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Marijuana Use Among 11th Grade Students in California, 2019-21

Results of the Eighteenth Biennial State California Healthy Kids Survey

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To download: https://calschls.org/docs/marijuana_2024.pdf

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Introduction

Historical shifts are occurring in marijuana policy and patterns of use among adolescents, with California voters approving legal adult recreational use of marijuana via the proposition process, Proposition 64, the Adult Use of Marijuana Act, in November 2016. There has also been a rise in the availability and popularity of two alternative methods of consuming marijuana other than smoking over the last decade: inhalation through vaping devices (e-cigarettes) and oral ingestion of edibles (Lim et al., 2022; Patrick, Miech, Kloska, Wagner, & Johnston, 2020). These developments have raised concerns that there will be a decline in adolescents' disapproval of marijuana use and in their perceptions of its dangers. These developments have also raised concerns that adolescents' access to and use of marijuana will increase and, as a result, adverse effects from that use will also increase.

To help shed light on the dynamics of adolescent marijuana use this report summarizes the most recent data about the use, influences, and effects of marijuana among 11th graders in California as reported on the 2019-21 Biennial California Healthy Kids Survey (CHKS). The report focuses on information that will help guide the efforts of educators, providers of health, prevention and intervention services, and parents to ensure that California's youth have the support they need to thrive, experience healthy lives, ensure well-being, and succeed in school and life.

This report is a follow-up to two previous reports on adolescent marijuana use based on 2017-19 Biennial CHKS results (Austin et al. 2021a, 2021b). Those analyses found evidence that a prior decline in adolescent marijuana use between 2011-13 and 2013-15 had leveled off and suggested there might be an uptick in use in the future. Among 11th graders, current marijuana users (that is, those who have used marijuana within the past 30 days) were more likely than their peers who were not current marijuana users to report using alcohol and other drugs (AOD) and to experience a wide range of substance use problems as well as educational, social-emotional, and behavioral issues.

Despite previous concerns that adolescent use might be on the rise, the data from the 2019-21 Biennial CHKS indicates that 11th graders are actually using marijuana less often than they did in the 2017-19 survey period. Complicating the analysis of the findings, however, is the fact that the data collection occurred during the unique circumstances of the COVID-19 pandemic. The conditions prompted by the pandemic—particularly the physical and social isolation that occurred—likely played an important role in the reported use reduction. Declines in survey participation may also have resulted in lower self-reported use. Even with this reduction, however, the popularity of marijuana still stands out. Since 2013-15, use of marijuana within the past month among all secondary students in the survey has greatly exceeded that of cigarettes and since 2017-19 it has reached equivalency to alcohol. There are further indications in other 2019-21 results among 11th graders regarding availability, attitudes, and

the rise of vaping and use of edible products that suggest the ending of the pandemic conditions might result in an increase in marijuana use and frequency of use.

This new report confirms and augments the evidence from 2017-19 that current marijuana users experience a wide range of interrelated substance use and other problems, particularly regarding learning and behavioral health, with problems increasing with frequency of use. These results are especially disconcerting given the evidence that increasing numbers of adolescents are experiencing mental health problems.

While more monitoring and research is needed on adolescent marijuana use, including the effects of legalization and the rise of vaping and edible ingestion, it is evident from the data in this and the prior Biennial CHKS marijuana reports that prevention and intervention efforts need to be strengthened. The findings summarized in this report can inform strategies for improving these efforts and helping to avert a resurgence in use, including integrating behavioral health and educational improvement and taking a holistic whole child approach to overall adolescent well-being.

Study Methods and Sample

The Biennial CHKS is California's most important source of long-term information about substance use among the state's adolescents as well as about youth learning engagement, health, and overall well-being.[1] Since 1985, the survey has been conducted among a representative statewide sample of students in grades seven, nine, and eleven. Since 2011-13 this state survey has been administered across two-year periods because many of the school districts that participate in the local CHKS only administer the survey every other year. This means it takes two years for all the schools and school districts randomly selected for the sample to be surveyed.

The sample of students that this report focuses on consisted of the 13,495 11th graders who responded to the Eighteenth Biennial CHKS in the two school years of 2019-20 and 2020-21. The study was limited to 11th graders because their higher rates of marijuana use and longer involvement in it provided greater insight into differences among adolescents due to frequency and level of use, possible adverse use experiences, and variations between numerically significant groups of users. The results for 11th graders also provide valuable information for educators and practitioners working with younger adolescents.

Results for 11th graders who are current users (those who have used any marijuana within the past 30 days) are compared to nonusers (their peers who did not use any marijuana within the past 30 days, who make up 88 percent of the sample), although some may have used it previously. Additional analyses were conducted for two subgroups of current users:

- infrequent users, who used on only 1 or 2 of the past 30 days
- frequent users, who used on 3 or more of the past 30 days

As discussed in detail in the Eighteenth Biennial CHKS report (Austin et al. 2023), pandemic-related school building closures resulted in 30 percent of respondents being remote learners who took the survey online outside of a classroom setting. Largely as a result there was a decline in response rates from 74 percent in 2017-19 to 58 percent in 2019-21. Accordingly, the data was weighted to account for differential responses. Prior analyses of CHKS data suggest that response rates do not appreciably affect prevalence estimates (Hanson and Puckett 2021). The characteristics of the overall sample were consistent with past surveys. Thus, the current results are comparable to those of the prior surveys discussed in this report, but they still should be interpreted cautiously given the impact of the pandemic on survey administration and participation.

[1] Prior to 2011, the survey was known as the California Student Survey on Substance Use and Safety (CSS). In 2011-13, the survey questions and data collection were integrated into the local CHKS for statewide assessment. The local CHKS is designed to provide representative district- and school-level data that can be used to address local needs.

Trends in Marijuana Use

Of the total sample, 12 percent were current marijuana users (past 30 days, as shown in Exhibit 2 below). Those current users made up about half the sample of students who had ever used marijuana (at least once) in their lifetime (25 percent, as shown in Exhibit 1 below). Approximately two-thirds of current users (8 percent of the total sample) reported that they used marijuana frequently (3 or more of the past 30 days).

In 2017-19, data from the Seventeenth Biennial CHKS indicates that marijuana use among secondary students had leveled off after declining between 2011-13 and 2015-17. There was concern that these results might be related to changes in the wording of the marijuana questions,[2] but several other survey findings indicated that a rise in marijuana's popularity was occurring and an uptick in use might be imminent. There was a rise in positive attitudes toward marijuana and its perceived availability and users were increasingly vaping and eating it—new ways of consuming that might be more appealing to more students than smoking.

Contrary to this prediction, in 2019-21, both lifetime and current marijuana use rates declined markedly among all 11th graders. Current marijuana use declined from approximately 16 percent to 12 percent between 2017-19 and 2019-21, with similar declines in infrequent and frequent use (see Exhibits 1 and 2 below). However, as described in the Eighteenth Biennial CHKS report, this decline likely was due to COVID-19 pandemic conditions. The height of the pandemic in 2020-21 coincided with a one-year; five percentage point drop in current marijuana use compared to 2019-20 (Austin et al. 2023). Unprecedented declines also occurred in the use of alcohol (see Exhibits 1 and 2) and tobacco and were found in national surveys during the same period (Hanson and Puckett 2021; Johnston et al. 2022). This raises the question of whether the gradual lessening of the pandemic's conditions after 2021 may prompt a resurgence in marijuana use rates.

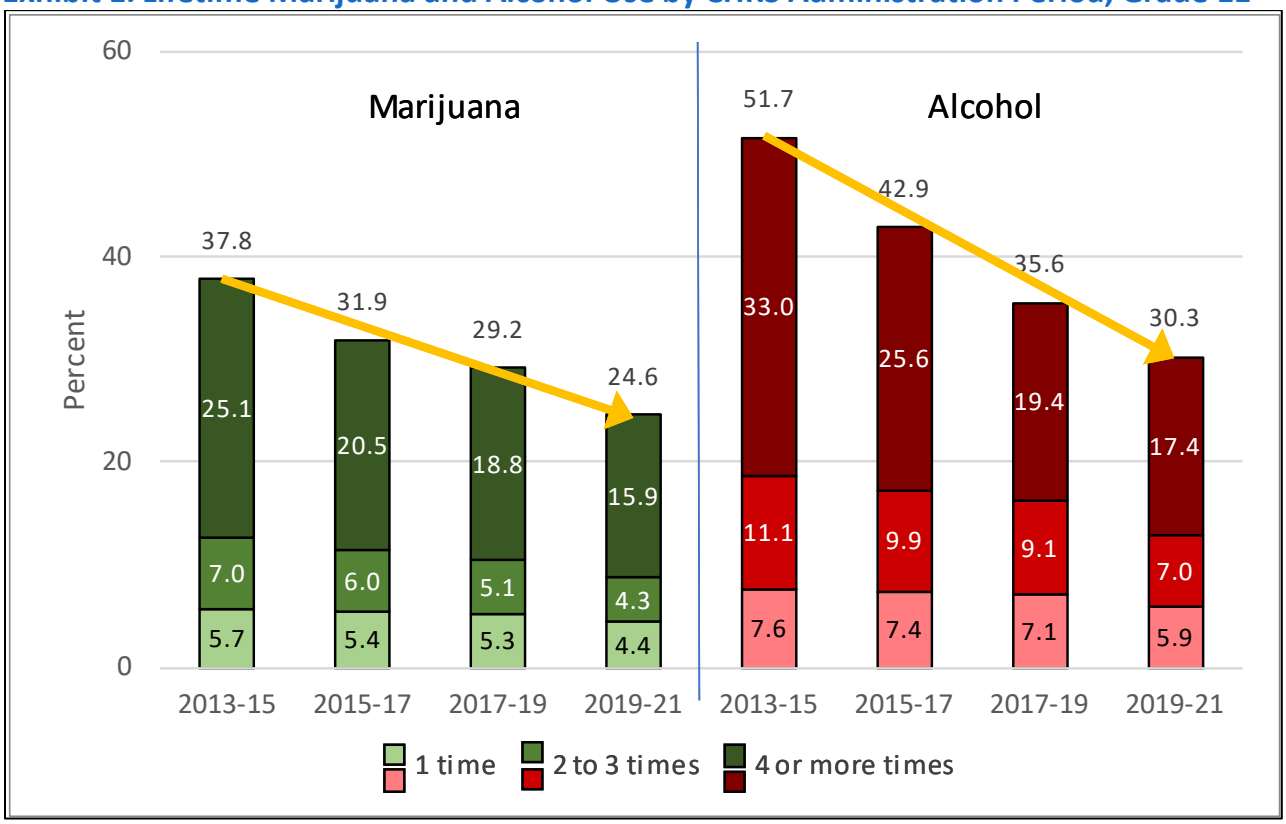
The popularity of marijuana use is clearly evident even though use is lower than in 2013-15. One quarter of 11th grade students reported having ever tried marijuana, with 16 percent

[2] The questions about marijuana were changed from asking about use in general to specifying smoking, vaping, and oral ingestion (for example, use of edibles).

reporting use four or more times. Furthermore, the popularity of marijuana has increased relative to alcohol:

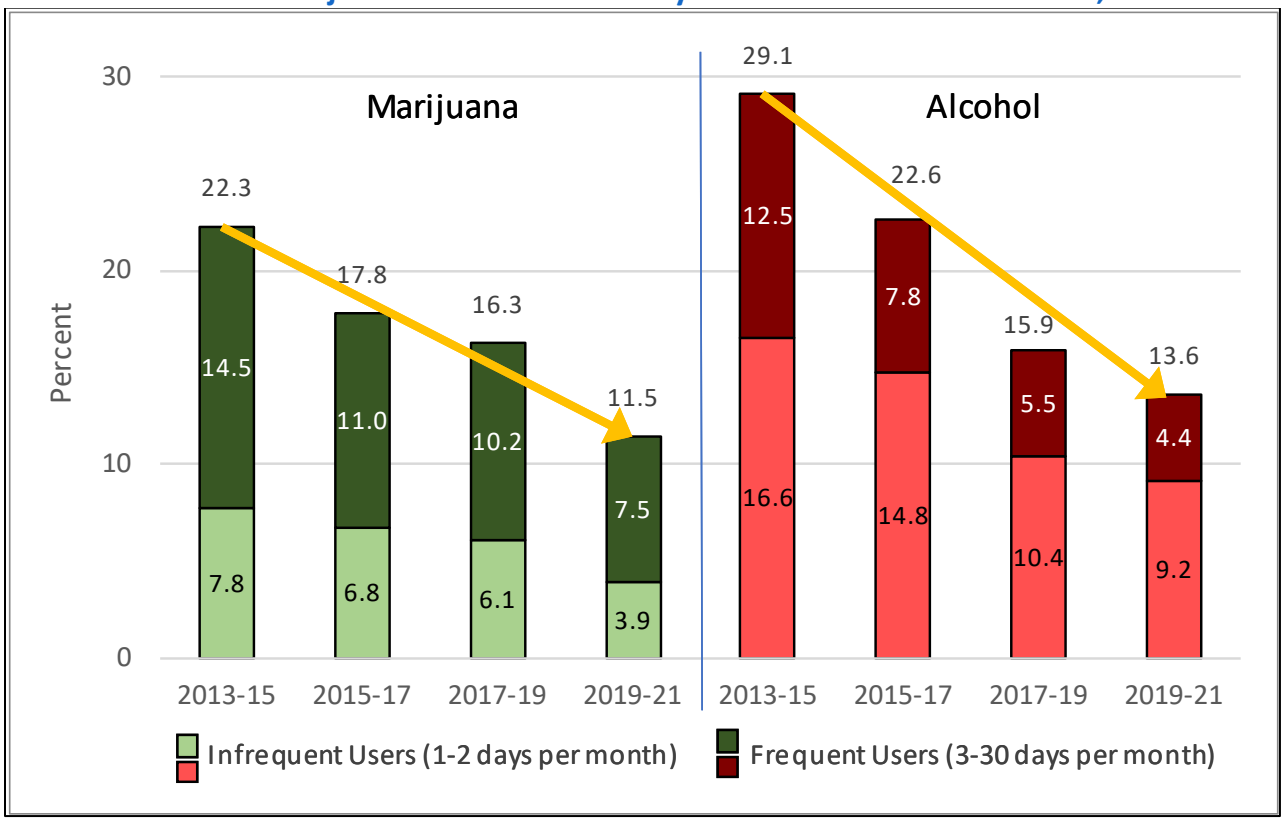
- Lifetime alcohol use declined by 21 percentage points (to 30 percent) since 2013-15 compared to a 13 percentage point drop (to 25 percent) for marijuana. Lifetime use of four or more times was similar for alcohol and marijuana use for the past two survey administrations (see Exhibit 1).
- Use of alcohol in 2019–21 was only two points higher than for marijuana (14 percent versus 12 percent), and use rates were almost the same in 2017–19. Moreover, since 2013–15, current alcohol use dropped by 15 points (from 29 percent to 14 percent) compared to 11 points for marijuana (from 22 percent to 11 percent) (see exhibit 2).
- Frequent use of marijuana was more common than frequent use of alcohol in the past two surveys (8 percent versus 4 percent for 2019–21), whereas rates were more similar in 2013–15 (see Exhibit 2).

