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Cannabis Research Center
University of Minnesota

AUGUST 2024

Cannabis Use and Perceptions Among Minnesota High School Students

Before Legalization of Adult-Use, Fewer Youth Reported Using Cannabis

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Summary

Using data from the Minnesota Student Survey, this brief examines Minnesota 9th and 11th grade students' (i.e., high school students) self-reported use of cannabis and other substances, including alcohol, tobacco, and nicotine-vaping products. The data presented here predate the state's 2023 legalization of cannabis for non-medical use by adults, offering a baseline for future research to understand potential public health implications on youth.

In just over a decade, the United States has seen a dramatic shift in cannabis policy. While cannabis remains a prohibited substance by the federal government, which typically uses the alternative name "marijuana," 24 states have legalized cannabis for non-medical use by adults. Together, states that have legalized cannabis comprise a majority of the U.S. population.

The decision by those states to restrict cannabis to adults — setting a minimum age of 21 to use and purchase, similar to alcohol and tobacco — reflects common concerns about the potential for cannabis use to harm youth. While research on the public health implications of cannabis use is limited, studies have found associations between adolescent use of cannabis and a variety of negative outcomes, including lower educational attainment and worse school performance, as well as mental health and substance use disorders.[1,2,3,4]

Despite minimum age laws and other related policies intended to limit access, concerns remain that legalization could nonetheless result in increased cannabis use by underage youth. Data from other states, such as Colorado and Washington, have generally not found clear increases in underage cannabis use since legalization.[5,6] In fact, some studies have found declines in cannabis use by youth since legalization, following a long-term trend of decreasing substance use by youth.[7] However, it is not yet clear whether similar results will materialize in other states that have legalized cannabis. States that legalized cannabis more recently may have different demographics, cultures, and policies than those that legalized adult-use cannabis earlier.

As Minnesota implements its 2023 legislation that legalized adult-use cannabis, monitoring rates of underage cannabis use and related issues will be critical. This report is designed to provide pre-legalization baseline data on cannabis use and perceptions among Minnesota high school students.

We used data from the Minnesota Student Survey, which is conducted every three years in schools throughout the state. For our study, we examined data from 2016, 2019, and 2022, focusing on responses from 9th and 11th grade students enrolled in public schools (excluding elementary school- and middle school-age students). We focus primarily on data from 2022, the most recent survey year available, and reference other years of data mainly in discussing trends. Though these data do not include responses from 10th and 12th graders, who are not included in the survey, we colloquially refer to these respondents as "high school students" for ease of presentation of the data.[8] However, it is worth acknowledging that these data may not represent all ages of high school students; other surveys have found that 12th graders tend to use substances, including cannabis, at higher rates than younger high school students.[9]

As context for the cannabis estimates, we also present similar data on Minnesota high school students' use and perceptions of alcohol and nicotine products (both tobacco and "vaping" or e-cigarettes). Our study focuses on three main measures:

- Whether students reported having *never used cannabis*
- Whether students reported having used cannabis in the *past 30 days*
- Whether students believed that *most of their peers* are using cannabis

When comparing estimates, we tested for statistical significance using *t*-tests (e.g., comparing estimates between difference substances, or comparing them for changes over time). Charts included in this report indicate whether differences were found to be statistically significant; note that all differences described in the report text are statistically significant unless noted otherwise.

Through most of the report, we round estimates to the nearest whole number. This was done for two reasons. First, we round for ease of presentation. Second, we round to avoid giving a false sense of precision in the estimates. While there is some degree of uncertainty in all survey data, this is particularly true in circumstances such as reporting substance use, in which people might be hesitant to respond truthfully due to concerns about consequences or simply discomfort with reporting something that carries stigma.

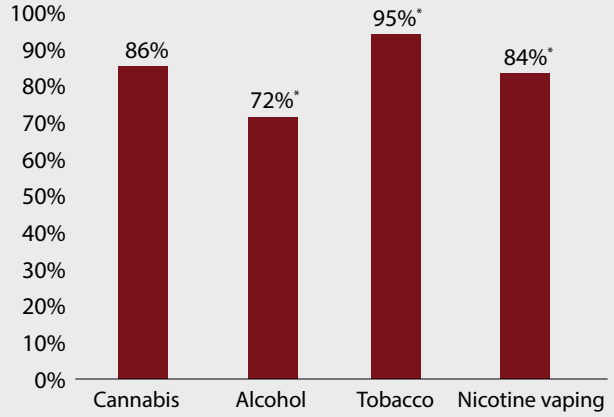
Most Minnesota high school students said they've never used cannabis

The first important finding from our study is that most Minnesota high school students said they had never used cannabis.

