.17)	9.1 * (7.81–10.57)	10.5 * (9.87–11.12)	<0.0001

Data from 2015–2017 National Surveys on Drug Use and Health (NSDUH).

^I. SAMHSA requires that any description of overall sample sizes based on the restricted-use NSDUH data files be rounded to the nearest 100 to minimize potential disclosure risk. CUD=12-month cannabis use disorder. Each adjusted prevalence controlled for age, sex, race/ethnicity, family income, age of first alcohol use, age of first tobacco use, 12-month major depressive episode, 12-month alcohol use disorder, past-month nicotine dependence, 12-month cocaine use or use disorder, 12-month hallucinogen use or use disorder, 12-month prescription tranquilizer or sedative use disorder, 12-month prescription stimulant use disorder, and 12-month opioid (prescription opioid or heroin) use disorder. Since NSDUH measured 12-month major depressive episode for youth and for adults slightly differently and because of our specific research questions for the two age groups, our analyses for youth and for emerging adults were conducted separately. Each bolded estimate among youth is significantly higher than the corresponding estimate among young adults within the same timeframe since first cannabis use.

*. Within each age group, each estimate is significantly different from the corresponding estimate within 12-month since first cannabis use.