Exhibit 1. Lifetime Marijuana and Alcohol Use by CHKS Administration Period, Grade 11



Source: Biennial CHKS Data, 2013-15 to 2019-21. HS A.74, 75: *During your life, how many times have you used the following? One full drink of alcohol (such as a can of beer, glass of wine, wine cooler, or shot of liquor). Marijuana (smoke, vape, eat, or drink).*
Note: This figure is fully described in the appendix (see Exhibit A1).

Exhibit 2. Current Marijuana and Alcohol Use by CHKS Administration Period, Grade 11



Source: Biennial CHKS Data, 2013-15 to 2019-21. HS A.96, 98: *During the past 30 days, on how many days did you use … One or more drinks of alcohol? Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A2).

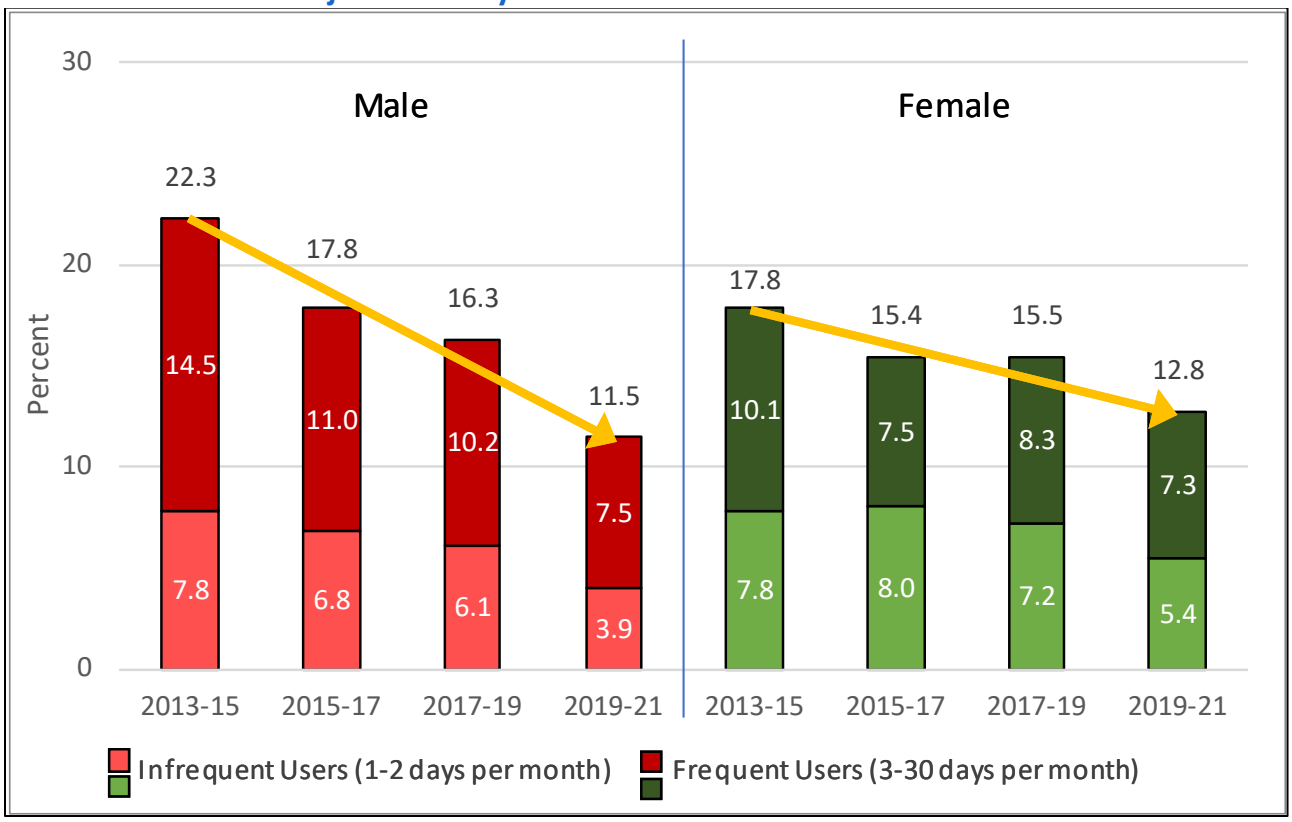
Marijuana Use Across Demographic Groups

Understanding how use varies among subgroups of youths is essential in order for prevention, intervention, and health-care providers to implement supports and services that effectively address subgroup needs and increase the odds of success. The highest use rates occurred among vulnerable populations (for example, youths who are transgender, bisexual, in foster care, or experiencing homelessness). There were no major differences across gender and racial/ethnic groups except that there was substantially less use among Asian American students and a higher proportion of frequent users among the current marijuana users among American Indian, African American, and Pacific Islander students. These findings of relatively small differences between different groups of students are similar to those in the 2017-19 marijuana report and underscore the widespread popularity of marijuana across students while underscoring the need to pay particular attention to vulnerable populations (see Exhibit 6 below).

Gender

Historically, gender differences have been small for any current use of marijuana. Compared to 2017-19, there was a slight shift in 2019-21, with females now one point higher than males in the percentage of current users (13 percent female versus 12 percent male), whereas males were previously one point higher than females (16 percent male versus 15 percent female). Frequent use was also similar for males and females in 2019-21, whereas in prior years, it was higher for males at 10 percent and females at 8 percent (see Exhibit 3 below).

Exhibit 3. Current Marijuana Use by Gender and CHKS Administration Period Grade 11

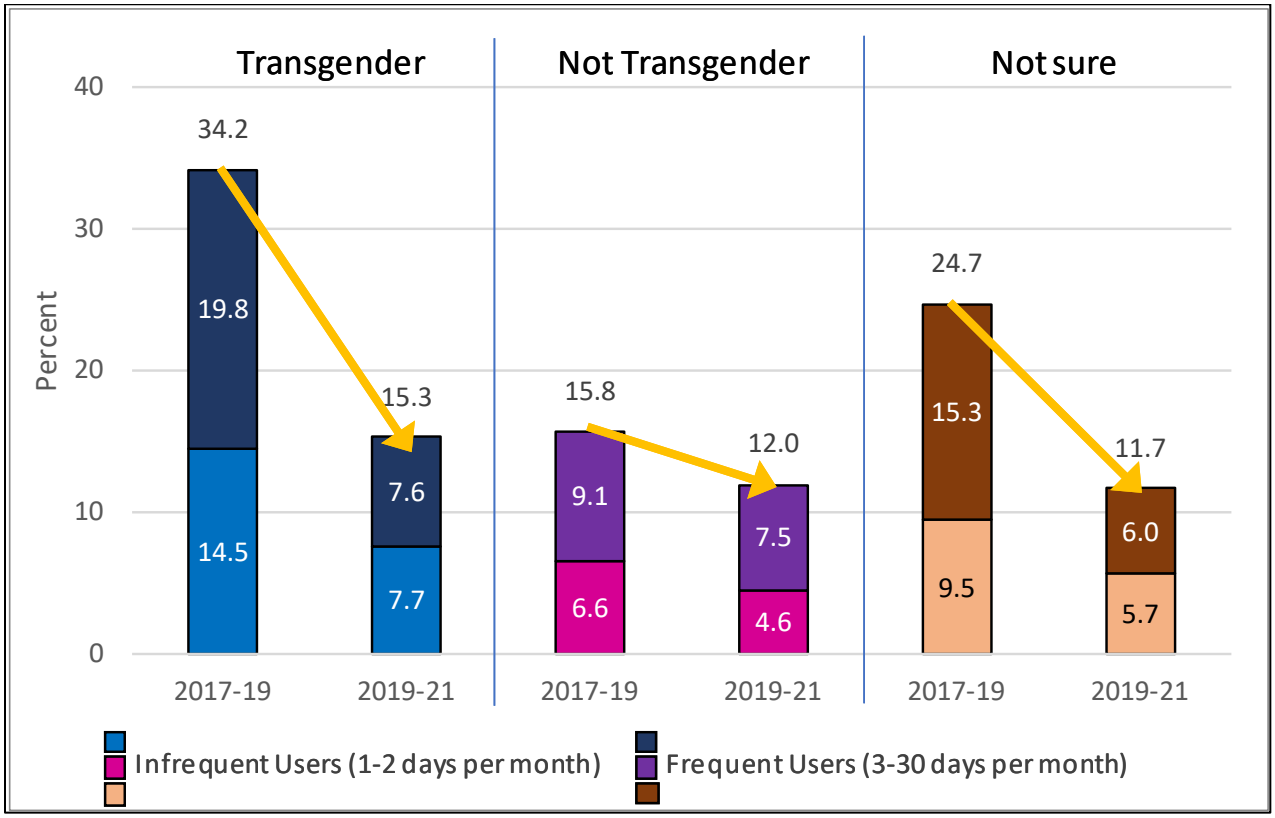


Source: Biennial CHKS Data, 2013-15 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A3).

Gender Identity

As in previous surveys, youth who self-identify as transgender reported higher use than did youth who reported that they were not transgender (15 percent versus 12 percent respectively). Although this is a considerably smaller difference than found in 2017-19 (34 percent transgender versus 16 percent not transgender), this difference is likely because of variability due to the group's small sample size (1 percent). There were no notable differences in rates for frequent use between transgender youth and youth who are not transgender (see Exhibit 4 below).

Exhibit 4. Current Marijuana Use by Gender Identity and Administration Period, Grade 11

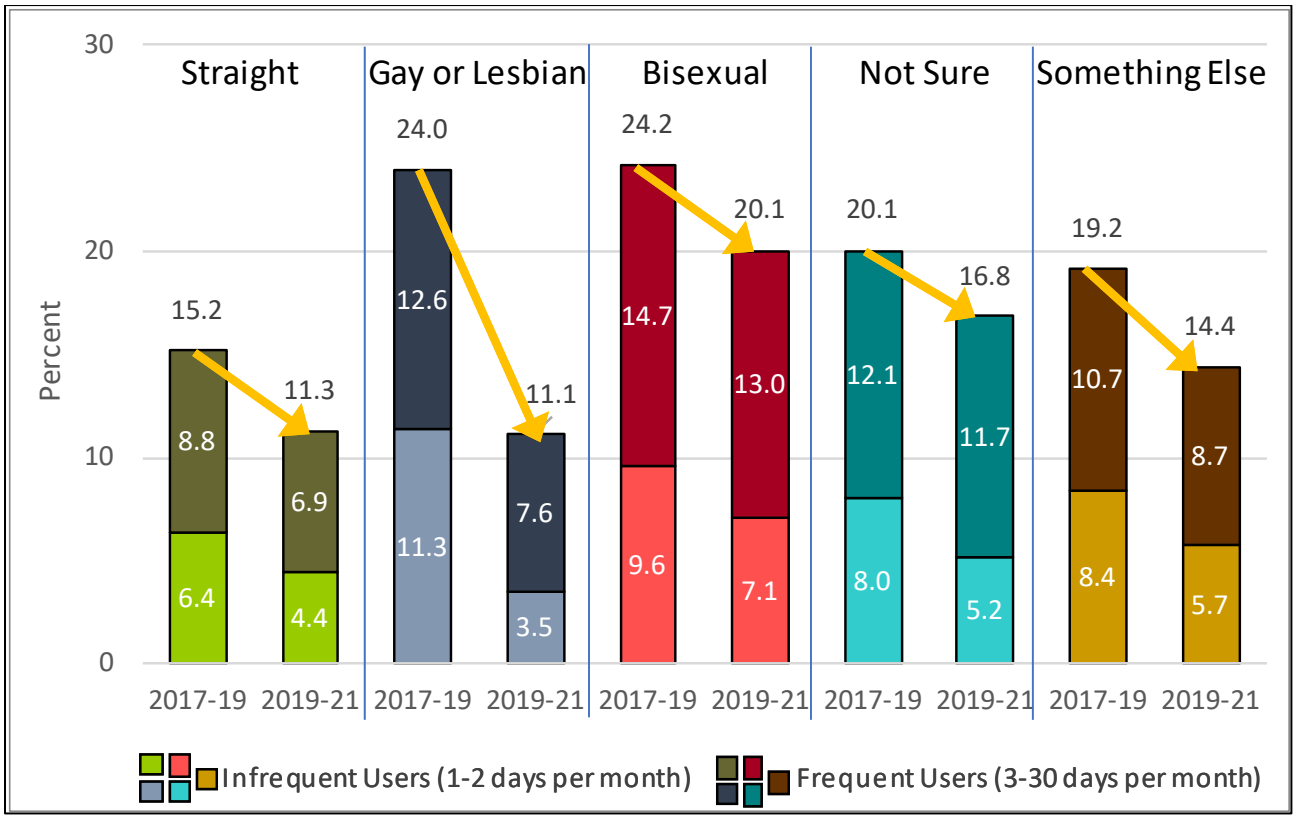


Source: Biennial CHKS Data, 2017-19 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A4)

Sexual Orientation

Unlike 2017-19, current marijuana use rates were similar for gay or lesbian and straight students at 11 percent in 2019-21. In contrast, among bisexual youths, both current (20 percent) and frequent use (13 percent) were about twice as high as straight and gay or lesbian.
Youths who self-identified as "Not Sure" also reported higher rates (17 percent current use and 12 percent frequent use) compared to gay or lesbian and straight students (see Exhibit 5 below).