While it may seem counterintuitive to describe the percentage of students who report *having never used cannabis* — rather than the much smaller share who do report having used cannabis — it helps to dispel a common misconception that cannabis (and other substance use) is the norm rather than the exception among high school students.

In 2022, 86% of high school students in Minnesota said they had never used cannabis, with the corollary that only 14% said they had used cannabis at least once.[10] By comparison, the percentage of students saying they had never used tobacco products was significantly higher at 95%. However, the percentage of students who reported never having used nicotine vaping products was significantly lower at 84%, as was the percentage who reported having never used alcohol at 72%. Together, these estimates tell us that Minnesota high school students were more likely to use alcohol and vape nicotine than use cannabis, but they are more likely to report trying cannabis than tobacco.

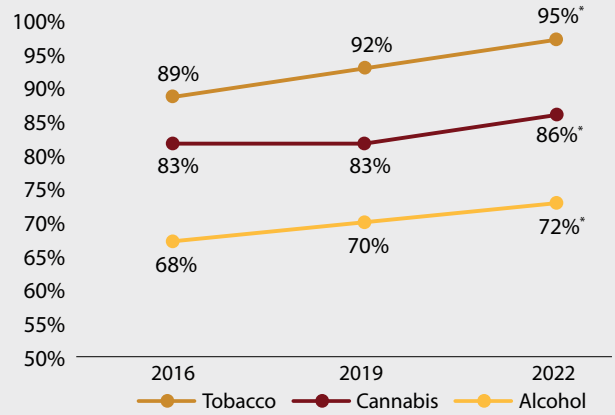
Figure 1: Percentage of Minnesota 9th and 11th Graders Who Have Never Used Cannabis and Other Substances, 2022



Source: SHADAC/CRC analysis of Minnesota Student Survey
* Significantly different from cannabis at 95% confidence level

Since 2016, the percentage of Minnesota high school students who report having never used cannabis increased from 83% to 86% — or, put another way, the percentage reporting that they *have* used cannabis has declined over time. Reported use of tobacco and alcohol showed a similar pattern during the same time frame, with the percentage reporting they had never used tobacco increasing from 89% to 95% and the percentage reporting they had never consumed alcohol increasing from 68% to 72%. Data on nicotine vaping were not available in the 2016 survey, so a trend analysis was not possible for this or any other section of this report.

Figure 2: Percentage of Minnesota 9th and 11th Graders Who Have Never Used Cannabis and Other Substances, 2016-2022

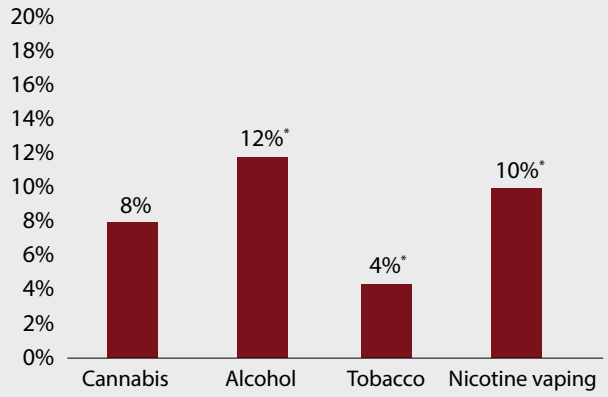


Source: SHADAC/CRC analysis of Minnesota Student Survey
* Significantly different from 2016 at 95% confidence level

Fewer than one in ten high school students reported having used cannabis in the past 30 days

Another key finding is that fewer than one in ten Minnesota high school students reported having used cannabis in the past 30 days, with 8% of respondents reporting using cannabis in the past 30 days in 2022.[11] That was significantly lower than the percentages who reported using nicotine vaping products (10%) and alcohol (12%)[12] in the past 30 days, but it was significantly higher than the percentage who reported using tobacco (4%) in the past 30 days.