Exhibit 5. Current Marijuana Use by Sexual Orientation and Administration Period, Grade 11

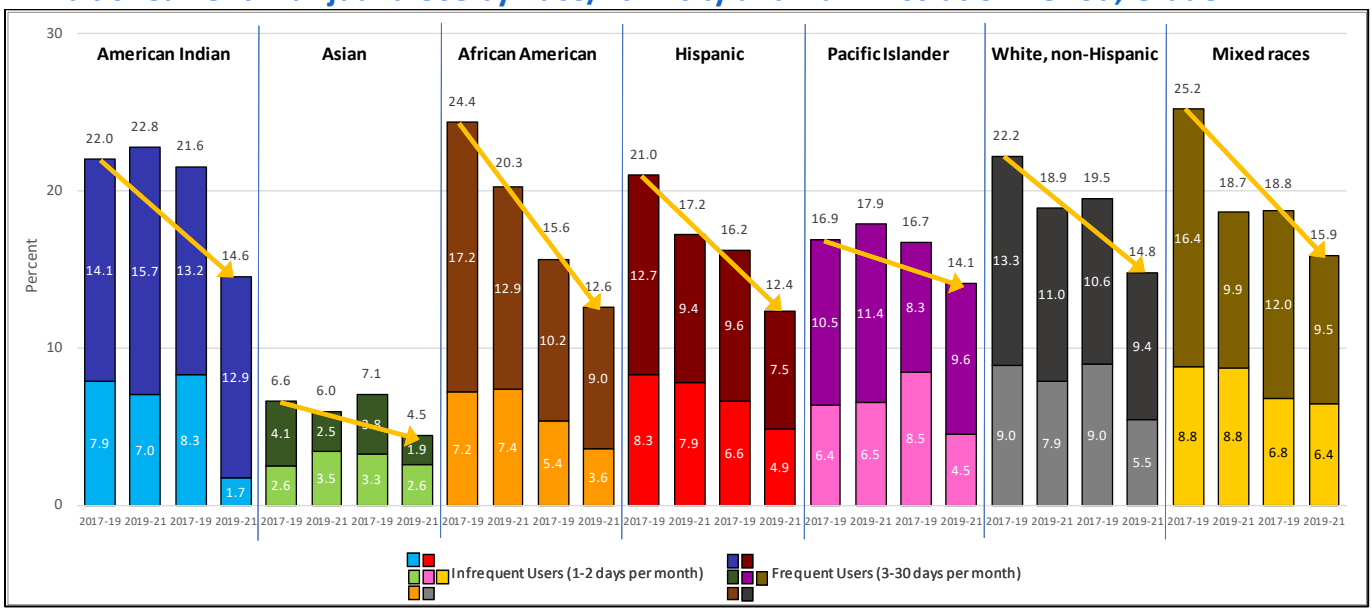


Source: Biennial CHKS Data, 2017-19 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A5).

Race/Ethnicity

Of the seven racial/ethnic groups, in 2019-21 Asian American students by far reported the lowest rates of current marijuana use (5 percent). Among other racial and ethnic groups, differences were relatively small and not statistically significant. In order of magnitude, youths who were of mixed race/ethnicity were only slightly the highest (16 percent), followed by White (15 percent), American Indian (15 percent), Pacific Islander (14 percent), African American (13 percent), and Hispanic (12 percent) students. The percentage of frequent users was around 9 percent for most groups except Asian American (2 percent), Hispanic (8 percent), and American Indian (13 percent) students. American Indian students had the highest proportion of frequent users among current users. African American users significantly decreased marijuana use by 11 percent in 2019-21 (see Exhibit 6 below).

Exhibit 6. Current Marijuana Use by Race/Ethnicity and Administration Period, Grade 11

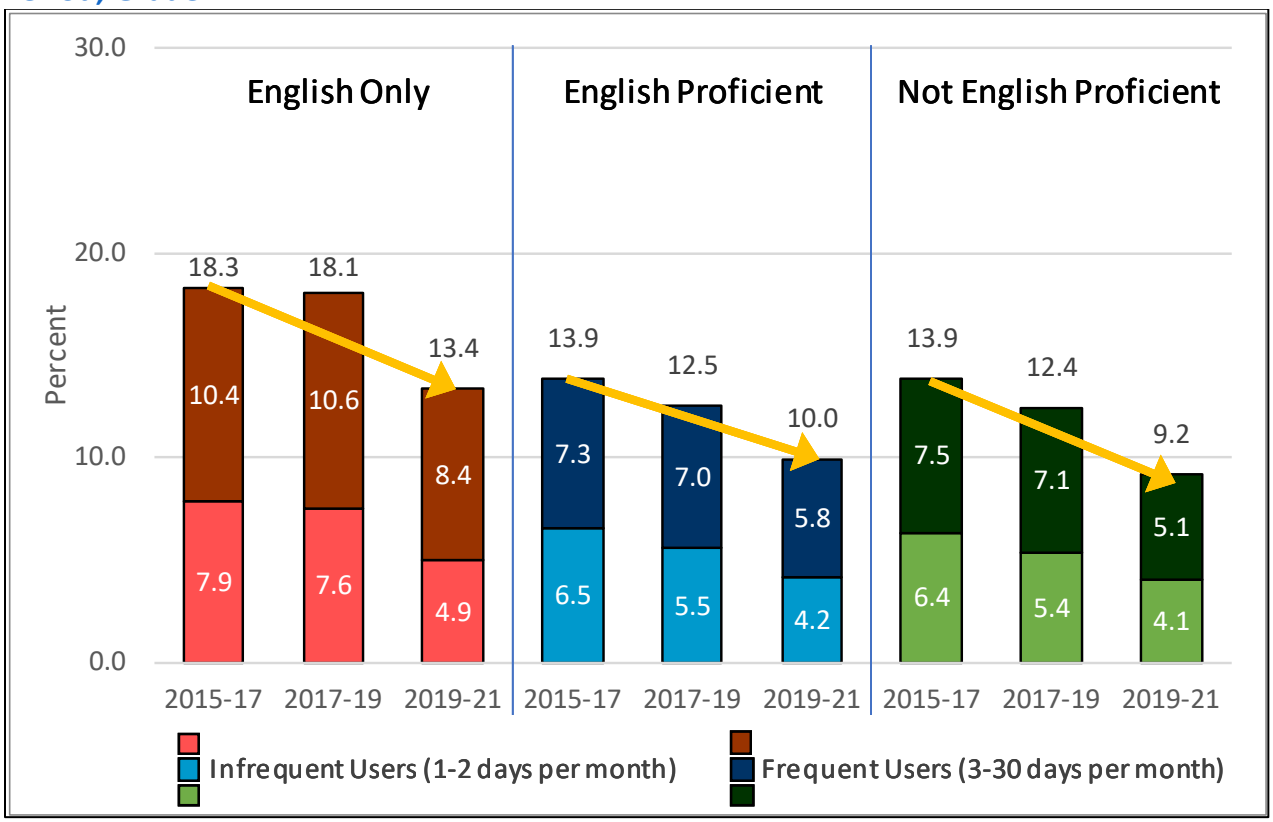


Source: Biennial CHKS Data, 2013-15 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A6).

English Language Proficiency

Current marijuana use was moderately higher among those students whose primary language is English (13 percent) relative to those who are English proficient (10 percent) or not English proficient (9 percent). Current frequent use was similar for English proficient (6 percent) and not English proficient (5 percent) and higher for English only (8 percent in Exhibit 7 below).

Exhibit 7. Current Marijuana Use by English Language Proficiency and Administration Period, Grade 11

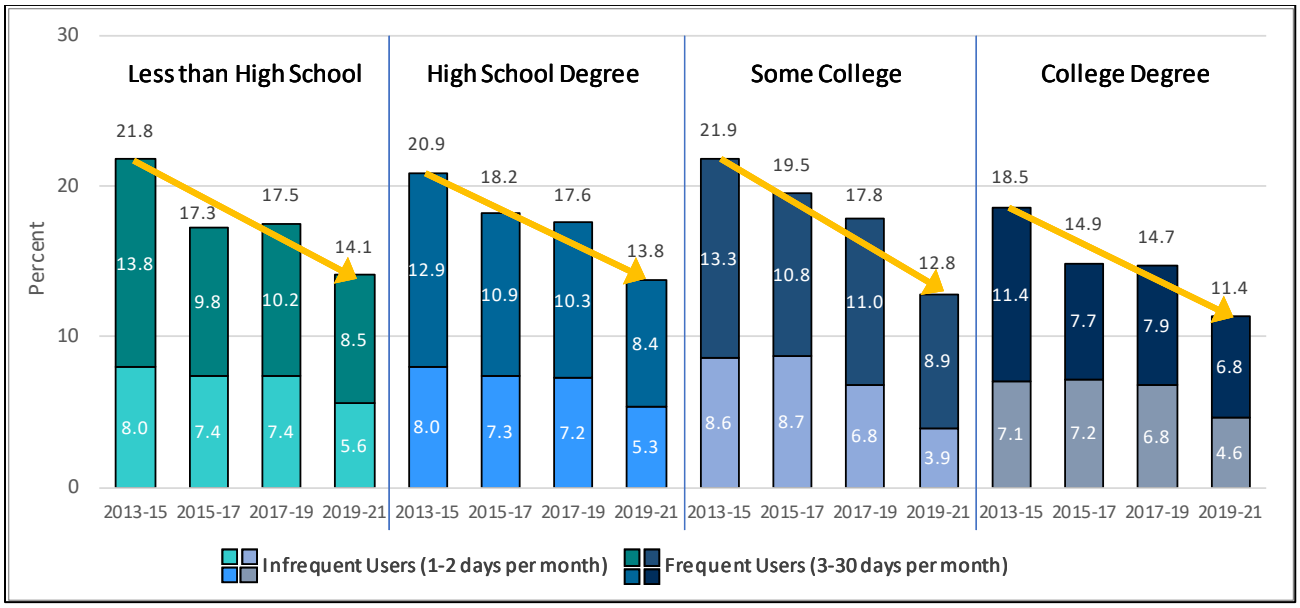


Source: Biennial CHKS Data, 2015-17 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A7).

Parental Education

Current use was about three points lower among 11th graders whose parents have a college degree (11 percent) compared to those whose parents have a high school degree or did not graduate from high school (both about 14 percent). Students whose parents had a college degree used less frequently (7 percent) than the other groups (see Exhibit 8 below).

Exhibit 8. Current Marijuana Use by Parental Education and Administration Period, Grade 11



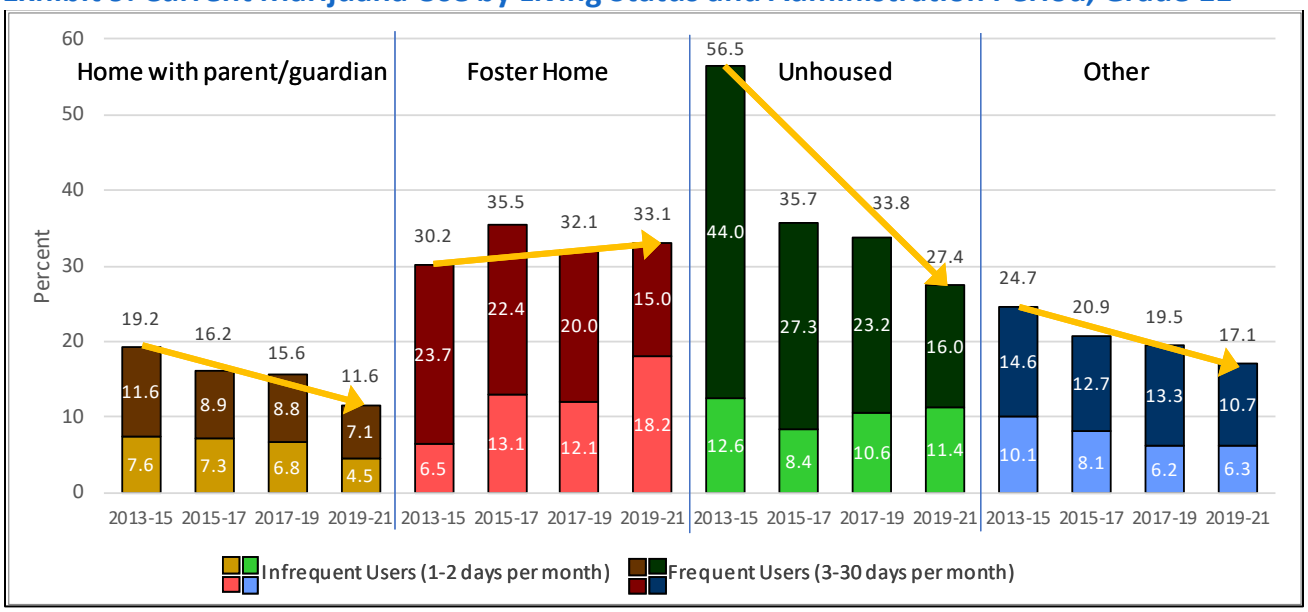
Source: Biennial CHKS Data, 2013-15 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*

Note: This figure is fully described in the appendix (see Exhibit A8).

Living Status

Youths in foster homes (33 percent) or unhoused (27 percent) were more than twice as likely to be current users than those in a home with a parent or guardian (12 percent). The same was true for frequent use. Although these youths comprised less than 1 percent of the sample, these results are similar to those for 2017-19 (see Exhibit 9 below).

Exhibit 9. Current Marijuana Use by Living Status and Administration Period, Grade 11



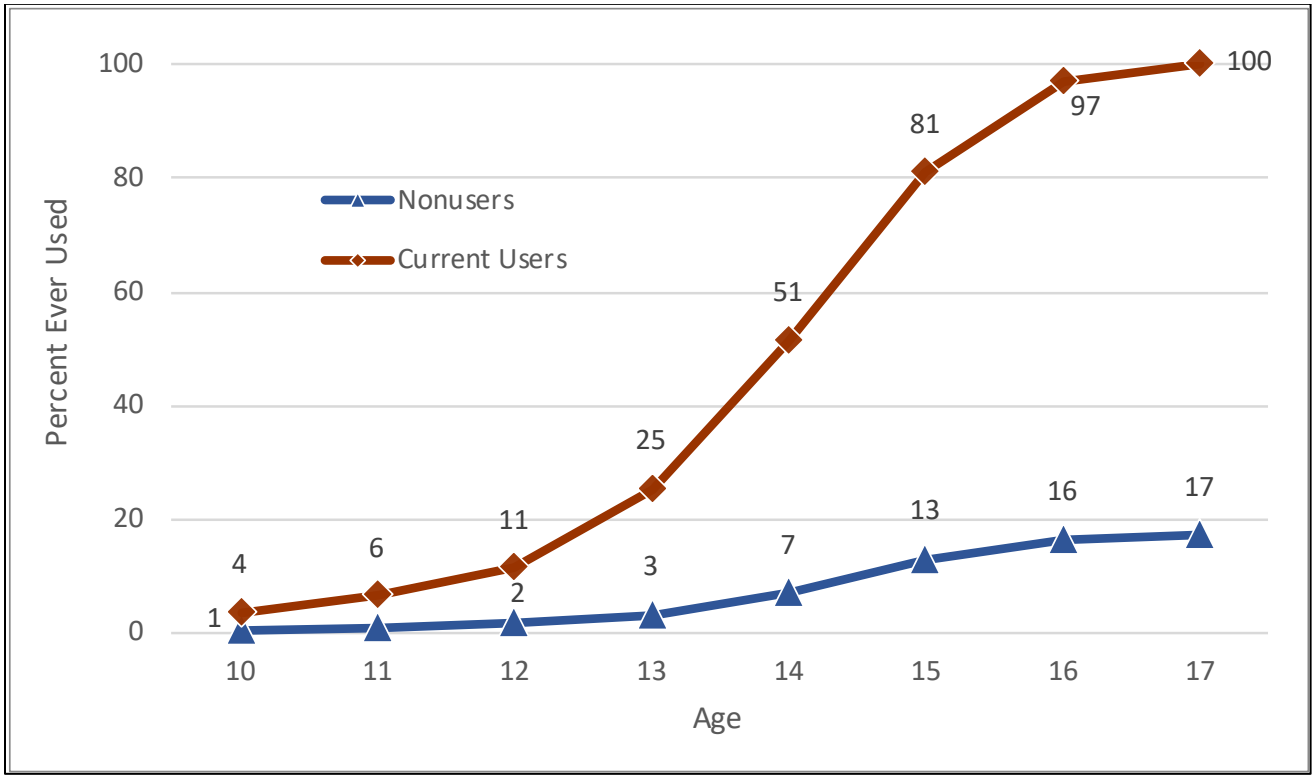
Source: Biennial CHKS Data, 2013-15 to 2019-21. HS A.98: *During the past 30 days, on how many days did you use … Marijuana (smoke, vape, eat, drink)?*
Note: This figure is fully described in the appendix (see Exhibit A9).

Patterns of Marijuana Use

Age of Initiation

The earlier initiation had occurred, the more likely it was for an 11th grader to be a current and frequent user. Current users were more likely than nonusers (by 44 percentage points) to have first tried marijuana before age fifteen (51 percent versus 7 percent). Thus, the relationship between the age of initial onset and current use is vital to early prevention program planning and implementation (see Exhibit 10 below).

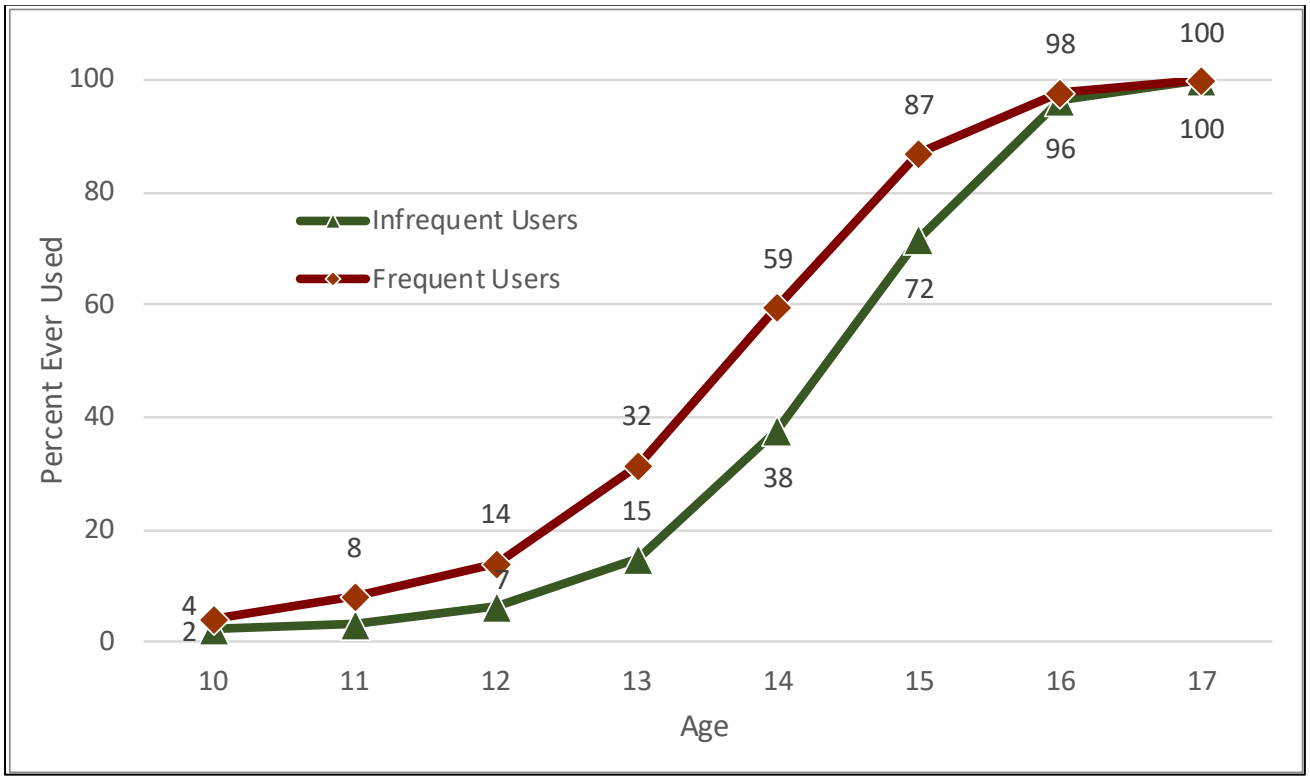
Exhibit 10. Percentage Ever Used by Age of Initiation and Current Marijuana Use, Grade 11



Source: Biennial CHKS Data, 2019-21. Cumulative percentages estimated using age of onset question HS B.4: *About how old were you the first time you tried any of these things? Marijuana (smoke, eat, or drink).*

Frequent users were more likely than infrequent users to initiate use before age fifteen (e.g., 59 percent versus 38 percent) and twice as likely to initiate before age thirteen (e.g., 14 percent versus 7 percent) (see Exhibit 11 below).

Exhibit 11. Percentage Ever Used by Age of Initiation and Frequency of Marijuana Use, Grade 11



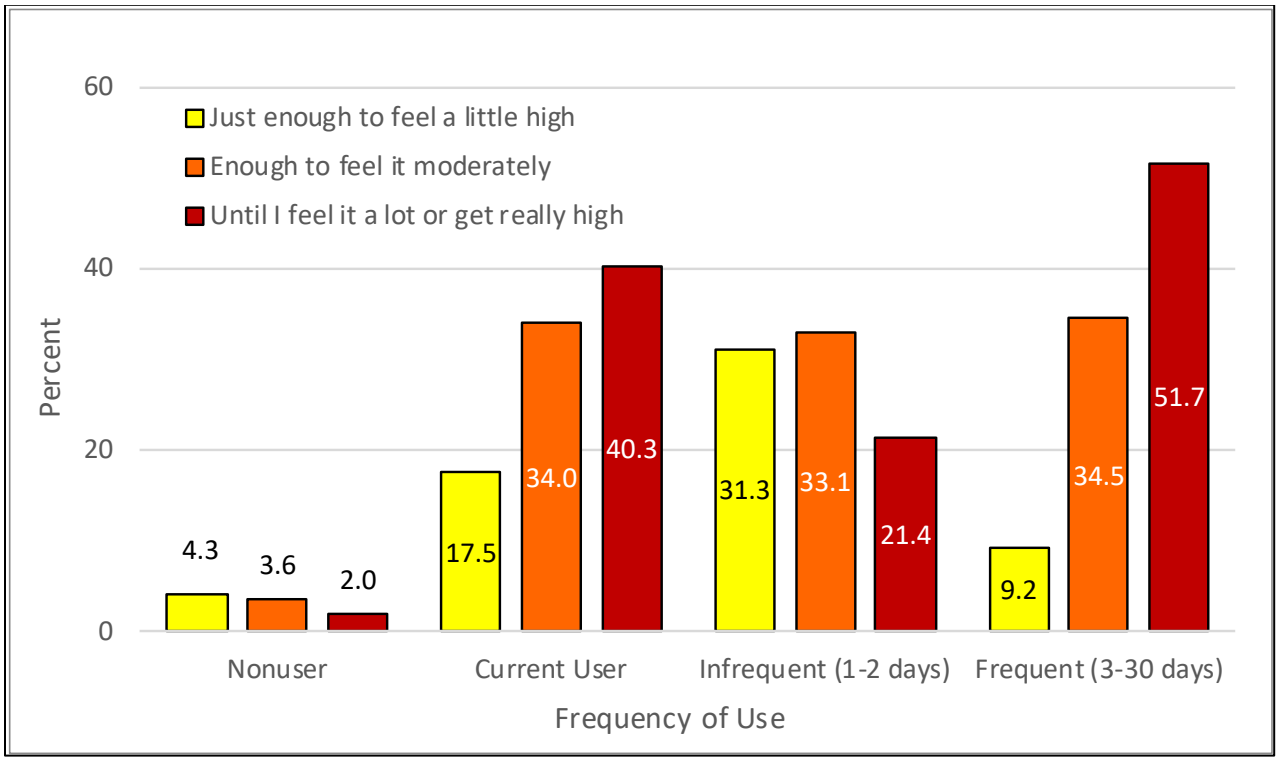
Source: Biennial CHKS Data, 2019-21. Cumulative percentages estimated using age of onset question HS B.4: *About how old were you the first time you tried any of these things? Marijuana (smoke, eat, or drink).*

Consumption Preferences

The frequency of current marijuana use was associated with the intensity of drug use. Frequent users (51.7 percent) are far more likely than infrequent users (21.4 percent) to consume marijuana or other drugs until they feel "it a lot or get really high." Following this trend, infrequent users (31.3 percent) are more likely to ingest "just enough to feel a little high" than frequent users (9.2 percent) (see Exhibit 12 below).

[3] On this question, 8 percent of current users reported that they do not use drugs.

Exhibit 12. Drug Consumption Preferences by Frequency of Marijuana Use, Grade 11



Source: Biennial CHKS Data, 2019-21. HS B.7: *If you use marijuana or other drugs, how "high" (stoned, faded, wasted, trashed) do you usually like to get?*
Note: This figure is fully described in the appendix (see Exhibit A12).

Consumption Methods and Products

One of the potential factors fueling marijuana use is the growing popularity, since the beginning of the decade, of vaping and orally ingesting marijuana (Austin et al., 2021a). People vape with battery-operated devices (often called e-cigarettes) used to inhale an aerosol, which can contain nicotine, marijuana, flavorings, and other chemicals. Inhaling through a mouthpiece activates a battery-powered heating element, which vaporizes the liquid solution in the cartridge or reservoir.

The most popular oral-ingestion products are edibles infused with cannabis extract, which come in many forms, including baked goods, candies, gummies, and beverages that may be homemade or prepared commercially (Barrus et al., 2016). California's legalization of medical marijuana use in 1996 ushered in the era of store-bought commercially available products, although homemade edibles had been consumed for decades before.

Among current marijuana users, the percentage who have ever vaped marijuana was almost as high as for those smoking it (89 percent versus 91 percent). Even among nonusers, vaping marijuana slightly exceeded smoking it (12 percent versus 11 percent). More than three-quarters of current users (77 percent) had ingested it orally, only 14 points lower than for smoking marijuana. The biggest difference between these two groups was for oral ingestion. Two-thirds (67 percent) reported ever using all three methods, compared to only 5 percent of nonusers. The percentages among frequent users were about 10 points higher than among infrequent users for smoking (95 percent versus 83 percent) and vaping (92 percent versus 83 percent) and 22 percentage points higher for oral ingestion (85 percent versus 63 percent). The rate for ever using all three methods rose to 78 percent for frequent users compared to 49 percent for infrequent users (see Exhibit 13 below).

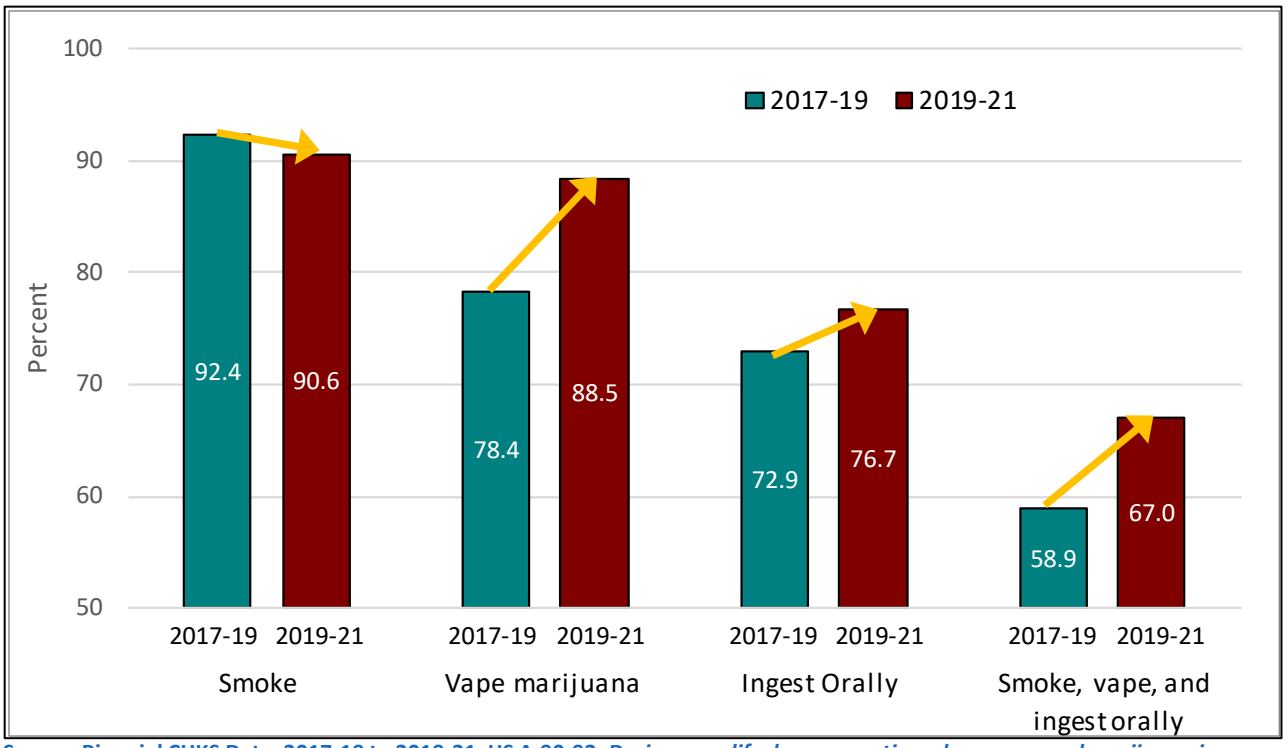
Exhibit 13. Methods of Marijuana Consumption by Frequency of Marijuana Use, Grade 11

Method of marijuana use (ever)	Nonuser (%)	Current User(%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Smoke	10.8	90.6	83.0	95.4
Vape marijuana	12.3	88.5	82.8	92.1
Ingest orally	7.6	76.7	63.1	85.2
Smoke, vape, and ingest orally	4.8	67.0	48.7	78.4

Source: Biennial CHKS Data, 2019-21. HS A.90-92: ***During your life, how many times have you used marijuana in any of the following ways … Smoke it? In a vaping device? Eat or drink it in products made of marijuana?***

Use of noncombustible products, especially vaping devices, has increased in popularity since 2017-19. Among all 11th graders, lifetime smoking declined by 1.8 percentage points but increased substantially for vaping by 10.1 points and rose by 3.8 points for oral ingestion. Current marijuana use of all three methods rose 8.1 percentage points (see Exhibit 14 below).