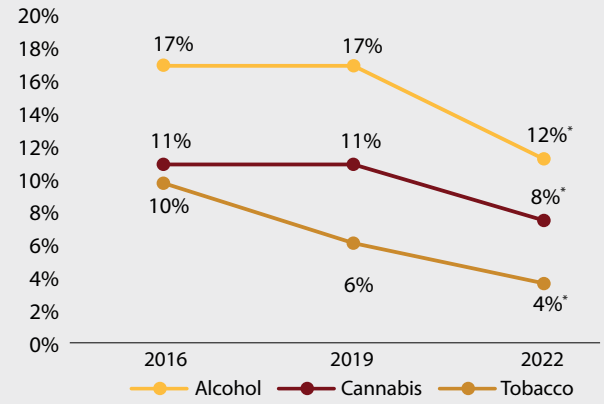
Figure 3: Percentage of Minnesota 9th and 11th Graders Who Have Used Cannabis and Other Substances in the Past 30 Days, 2022



Source: SHADAC/CRC analysis of Minnesota Student Survey
* Significantly different from cannabis at 95% confidence level

From 2016 to 2022, the percentage of students who reported using cannabis in the past 30 days declined from 11% to 8%. The percentage of students who reported using tobacco and alcohol also declined.

Figure 4: Percentage of Minnesota 9th and 11th Graders Who Have Used Cannabis and Other Substances in the Past 30 Days, 2016-2022



Source: SHADAC/CRC analysis of Minnesota Student Survey
* Significantly different from 2016 at 95% confidence level

Recent cannabis use varied across demographic subgroups in 2022

Although 8% of Minnesota's 9th and 11th grade population reported having used cannabis in the past 30 days, our study found that percentage varied across demographic subgroups. We analyzed 2022 data by several demographic categories.

Demographic categories we assessed include:

- Race and ethnicity
- Sex
- Gender identity
- Sexual orientation
- Geographic region

We did not assess trends for all demographic categories because the subcategories in the survey have changed over time.

Race and ethnicity

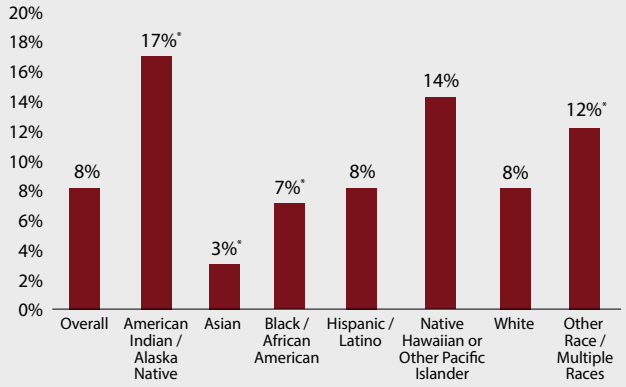
Our analysis compared racial and ethnic subgroups to the overall Minnesota high school student population — rather than comparing one subgroup against another — as there was not an obvious "best" reference group.[13] As shorthand, we call the rate for the overall 9th and 11th grade population the "population average."

Students who identified as Asian and students who identified as Black/African American were less likely to report cannabis use in the past 30 days compared to the population average of 8% (3% and 7%, respectively) in 2022. Students who identified

as Hispanic/Latino, Native Hawaiian or other Pacific Islander, or White reported cannabis use in the past 30 days that was not significantly different from the population average (8%, 14%, and 8%, respectively). Students who identified as American Indian/Alaska Native and those who identified as other or multiple races reported cannabis use in the past 30 days that was significantly higher than the population average (17% and 12%, respectively).

Those findings represent departures from 2016 data in several cases. In 2016, Black, Latino, and Native Hawaiian and Pacific Islander students reported higher rates of cannabis use than the population average; and White students reported lower rates of cannabis use than the population average.