Exhibit 14. Methods of Consumption Among Current Users by CHKS Administration Period, Grade 11



Source: Biennial CHKS Data, 2017-19 to 2019-21. HS A.90-92: *During your life, how many times have you used marijuana in any of the following ways … Smoke it? In a vaping device? Eat or drink it in products made of marijuana?*
Note: This figure is fully described in the appendix (see Exhibit A14).

Precursors to Marijuana Use

This section presents findings from questions designed to describe factors that may influence student involvement in marijuana use: their attitudes toward use and that of their peers and parents (degree of disapproval), their knowledge about sources for obtaining marijuana, and their self-reported reasons for using drugs. Knowledge about adolescent perceptions of marijuana, its availability, and why they might use it is important for developing effective prevention and intervention programs.

Attitudes Toward Use

The CHKS responses indicated that students' marijuana use is related to their attitudes about use. Current marijuana users are much less likely than nonusers to have negative attitudes toward use, and frequent users less likely than infrequent users (see Exhibit 15 below). Since 2017-19, there was an increase in personal and perceived peer disapproval of marijuana use among 11th graders, but that increase only occurred among nonusers. Among current marijuana users disapproval changed little. The increase in personal and peer disapproval among nonusers could be partially responsible for the decline in use. Pandemic conditions may have played a role in fostering more disapproval among nonusers by reducing their exposure to peers with pro-use attitudes and raising health concerns. These findings indicate a need for more prevention messages that target users.

Personal Disapproval of Use

Peer disapproval was about ten times more likely for nonusers than for current users. Only 3 percent strongly disapproved of a peer trying marijuana once or twice (experimenting) versus 29 percent of nonusers. For "use once a month or more often," both nonusers (5 percent) and infrequent users (39.6 percent) increased their disapproval (see Exhibit 15 below).

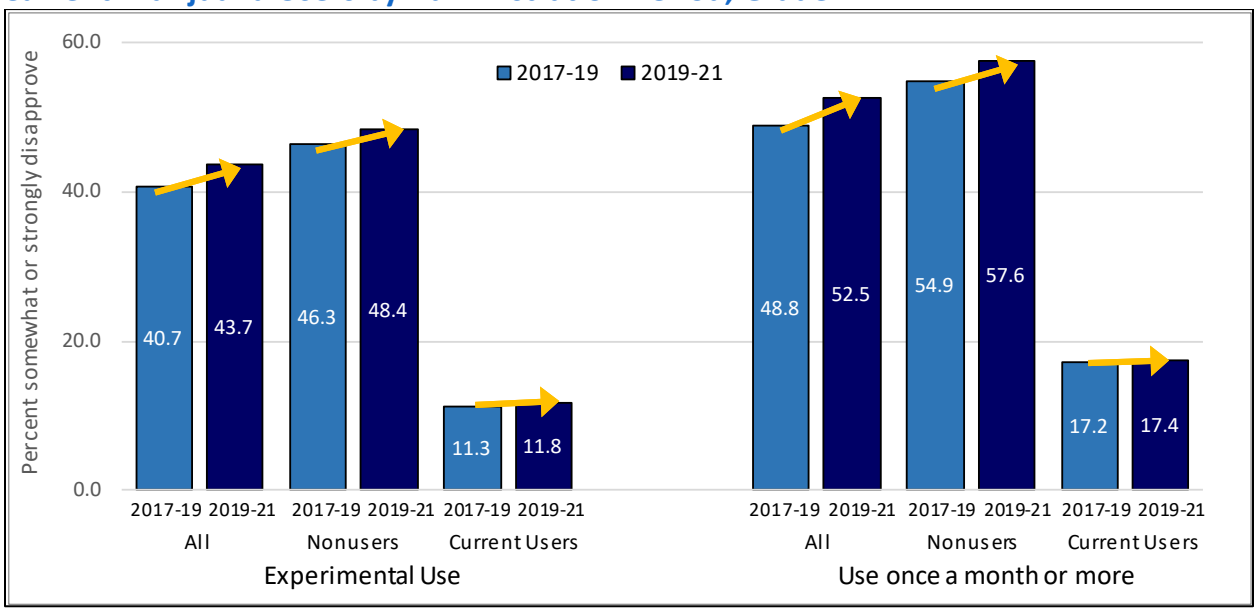
Compared to 2017-19, there were only minor differences in the results for personal disapproval among current marijuana user groups. In contrast, among nonusers, personal disapproval rose two points for marijuana experimentation (46 percent to 48 percent) and three points for monthly or more often (55 percent to 58 percent), accounting for an overall rise in disapproval among 11th graders (see Exhibit 16 below).

Exhibit 15. Personal Disapproval of Marijuana Use by Frequency of Marijuana Use, Grade 11

Level of disapproval	Nonuser (%)	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Experimental use				
Neither approve/disapprove	51.6	88.7	85.0	90.9
Somewhat disapprove	19.8	8.2	12.1	5.9
Strongly disapprove	28.6	3.1	3.0	3.2
Use once a month or more				
Neither approve/disapprove	42.4	82.6	75.3	87.2
Somewhat disapprove	17.9	12.8	18.2	9.5
Strongly disapprove	39.6	4.6	6.5	3.4

Source: Biennial CHKS Data, 2019–21. HS B.17, 18: ***How do you feel about someone your age doing the following? Trying marijuana once or twice. Using marijuana once a month or more regularly.***

Exhibit 16. Personal Disapproval of Marijuana Use Among All Students, Nonusers, and Current Marijuana Users by Administration Period, Grade 11



Source: Biennial CHKS Data, 2017-19 to 2019-21. HS B.17, 18: *How do you feel about someone your age doing the following? Trying marijuana once or twice. Using marijuana once a month or more regularly.*
Note: This figure is fully described in the appendix (see Exhibit A16).

Perceived Peer Disapproval. When asked about how a close friend would feel if the respondent used marijuana, only 12 percent of current marijuana users answered that it would be "very wrong" compared to 52 percent of nonusers, four times lower. Rates for frequent users were almost half that of infrequent users (9 percent versus 15 percent) (see Exhibit 17 below).

Exhibit 17. Peer Disapproval of Marijuana Use by Frequency of Marijuana Use, Grade 11

Level of disapproval	Nonuser (%)	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Very wrong	52.3	11.5	15.0	9.4
Wrong	19.8	9.3	12.9	7.1
A little wrong	14.5	21.7	26.3	18.9
Not at all wrong	13.4	57.5	45.9	64.7

Source: Biennial CHKS Data, 2019-21. HS B29: ***How wrong would your close friends feel it would be if you did the following? Use marijuana (smoke, vape, eat, or drink).***

Parental Disapproval

Approximately 45 percent of current users reported that their parents would feel it was "very wrong" if the respondent used marijuana, compared to 82 percent among nonusers. Frequent users were also less likely than infrequent users to report that their parents would feel it was "very wrong" if they used marijuana (40 percent versus 53 percent) (see Exhibit 18 below).

Exhibit 18. Parental Disapproval of Marijuana Use by Frequency of Marijuana Use, Grade 11

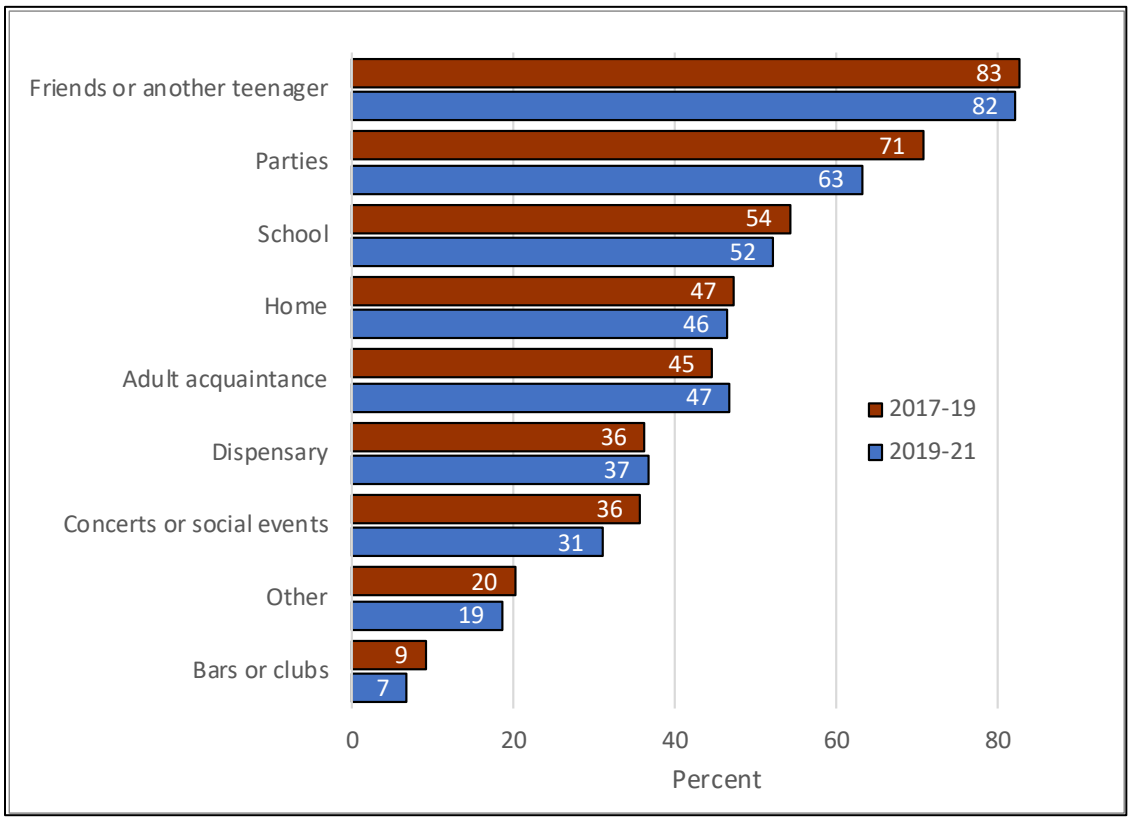
Level of disapproval	Nonuser (%)	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Very wrong	82.4	44.9	52.8	40.0
Wrong	10.6	20.5	23.8	15.5
A little wrong	4.5	21.0	17.6	23.2
Not at all wrong	2.4	13.5	5.9	18.3

Source: Biennial CHKS Data, 2019-21. HS B.24: ***How wrong do your parents or guardians feel it would be for you to do the following? Use marijuana (smoke, vape, eat, or drink).***

Availability of Marijuana

Among "knowledgeable" 11th graders—those who selected at least one of the nine sources for where students usually obtained marijuana—little change is evident between 2017-19 and 2019-21. Across both surveys, 11th graders were most likely to obtain marijuana from friends and peers; followed by parties; and then a grouping of school, home, and adult acquaintances. Moderately fewer reported obtaining marijuana at parties (71 percent versus 63 percent) and concerts or social events (36 percent versus 31 percent), and slightly more reported adult acquaintances (47 percent versus 45 percent), both also likely reflecting pandemic-related social isolation from adolescent peers (see Exhibit 19 below).

Exhibit 19. Sources of Marijuana Among Knowledgeable Students, Grade 11



Source: Biennial CHKS Data, 2017-19 to 2019-21. HS B.15: *How do most kids at your school who use marijuana usually get it? (Mark All That Apply.)*
Note: This figure is fully described in the appendix (see Exhibit A19).

Among knowledgeable respondents, one source—dispensaries—differed significantly. Current marijuana users were much more likely than nonusers to select dispensaries (54.4 percent versus 32 percent), as a source for acquiring marijuana. Frequent users were also substantially more likely than infrequent users to identify dispensaries (60 percent versus 45 percent), as a source to obtain marijuana. Although all user groups selected friends/peers and parties as the most common sources, these findings indicate that dispensaries are a more common source among frequent users than infrequent users (see Exhibit 20 below).

Exhibit 20. Sources of Marijuana Among Knowledgeable Students by Frequency of Marijuana Use, Grade 11

Source of marijuana	Nonuser (%)	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Friends or another teenager	82.1	82.7	83.9	81.9
Parties	62.6	65.2	69.4	62.5
Adult acquaintance	44.5	55.8	53.6	57.1
Dispensary	32.0	54.4	45.4	60.1
School	52.2	52.2	48.8	54.4
Home	45.0	52.0	48.5	54.2
Concerts or social events	30.1	34.1	33.2	34.6
Other	17.3	22.9	18.0	26.0
Bars or clubs	6.2	8.7	8.3	9.0

Source: Biennial CHKS Data, 2019-21. HS B.15: ***How do most kids at your school who use marijuana usually get it? (Mark All That Apply.)***

Reasons for Alcohol and Other Drug Use

More than half of current marijuana users reported that they used alcohol, marijuana, or other drugs in the past 12 months for the following five reasons:

- to get "high" (74 percent)
- to have a good time with friends (73 percent)
- to relax (70 percent)
- to get away from problems (52 percent)
- because it made them feel better (51 percent)

Reported reasons varied markedly by frequency of marijuana use. Frequent users were substantially more likely than infrequent users to report that they used substances to get "high" (82 percent versus 61 percent), to relax (79 percent versus 54 percent), because of anger or frustration (44 percent versus 22 percent), and to get through the day (41 percent versus 16 percent). The most notable differential between frequent and infrequent users was "to get through the day," with a difference of 25 percentage points. Overall, frequent users were more likely than infrequent users to report that they used alcohol, marijuana, and other drugs for pleasure and problem avoidance (see Exhibit 21 below).

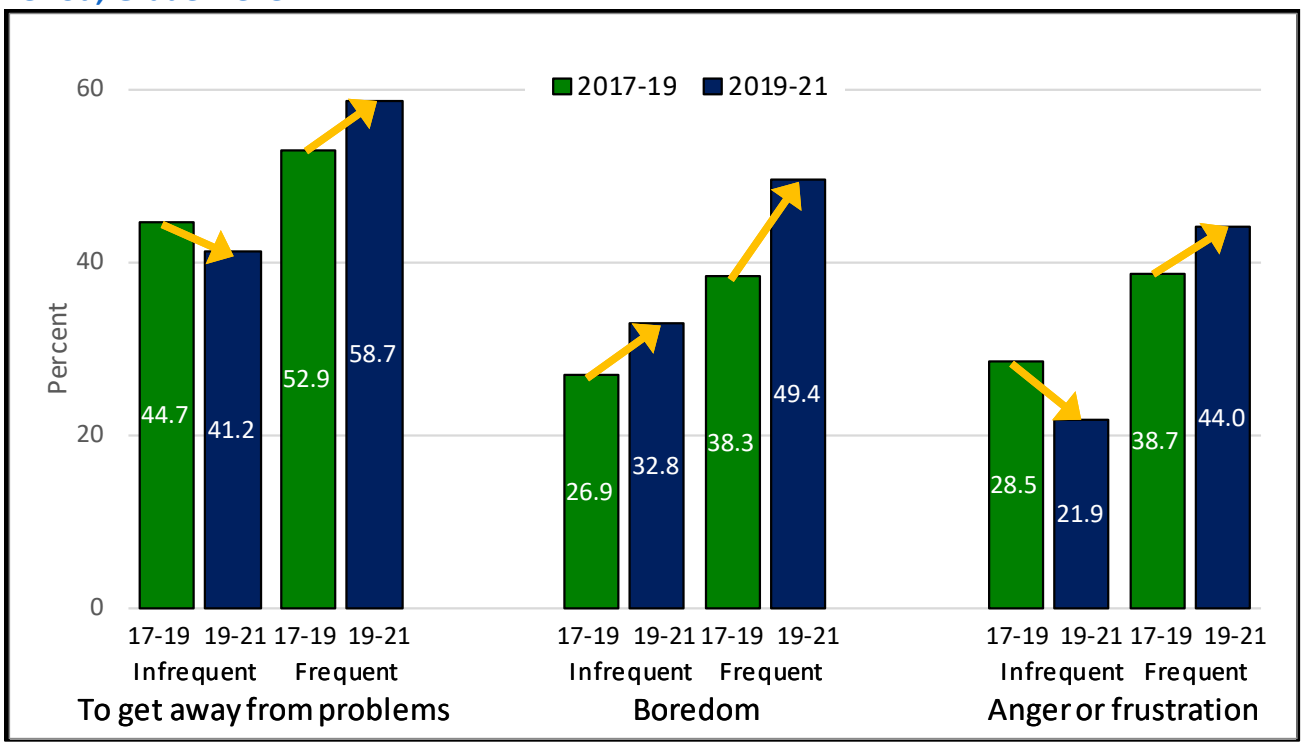
Exhibit 21. Reasons for Alcohol and Other Drugs Use Among Current Marijuana Users by Frequency of Marijuana Use, Grade 11

Reasons for marijuana use	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
To get "high"	73.9	60.7	81.7
To have a good time with friends	72.5	68.9	74.5
To relax	69.5	53.8	78.8
To get away from problems	52.2	41.2	58.7
Because it made you feel better	51.4	39.0	58.6
Because of boredom	43.3	32.8	49.4
Because of anger or frustration	35.9	21.9	44.0
To get through the day	32.1	16.2	41.4
To experiment (try using)	31.6	38.6	27.5
To seek deeper insights and understanding	30.6	21.1	36.2
To fit in with a group you like	8.7	7.4	9.5
None of the above	2.3	2.8	2.1

Source: Biennial CHKS Data, 2019-21. HS B.8: ***Have you used alcoholic beverages, marijuana, or other drugs in the past 12 months for any of the following reasons? (Mark All That Apply.)***

The frequency of reported reasons for AOD use was similar to 2017–19, except current users were more likely to report using because of boredom. In addition, frequent users were more likely to report using AOD to get away from problems, because of boredom, and because of anger or frustration in 2019–21 (see Exhibit 22 below).

Exhibit 22. Reasons for AOD Use by Frequency of Marijuana Use and Administration Period, Grade Eleven



Source: Biennial CHKS Data, 2017-19 to 2019-21. HS B.8: *Have you used alcoholic beverages, marijuana, or other drugs in the past 12 months for any of the following reasons? (Mark All That Apply.)*
Note: This figure is fully described in the appendix (see Exhibit A22).

Relationship of Marijuana Use to Behavioral Health and Educational Outcomes

How is current marijuana use related to adolescent educational outcomes and behavioral health? The findings of the 2019-21 Biennial CHKS confirm those from 2017-19 (Austin et al. 2021b) in showing that current marijuana users are more likely than nonusers to report involvement in other substance use, including indicators of problematic use and dependency. They are also more likely to have issues related to mental health, school engagement, and academic performance, many of which they attribute to their substance use. In all these areas, results were more negative for frequent than for infrequent users.

Use of Alcohol, Tobacco, and Other Drugs

Current marijuana users were markedly more likely than nonusers to report alcohol drinking (60 percent versus 7 percent), binge drinking (40 percent versus 3 percent), vaping (57 percent versus 4 percent), cigarette smoking (10 percent versus 0.4 percent), and use of other drugs (15 percent versus less than 1 percent). Frequent users reported higher rates than infrequent users in all these alcohol, tobacco, and other drugs (ATOD) categories, particularly binge drinking (44 percent versus 33 percent) and use of other drugs (18 percent versus 9 percent) (see Exhibit 23 below).

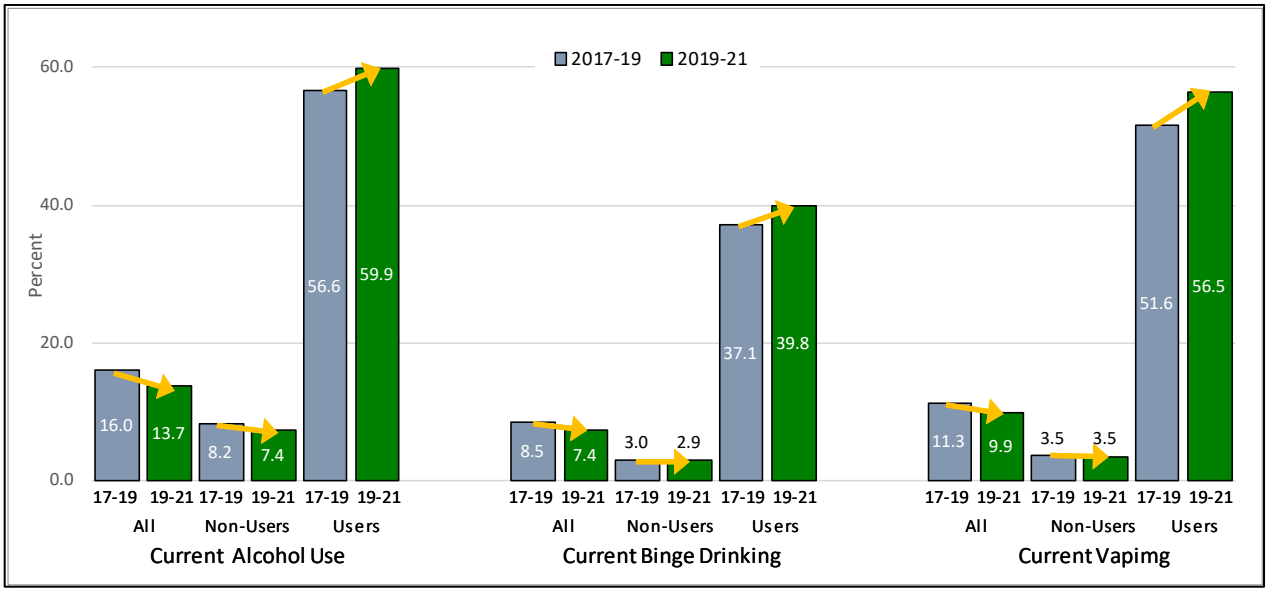
Exhibit 23. Alcohol, Tobacco, and Other Drugs Use by Frequency of Marijuana Use, Grade 11

Substance use during the past 30 days	Nonuser (%)	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Alcohol	7.4	59.9	55.2	62.9
Binge drinking	2.9	39.8	32.6	44.4
Vaping	3.5	56.5	51.6	59.6
Cigarette	0.4	10.4	7.4	12.3
Other drugs	0.7	14.5	8.6	18.2

Source: Biennial CHKS Data, 2019-21. HS A.93, 95-101: ***During the past 30 days, on how many days did you use… Cigarettes? Vape products? One or more drinks of alcohol? Five or more drinks of alcohol in a row, that is, within a couple of hours? Inhalants? Prescription drugs to get "high" or for reasons other than prescribed? Any other drug, pill, or medicine to get "high" or for reasons other than medical?***

ATOD use may have become even more concentrated among current marijuana users over the past two years. Current alcohol use, binge drinking, and vaping increased among current marijuana users in 2019-21 while declining or remaining at the same level for all students and nonusers (see exhibit 24 below).

Exhibit 24. Alcohol and Other Drugs Use Among All Students, Nonusers, and Current Marijuana Users by Administration Period, Grade 11



Source: Biennial CHKS Data, 2017-19 to 2019-21. HS A.95-97: *During the past 30 days, on how many days did you use … Vape products? One or more drinks of alcohol? Five or more drinks of alcohol in a row, that is, within a couple of hours?* Note: This figure is fully described in the appendix (see Exhibit A24).

Alcohol and Other Drug Dependency and Impacts

Consistent with their higher rates of substance use and for liking to use drugs to get high, current marijuana users were likely to report at least one indicator of AOD dependency and a wide range of adverse behavioral, personal, and education effects from that use, with rates increasing with marijuana use frequency. Moreover, although AOD use has declined since 2017-19, the percentages of current users who reported experiencing these dependency indicators and adverse effects increased, suggesting a rising trend for risk from marijuana use.

Dependency

More than half (55 percent) of current marijuana users experienced at least 1 of 10 indicators of AOD use dependency or problematic patterns of use, and 38 percent experienced 2 or more. Individual rates across the indicators generally ranged from around 10 percent to 30 percent among users and fell in four tiers, as follows:

- The most frequently selected indicator was *using alcohol or drugs when alone* (41 percent).
- The next two most frequently selected were having *thought about reducing/stopping use* (32 percent) and *increasing how much was used to have the same effect as before* (31 percent), an indicator of the development of tolerance.
- About one-fifth had used AOD *a lot more than intended* (21 percent) and *used even though they had not intended to* (21 percent).
- Reflecting on the extent to which AOD use was integrated into their lives, about one-tenth reported that they frequently spent a lot of time getting AOD, using AOD, or being hung over (14 percent); that they *didn't feel OK unless they had something to drink or used a drug* (12 percent); and that using *had kept them from doing a normal activity* (10 percent).

Even though almost one-third *thought about reducing/stopping use*, only 13 percent *spoke with someone about reducing or stopping use*, and only 4 percent had *attended counseling, a program, or a group to help reduce/stop use*, which is indicative of the need to expand intervention outreach and services (see Exhibit 25 below).

Marijuana use frequency differentiates the extent to which students report AOD dependency experiences. Frequent users are substantially more likely than infrequent users to report that they:

- *used alcohol or drugs when they were alone* (50 percent versus 26 percent),
- *had to increase the amount they used to have the same impact as before* (39 percent versus 18 percent),
- *used alcohol or drugs a lot more than intended* (26 percent versus 12 percent), and

- *didn't feel OK unless they had something to drink or used a drug* (15 percent versus 6 percent).

Frequent users were also more likely to report that they *thought about reducing or stopping use* (39 percent versus 21 percent).

Exhibit 25. Alcohol and Other Drugs Dependency Indicators by Frequency of Marijuana Use, Grade 11

Dependency-related indicator	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
I use alcohol or drugs but have not had any of the 10 experiences below	30.1	37.8	25.3
Used alcohol or drugs when you were alone	40.6	25.8	49.7
Thought about reducing or stopping use	32.2	21.2	39.0
Found you had to increase how much you use to have the same effect as before	31.1	18.0	39.2
Told yourself you were not going to use but found yourself using anyway	21.3	15.7	24.7
Used alcohol or drugs a lot more than you intended	20.8	12.3	26.0
Frequently spent a lot of time getting, using, or being hung over from using alcohol or other drugs	13.6	6.8	17.7
Spoke with someone about reducing or stopping use	12.8	8.4	15.5
You didn't feel OK unless you had something to drink or used a drug	11.9	6.3	15.3
Your use of alcohol or drugs often kept you from doing a normal activity	9.5	5.6	11.9
Attended counseling, a program, or a group to help you reduce or stop use	3.9	2.8	4.5
One or more indicators	54.6	41.4	62.7
Two or more indicators	37.7	25.6	45.2

Source: Biennial CHKS Data, 2019-21. HS B.10: ***If you use alcohol, marijuana, or another drug, have you had any of the following experiences? (Mark All That Apply.)***

Although marijuana and AOD use in general declined between 2017-19 and 2019-21, for each of the dependency indicators, percentages increased among current marijuana users. Experiencing one or more indicators increased by 8 percentage points (47 percent to 55 percent) and experiencing two or more indicators increased by 9 percentage points (29 percent to 38 percent). Percentages were five to six points higher for experiencing use tolerance, using more than intended, using alone, and using when not intending to. For almost all indicators, the increases occurred among both frequent and infrequent users (not shown). In contrast, there was a decline of 7 percentage points for *not* experiencing any indicator (from 37 percent to 30 percent) (see Exhibit 26).

The cessation-interest indicators also increased. The biggest change across administrative periods was an increase of 9 percentage points for thinking about stopping and reducing use (23 percent to 32 percent), 3 percentage points for speaking with someone about it (10 percent to 13 percent), and 2 percentage points for attending a program (2 percent to 4 percent).