Figure 5: Percentage of Minnesota 9th and 11th Graders Who Have Used Cannabis in the Past 30 Days by Race and Ethnicity, 2022

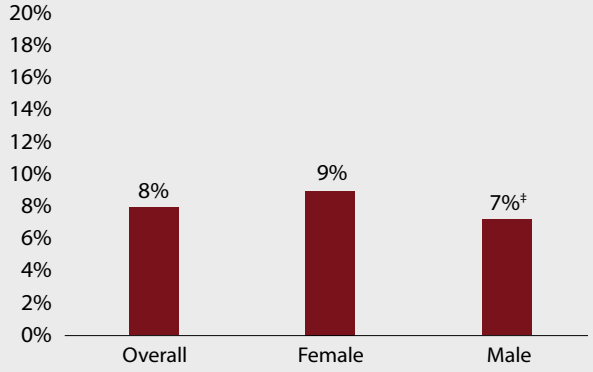


Source: SHADAC/CRC analysis of Minnesota Student Survey
* Significantly different from overall at 95% confidence level

Sex

The survey asked students their sex as assigned at birth, with response options of male and female. Female students were more likely than male students to report having used cannabis in the past 30 days (9% vs. 7%, respectively) in 2022. That represented a change from 2016, when male students were more likely to report cannabis use in the past 30 days than female students (11% vs. 10%, respectively).

Figure 6: Percentage of Minnesota 9th and 11th Graders Who Have Used Cannabis in the Past 30 Days by Sex, 2022



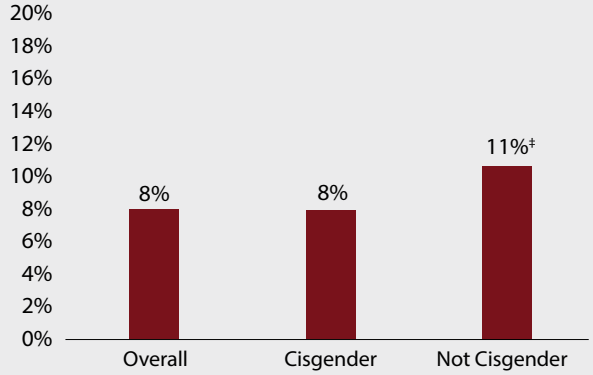
Source: SHADAC/CRC analysis of Minnesota Student Survey
‡ Significantly different from female at 95% confidence level

Gender identity

The 2022 survey also asked students about their gender identity, with multiple response options, including cisgender (i.e., gender identity matching that assigned at birth), transgender (i.e., gender identity that does not match that assigned at birth), as well as other options, including non-binary gender, agender, two spirit, and questioning/unsure. Due to relatively small numbers of responses for some response categories, we aggregated the data into "cisgender" and "not cisgender" to produce statistically reliable estimates.[14]

Students who identified as cisgender (i.e., those who identify with their gender as assigned at birth) were less likely to report having used cannabis in the past 30 days than students who did not identify as cisgender (i.e., those identify as transgender, nonbinary, etc.) in 2022 (8% vs. 11%, respectively). We see that pattern in 2016 data as well.

Figure 7: Percentage of Minnesota 9th and 11th Graders Who Have Used in the Past 30 Days by Gender Identity, 2022



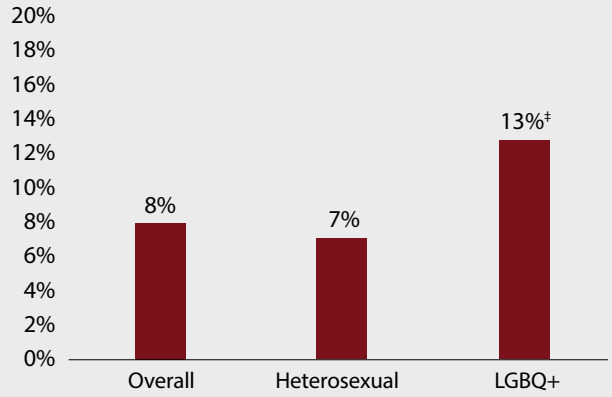
Source: SHADAC/CRC analysis of Minnesota Student Survey
‡ Significantly different from cisgender at 95% confidence level

Sexual orientation

In 2022, the survey also asked students about their sexual orientation, with response options including straight or heterosexual, gay or lesbian, bisexual, as well as asexual, pansexual, queer, and questioning/unsure. Due to relatively small numbers of responses for some response categories, we aggregated the data into "heterosexual" and "LGBQ+" (minus the "T" which is often included in LGBTQ+, since transgender was measured separately in the gender-identity question) to produce statistically reliable estimates.