Exhibit 26. Alcohol and Other Drugs Dependency Indicators Among Current Marijuana Users by CHKS Administration Period, Grade 11

Dependency-related indicator	2017-19 (%)	2019-21 (%)	Change (%)
I use alcohol or drugs but have not had any of the 10 experiences below	37.1	30.1	-7.0
Used alcohol or drugs when you were alone	36.3	40.6	4.3
Thought about reducing or stopping use	23.0	32.2	9.2
Found you had to increase how much you use to have the same effect as before	24.7	31.1	6.4
Told yourself you were not going to use but found yourself using anyway	14.6	21.3	6.7
Used alcohol or drugs a lot more than you intended	16.4	20.8	4.4
Frequently spent a lot of time getting, using, or being hung over from using alcohol or other drugs	11.0	13.6	2.5
Spoke with someone about reducing or stopping use	10.4	12.8	2.4
You didn't feel OK unless you had something to drink or used a drug	8.8	11.9	3.1
Your use of alcohol or drugs often kept you from doing a normal activity	8.5	9.5	1.0
Attended counseling, a program, or a group to help you reduce or stop use	2.4	3.9	1.5
One or more indicators	46.5	54.6	8.2
Two or more indicators	28.9	37.7	8.9

Source: Biennial CHKS Data, 2017-19 to 2019-21. HS B.10: ***If you use alcohol, marijuana, or another drug, have you had any of the following experiences? (Mark All That Apply.)***

Impacts of Alcohol and Other Drugs Use

Students were asked whether their AOD use *ever* caused them to have impacts on any of 11 personal, behavioral, or educational factors. At least one or more impacts was reported by 40 percent of current users and two or more by 22 percent. Frequent users were more likely to report these effects than were infrequent users, and they were twice as likely to report two or

more impacts (27 percent versus 13 percent) (see Exhibit 27 below).

Among current users, forgetting what happened or passing out was most commonly reported (23 percent), followed by issues related to emotions (18 percent), schoolwork (15 percent), and money (11 percent). Frequent users reported higher rates than did infrequent users on all the indicators, but the differences were greatest for forgetting or passing out (28 percent versus 16 percent), followed by problems with schoolwork (18 percent versus 9 percent) and money (14 percent versus 5 percent) (see Exhibit 27 below).

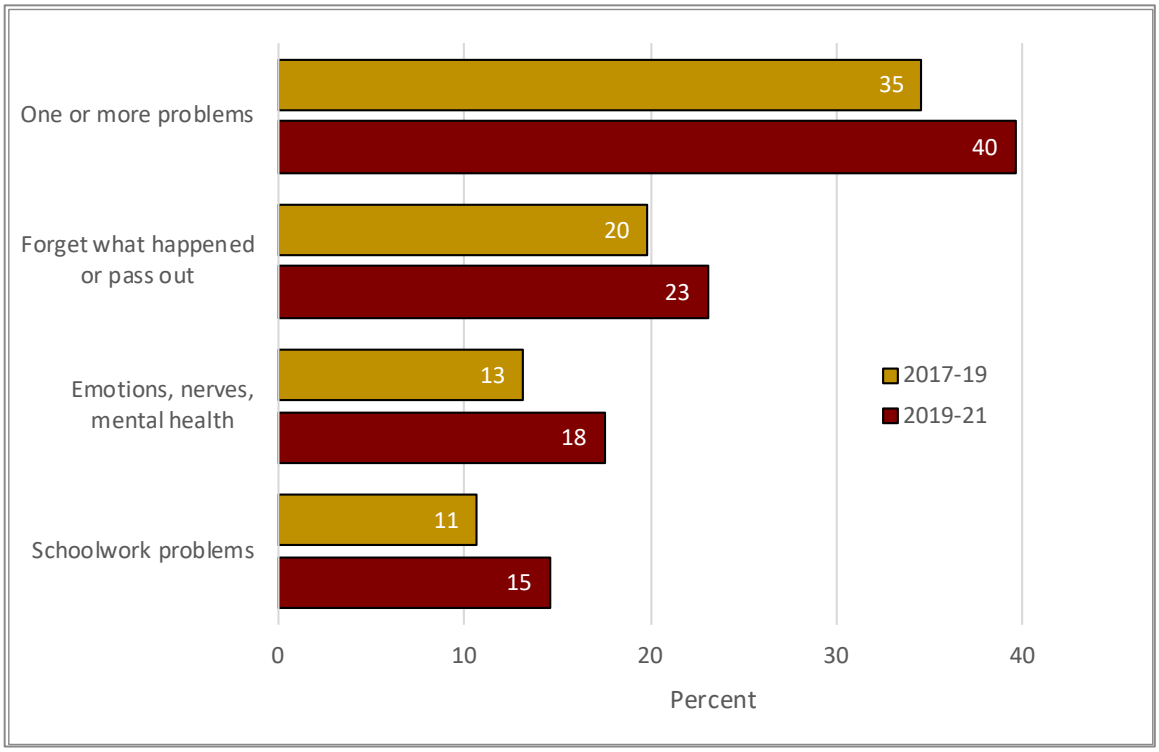
Exhibit 27. Impacts of Alcohol and Other Drugs Use by Frequency of Marijuana Use, Grade Eleven

Impacts of AOD use	Any current user (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
I've used alcohol or drugs but never had any 11 problems below	44.8	50.2	41.4
Forget what happened or pass out	23.1	15.5	27.7
Have problems with emotions, nerves, or mental health	17.5	14.4	19.4
Have problems with schoolwork	14.6	8.7	18.2
Have money problems	10.5	4.7	14.0
Get into trouble or have problems with the police	9.2	4.9	11.9
Damage a friendship	8.5	6.3	9.9
Miss school	7.7	4.8	9.5
Been suspended from school	6.9	3.9	8.7
Have unwanted or unprotected sex	6.2	3.1	8.1
Physically hurt or injure yourself	6.0	3.8	7.3
Fight with others	4.8	3.9	5.4
One or more impacts	39.6	29.2	45.9
Two or more impacts	21.7	13.4	26.7

Source: Biennial CHKS Data, 2019-21. HS B.9: *Has using alcohol, marijuana, or other drugs ever caused you to have any of the following problems? (Mark All That Apply.)*

Although marijuana use declined in 2019-21, percentages increased five points among current marijuana users for experiencing one or more indicators of AOD-related impacts (from 35 percent to 40 percent). There were increases in forgetting what happened or passing out (20 percent to 23 percent), problems with emotions (13 percent to 18 percent), and schoolwork (11 percent to 15 percent) (see Exhibit 28 below).

Exhibit 28. Impacts of Alcohol and Other Drugs Use Among Marijuana Users by Administration Period, Grade Eleven



Source: Biennial CHKS Data, 2017-19 to 2019-21. HS B.9: *Has using alcohol, marijuana, or other drugs ever caused you to have any of the following problems? (Mark All That Apply.)*
Note: This figure is fully described in the appendix (see Exhibit A28).

Mental Health

Among the most concerning findings from the Eighteenth Biennial CHKS was a four-year rise in the percentage of 11th graders (and 9th graders) who reported chronic sadness (feeling so sad or hopeless almost every day for two or more weeks in the past 12 months that they stopped doing some usual activities) (Austin et al., 2023). Chronic sadness was more pronounced among any current users than nonusers (61 percent versus 39 percent). Frequency of use was not strongly related to this indicator. The mental health indicator *chronic sadness* was only higher for frequent users than infrequent users (61 percent versus 59 percent).

Contemplating suicide in the past 12 months was reported by 30 percent of any current users, about twice the percentage of nonusers (14 percent). As with chronic sadness, there was not a strong relationship with frequency of use. The rate for frequent users was only 3 percentage points higher than that for infrequent users (31 percent versus 28 percent) (see Exhibit 29 below).

Exhibit 29. Mental Health by Frequency of Marijuana Use, Grade Eleven

Mental health indicator	Nonuser (%)	Current User (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Chronic sadness	39.4	60.5	59.1	61.4
Suicide ideation	14.3	29.9	28.3	30.9

Source: Biennial CHKS Data, 2019-21. HS A.124: ***During the past 12 months, did you feel so sad or hopeless almost every day for two weeks or more that you stopped doing some usual activities?*** **HS A.125:** ***During the past 12 months, did you ever seriously consider attempting suicide?***

School Engagement and Performance

Consistent with the relatively high ranking of AOD use–related impacts on schoolwork that current marijuana users reported, frequency of current use was negatively associated with the survey's educational indicators. Current users reported substantially lower levels than nonusers for academic motivation (5 percent versus 66 percent) and having usual class grades of As and Bs (48 percent versus 64 percent). Similarly, they were more than twice as likely to have missed 3 or more days of school in the past 30 days (26 percent versus 12 percent), an indicator of chronic absenteeism.

Reasons for Being Absent from School

To provide insight into school absenteeism, respondents were asked which of eight reasons may have caused them to miss a day of school in the past 30 days. Current users are 15 times more likely than nonusers to report alcohol or drugs as a reason for their absence. Current users are more likely than nonusers to have experiences that negatively impact attendance. Frequent users were more likely than nonusers to experience illness (10.3 percentage points), lack of sleep (15.4 points), sadness, hopelessness, and anxiety

Current users were about two times more likely than nonusers to select lack of sleep (25 percent versus 12 percent) and sadness, hopelessness, and anxiety (21 percent versus 10 percent). Current users were three times more likely than nonusers to have missed school because they were bored or uninterested (15 percent versus 5 percent) and two times more likely to be behind in schoolwork (17 percent versus 8 percent).

Exhibit 30. Pupil Engagement by Frequency of Marijuana Use, Grade Eleven

Indicator	Nonusers (%)	Any current users(%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Academic motivation	65.8	51.5	55.0	49.3
Absences				
0 days	54.4	34.5	39.7	31.3
1 or more days	45.6	65.5	60.3	68.7
3 or more days	12.2	26.2	22.2	28.8
Reasons for absence				
Illness	40.4	49.3	47.2	50.7
Not enough sleep	12.0	24.9	21.0	27.4
Sad, hopeless, anxious	9.5	21.1	20.3	21.7
Behind in schoolwork	7.5	16.7	17.1	16.5
Bored/uninterested in school	4.5	15.1	10.4	18.1
Care/help for family member	5.0	9.7	9.2	10.1
Used alcohol or drugs	0.4	6.2	2.2	8.9
Wanted to spend time with friends	1.2	5.9	6.6	5.4
Grades				
As and/or Bs	64.3	47.6	54.0	43.5

Source: Biennial CHKS Data, 2019–21. HS A.51–54: ***How strongly do you agree or disagree with the following statements? I try hard to make sure that I am good at my schoolwork. I try hard at school because I am interested in my work. I work hard to try to understand new things at school. I am always trying to do better in my schoolwork.*** **HS A.22, 26, 24:** ***In the past 30 days, how often did you miss an entire day of school for any reason?*** **[In-school and Hybrid only]** ***In the past 30 days, how often did you miss an entire day of remote learning classes for any reason?*** **[Remote and Hybrid only] HS A.37–39:** ***In the past 30 days, did you miss a day of school for any of the following reasons? (Mark All That Apply.)*** **[In-school and Hybrid only]** ***In the past 30 days, did you miss a day of school from home for any of the following reasons? (Mark All That Apply.)*** **[Remote only] HS A.36:** ***During the past 12 months, how would you describe the grades you mostly received in school?***

Summary and Discussion

Although the 2019–21 survey results indicated that current marijuana use had declined among 11th graders since 2017–19, it was still reported by 12 percent that it has become more common than current use of ATOD, and there are many reasons to be concerned about use trends and the well-being of users.

The Needs of Current Users

This study's results reinforce those from 2017–19 in showing that current marijuana users are more likely than nonusers to

- use alcohol, other drugs, and vaping devices and engage in AOD use to get high;
- report a wide range of dependency-related indicators; and
- experience a wider range and higher levels of educational, behavioral, and social–emotional issues, some of which they perceive as a consequence of their AOD use.

These negative findings were also greater among frequent users than infrequent users. Moreover, marijuana users' needs requiring intervention may have worsened compared to 2017–19, as evidenced by

- increases in disapproval of marijuana use in the eleventh-grade population as a whole that was not evident among marijuana users;
- moderate increases among users, but not nonusers, in 30-day alcohol use, binge drinking, use of vaping devices, and problematic patterns of marijuana use (for example, liking to use a lot/get really high);
- greater increases in reported AOD dependency indicators and problems due to AOD use among marijuana users; and
- greater increases in chronic sadness and adverse educational experiences among users than among nonusers.

Mental Health

Although an adolescent mental health crisis, possibly exacerbated by the COVID-19 pandemic, is well-documented (Office of the Surgeon General 2021), one of the most troubling findings from this and the previous marijuana report is the greater extent to which current marijuana users report mental health issues, which seem to both influence their AOD use and be negatively affected by it.

- Current marijuana users were 1.5 times more likely than nonusers to have experienced chronic sadness (61 percent) and 2 times more likely to have contemplated suicide (30 percent).
- Marijuana users were two times more likely to report missing school in the past 30 days because they felt very sad, hopeless, anxious, stressed, or angry (21 percent versus 10 percent), the third most selected reason for being absent.
- Issues related to emotional well-being were prominent among identified reasons for AOD use. Almost half of current marijuana users selected problem avoidance and a desire to feel better as a reason for AOD use. About one-third reported using AOD to get through the day or because of anger and frustration. In addition, regarding dependency indicators, over one-tenth reported that they did not feel OK unless they had something to drink or used a drug.
- Almost one-fifth (18 percent) of current marijuana users reported that mental health problems resulted from their AOD use, which was the most selected use-related impact. This was a five percentage point increase since 2017–19, one of the few such impacts that increased (along with schoolwork problems and passing out).

Educational Issues

Issues related to education also stand out among current users. This suggests that efforts to prevent use and address the needs of users should be incorporated into school improvement efforts. Current users reported substantially lower levels of academic motivation and performance (self-reported grades) than did nonusers, and they were more than twice as likely to have missed 3 or more days of school in the past 30 days. Indicative of the adverse impacts of AOD use on these indicators, 15 percent of current marijuana users reported they had a use-related problem with schoolwork, 8 percent selected school attendance, and 6 percent identified AOD use as a reason for absenteeism in the past month.

One factor that may account for this association is that, as reported in 2017–19, current use of marijuana on school property exceeds that of all other substances among all 11th graders and occurred among 46 percent of current users. And one factor that may account for this is that marijuana vaping and oral ingestion is easier to conceal on school property than smoking is.

Current Use Trends

The reported reduction in marijuana use in 2019–21 was part of an unprecedented decline of substance use in general found over this period in California and nationally (Hanson and Puckett 2021; Johnston et al. 2022). As discussed in more detail in the main Biennial CHKS report (Austin et al. 2023), this broad decline has been linked to the unique conditions of the COVID-19 pandemic and the social isolation that resulted, which reduced AOD access and opportunities to use. The pandemic may also account for the rise in negative attitudes toward AOD use, as this primarily occurred among nonusers who may have been cut off from exposure from their peers that use and have more positive views.

Whether these findings reflect a long-term change or are just a short-term product of pandemic conditions remains to be seen, but they raise the possibility that use will rebound now that conditions are normalizing, students have returned to school, and social distancing has subsided. The results of the last two Biennial CHKSs, taken together, add support to the likelihood that a rebound in adolescent marijuana use might be found in the 2021–23 survey. The leveling off in 2017–19 of the previous decline in use appeared to be related to three factors: a weakening of negative attitudes about use, a rise in perceptions of availability, and the growth of oral ingestion and vaping (Austin et al. 2021a, 2021b). Similar factors are evident with regard to the 2019–21 results:

- Even with the overall rise in negative attitudes toward marijuana, indicators of disapproval of it remained lower than for tobacco, and marijuana's popularity continued to rise relative to alcohol and tobacco.
- The growing number of marijuana dispensaries appears to be helping facilitate use, as half of current users (54 percent) and 60 percent of frequent users identified them as a source where most students procured marijuana.
- The popularity of noncombustible marijuana products continues to rise.

The Rise of Vaping and Oral Ingestion

The availability and popularity of noncombustible products are arguably the most important drivers of marijuana use today. As discussed in the 2017–19 reports (Austin et al. 2021a, 2021b), the increase in the availability of vaping devices and edible marijuana over the past decade has dramatically changed adolescent use culture and may help account for the increase in marijuana's popularity relative to alcohol. Eleventh graders are now more likely to use vaping devices for consuming marijuana than tobacco. Among current users, lifetime rates for vaping

and oral ingestion both increased in the past two years, while marijuana smoking remained stable. Vaping and smoking marijuana are now almost equivalent (88 percent and 91 percent, respectively), and oral ingestion is almost as prevalent (77 percent). This was even true among nonusers who had used marijuana but not in the past 30 days. And although marijuana vaping was higher among frequent users than infrequent users, it increased more in the past two years among the infrequent users. This in itself may portend increases in overall adolescent marijuana use in the future.

Research indicates that three perceived attributes underlie the popularity of adolescent vaping and oral ingestion of marijuana compared to smoking it (Barrus et al. 2016; Sharma et al. 2023). These alternative methods are deemed safer and more socially acceptable and make it easier to conceal and covertly use. These perceived attributes also prompt concerns that the pervasiveness of vaping could result in earlier first use and more positive initial experiences, adding to the risk of higher prevalence and frequency of marijuana use and associated problems (Sharma et al. 2023).

Ongoing monitoring and prevention efforts targeting noncombustible marijuana use are important to ensure future reductions in overall use. Research should focus on assessing the etiology (including the impact of the legalization of adult recreational use), user characteristics, and short- and long-term impacts of the different modes and combinations of consumption, and whether these alternative modes of use may require different approaches to prevention and intervention.

Conclusion

The results from the past two Biennial CHKSs show that current marijuana use is a marker for possible AOD use involvement, use-related problems, and a wide range of educational and other behavioral health issues—problems that may be increasing within the user population. Prevention and intervention efforts are essential to counter marijuana's popularity and the conditions contributing to it, to reduce use, and to address user needs and the problems they experience. Especially given the subsiding of pandemic use-dampening conditions, without focusing more attention on marijuana, use may increase along with the educational and behavioral health challenges that youth experience.

Efforts to reduce marijuana use are more likely to be effective if they are integrated with overall behavioral health services and school improvement efforts. The correlational nature of CHKS data limits the ability to draw causal conclusions, but the data from both the 2017–19 and 2019–21 Biennial CHKSs shows that marijuana use, mental health issues, and disengagement from school are interrelated. Intervention programs targeting marijuana users should take a whole-child approach. Programs should not simply focus on discouraging substance use but also provide supports to address the social–emotional and educational difficulties that students may be experiencing. Similarly, programs to help students who are disengaged from school and experiencing social–emotional difficulties need to take into consideration the role marijuana use may play.

It is evident that existing AOD use intervention outreach and services are not sufficient. The rise in indicators of disapproval of marijuana among nonusers did not occur among current users. Although this may be a short-term result of the pandemic, this indicates that more messaging is needed that targets the user population. That almost one-third of current marijuana users had thought about stopping or reducing use—a substantial two-year increase—is offset by the low percentage that had spoken to someone about it and the negligible percentage that had attended counseling.

Now that pandemic conditions have subsided, youth have returned to in-person learning at school and social interactions have increased, prevention and intervention efforts are critically important to help prevent resurgence of use. If increases in adolescent marijuana use do occur, this likely will contribute to increasing the educational and mental health challenges that schools and community agencies must address if youths are to succeed and thrive. To guide

these efforts and ensure they meet the needs of users, it is equally important to continue monitoring and studying the characteristics of users, their patterns of use and reasons for using, and their experiences.

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Appendix A. Extended Figure Descriptions

Exhibit A1. Lifetime Marijuana and Alcohol Use by CHKS Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Substance	Administration period	1 time (%)	2 to 3 times (%)	4 or more times (%)	Totals (%)
Marijuana	**13–15**	5.7	7.0	25.1	**37.8**
	15–17	5.4	6.0	20.5	**31.9**
	17–19	5.3	5.1	18.8	**29.2**
	19–21	4.4	4.3	15.9	**24.6**
Alcohol	**13–15**	7.6	11.1	33.0	**51.7**
	15–17	7.4	9.9	25.6	**42.9**
	17–19	7.1	9.1	19.4	**35.6**
	19–21	5.9	7.0	17.4	**30.3**

See Exhibit 1.

Exhibit A2. Current Marijuana and Alcohol Use by CHKS Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Substance	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Marijuana	13–15	7.8	14.5	**22.3**
	15–17	6.8	11.0	**17.8**
	17–19	6.1	10.2	**16.3**
	19–21	3.9	7.5	**11.5**
Alcohol	13–15	16.6	12.5	**29.1**
	15–17	14.8	7.8	**22.6**
	17–19	10.4	5.5	**15.9**
	19–21	9.2	4.4	**13.6**

See Exhibit 2.

Exhibit A3. Current Marijuana Use by Gender and CHKS Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Gender	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Male	13–15	7.8	14.5	**22.3**
	15–17	6.8	11.0	**17.8**
	17–19	6.1	10.2	**16.3**
	19–21	3.9	7.5	**11.5**
Female	13–15	7.8	10.1	**17.8**
	15–17	8.0	7.5	**15.4**
	17–19	7.2	8.3	**15.5**
	19–21	5.4	7.3	**12.8**

See Exhibit 3.

Exhibit A4. Current Marijuana Use by Gender Identity and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Gender identity	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Transgender	17–19	14.5	19.8	**34.2**
	19–21	7.7	7.6	**15.3**
Not Transgender	17–19	6.6	9.1	**15.8**
	19–21	4.6	7.5	**12.0**
Not sure	17–19	9.5	15.3	**24.7**
	19–21	5.7	6.0	**11.7**

See Exhibit 4.

Exhibit A5. Current Marijuana Use by Sexual Orientation and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Sexual orientation	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Straight	17–19	6.4	8.8	**15.2**
	19–21	4.4	6.9	**11.3**
Gay or lesbian	17–19	11.3	12.6	**24.0**
	19–21	3.5	7.6	**11.1**
Bisexual	17–19	9.6	14.7	**24.2**
	19–21	7.1	13.0	**20.1**
Not sure	17–19	8.0	12.1	**20.1**
	19–21	5.2	11.7	**16.8**
Something else	17–19	8.4	10.7	**19.2**
	19–21	5.7	8.7	**14.4**

See Exhibit 5.

Exhibit A6. Current Marijuana Use by Race/Ethnicity and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Race/Ethnicity	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
American Indian	13–15	7.9	14.1	**22.0**
	15–17	7.0	15.7	**22.8**
	17–19	8.3	13.2	**21.6**
	19–21	1.7	12.9	**14.6**
Asian American	13–15	2.6	4.1	**6.6**
	15–17	3.5	2.5	**6.0**
	17–19	3.3	3.8	**7.1**
	19–21	2.6	1.9	**4.5**
African American	13–15	7.2	17.2	**24.4**
	15–17	7.4	12.9	**20.3**
	17–19	5.4	10.2	**15.6**
	19–21	3.6	9.0	**12.6**
Hispanic	13–15	8.3	12.7	**21.0**
	15–17	7.9	9.4	**17.2**
	17–19	6.6	9.6	**16.2**
	19–21	4.9	7.5	**12.4**

Race/Ethnicity	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Pacific Islander	13–15	6.4	10.5	**16.9**
	15–17	6.5	11.4	**17.9**
	17–19	8.5	8.3	**16.7**
	19–21	4.5	9.6	**14.1**
White, non-Hispanic	13–15	9.0	13.3	**22.2**
	15–17	7.9	11.0	**18.9**
	17–19	9.0	10.6	**19.5**
	19–21	5.5	9.4	**14.8**
Mixed races	13–15	8.8	16.4	**25.2**
	15–17	8.8	9.9	**18.7**
	17–19	6.8	12.0	**18.8**
	19–21	6.4	9.5	**15.9**

See Exhibit 6.

Exhibit A7. Current Marijuana Use by English Language Proficiency and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

English language proficiency	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
English only	15–17	7.9	10.4	**18.3**
	17–19	7.6	10.6	**18.1**
	19–21	4.9	8.4	**13.4**
English proficient	15–17	6.5	7.3	**13.9**
	17–19	5.5	7.0	**12.5**
	19–21	4.2	5.8	**10.0**
Not English proficient	15–17	6.4	7.5	**13.9**
	17–19	5.4	7.1	**12.4**
	19–21	4.1	5.1	**9.2**

See Exhibit 7.

Exhibit A8. Current Marijuana Use by Parental Education and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Parental education	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Less than high school	13–15	8.0	13.8	**21.8**
	15–17	7.4	9.8	**17.3**
	17–19	7.4	10.2	**17.5**
	19–21	5.6	8.5	**14.1**
High school degree	13–15	8.0	12.9	**20.9**
	15–17	7.3	10.9	**18.2**
	17–19	7.2	10.3	**17.6**
	19–21	5.3	8.4	**13.8**
Some college	13–15	8.6	13.3	**21.9**
	15–17	8.7	10.8	**19.5**
	17–19	6.8	11.0	**17.8**
	19–21	3.9	8.9	**12.8**
College degree	13–15	7.1	11.4	**18.5**
	15–17	7.2	7.7	**14.9**
	17–19	6.8	7.9	**14.7**
	19–21	4.6	6.8	**11.4**

See Exhibit 8.

Exhibit A9. Current Marijuana Use by Living Status and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Living status	Administration period	Infrequent users (1–2 days per month) (%)	Frequent users (3–30 days per month) (%)	Totals (%)
Home with parent/guardian	13–15	7.6	11.6	**19.2**
	15–17	7.3	8.9	**16.2**
	17–19	6.8	8.8	**15.6**
	19–21	4.5	7.1	**11.6**
Foster home	13–15	6.5	23.7	**30.2**
	15–17	13.1	22.4	**35.5**
	17–19	12.1	20.0	**32.1**
	19–21	18.2	15.0	**33.1**
Unhoused	13–15	12.6	44.0	**56.5**
	15–17	8.4	27.3	**35.7**
	17–19	10.6	23.2	**33.8**
	19–21	11.4	16.0	**27.4**
Other	13–15	10.1	14.6	**24.7**
	15–17	8.1	12.7	**20.9**
	17–19	6.2	13.3	**19.5**
	19–21	6.3	10.7	**17.1**

See Exhibit 9.

Exhibit A12. Drug Consumption Preferences by Frequency of Marijuana Use, Grade 11

A color-coded bar chart displays the data represented in the table below.

Consumption pattern	None (%)	Any (%)	Infrequent (1–2 days) (%)	Frequent (3–30 days) (%)
Just enough to feel a little high	4.3	17.5	31.3	9.2
Enough to feel it moderately	3.6	34.0	33.1	34.5
Until I feel it a lot or get really high	2.0	40.3	21.4	51.7

See Exhibit 12.

Exhibit A14. Methods of Consumption Among Current Users by CHKS Administration Period, Grade Eleven

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Method of consumption	2017–19 (%)	2019–21 (%)
Smoke	92.4	90.6
Vape marijuana	78.4	88.5
Ingest orally	72.9	76.7
Smoke, vape, and ingest orally	58.9	67.0

See Exhibit 14.

Exhibit A16. Personal Disapproval of Marijuana Use Among All Students, Nonusers, and Current Marijuana Users by Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Use category	Student category	2017–19 (%)	2019–21 (%)
Experimental use	All students	40.7	43.7
	Non-users	46.3	48.4
	Current users	11.3	11.8
Use once a month or more	All students	48.8	52.5
	Non-users	54.9	57.6
	Current users	17.2	17.4

See Exhibit 16.

Exhibit A19. Sources of Marijuana Among Knowledgeable Students by CHKS Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below.

Source	2017–19 (%)	2019–21 (%)
Bars or clubs	9	7
Other	20	19
Concerts or social events	36	31
Dispensary	36	37
Adult acquaintance	45	47
Home	47	46
School	54	52
Parties	71	63
Friends or another teenager	83	82

See Exhibit 19.

Exhibit A22. Reasons for Alcohol and Other Drugs Use by Frequency of Marijuana Use and Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Reasons	2017–19 (%)	2019–21 (%)
To get away from problems	44.7	41.2
	52.9	58.7
Boredom	26.9	32.8
	38.3	49.4
Anger or frustration	28.5	21.9
	38.7	44.0

See Exhibit 22.

Exhibit A24. Alcohol and Other Drugs Use Among All Students, Nonusers, and Current Marijuana Users by Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below. Arrows are used in the chart to indicate changes in the data across administration periods for each category.

Alcohol and other drug use	Student category	2017–19 (%)	2019–21 (%)
Current alcohol use	All students	16.0	13.7
	Non-users	8.2	7.4
	Current users	56.6	59.9
Current binge drinking	All students	8.5	7.4
	Non-users	3.0	2.9
	Current users	37.1	39.8
Current vaping	All students	11.3	9.9
	Non-users	3.5	3.5
	Current users	51.6	56.5

See Exhibit 24.

Exhibit A28. Impacts of Alcohol and Other Drugs Use Among Marijuana Users by Administration Period, Grade 11

A color-coded bar chart displays the data represented in the table below.

Impacts	2017–19 (%)	2019–21 (%)
Schoolwork problems	11	15
Emotions, nerves, mental health	13	18
Forget what happened or pass out	20	23
One or more problems	35	40

See Exhibit 28.