Students who identified as heterosexual were less likely than those who identified as LGBQ+ to report having used cannabis in the past 30 days in 2022 (7% vs. 13%, respectively). Comparable data were not available for 2016.

Figure 8: Percentage of Minnesota 9th and 11th Graders Who Have Used Cannabis in the Past 30 Days by Sexual Orientation, 2022



Source: SHADAC/CRC analysis of Minnesota Student Survey
‡ Significantly different from heterosexual at 95% confidence level

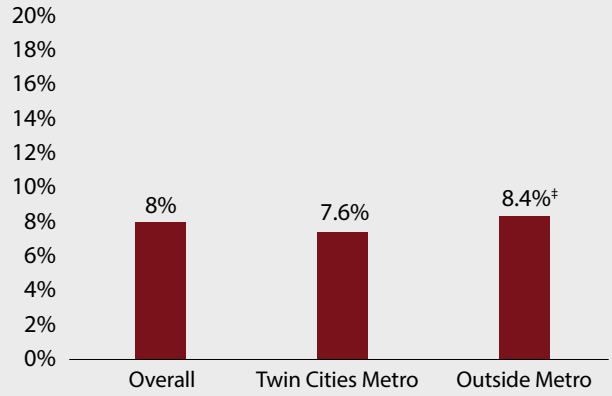
Geographic region

Geographic region is the only section of this report in which we do not round estimates to whole numbers. We present single decimals points in this section because there is a statistically significant difference in the estimates, but that difference would have been obscured by rounding to the nearest whole number as the difference itself is less than one percentage point.

Students in the Twin Cities metropolitan area reported using cannabis in the past 30 days at a rate significantly lower than students outside the metro in 2022, (7.6% vs. 8.4%). That relationship flipped from 2016, when the rate was higher among students in the Twin Cities metro than for students outside the metro.

Although the difference in cannabis use between Twin Cities high school students and high school students outside the metro was *statistically* significant as measured by the Minnesota Student Survey, that does not necessarily mean the difference is *meaningful* from a practical perspective. A difference between two subgroups of less than one percentage point is relatively small, even if that difference can be measured within a certain level of confidence.

Figure 9: Percentage of Minnesota 9th and 11th Graders Who Have Used Cannabis in the Past 30 Days by Geographic Region, 2022



Source: SHADAC/CRC analysis of Minnesota Student Survey
‡ Significantly different from Twin Cities metro at 95% confidence level

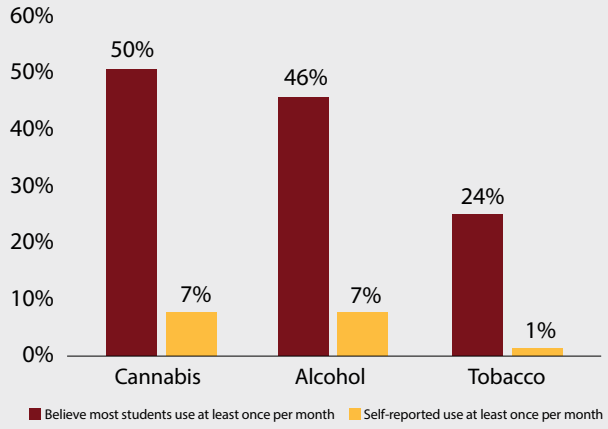
Many students appear to overestimate prevalence of cannabis use by peers

A notable surprise in our study was the difference between Minnesota high school students' reports of their *own* cannabis use versus their perceptions of peers' cannabis use. Half of Minnesota high school students (50%) said they thought that *most* students in their school used cannabis at least once a month. However, only 7% self-reported using cannabis at least once a month – a percentage based on a slightly different question than the prior two sections of this report, which aligns more closely with the question about peer use of cannabis.[15]

Together, these data suggest that Minnesota high school students are either dramatically under-reporting their consumption of cannabis (which seems unlikely, as these rates track with those from other surveys and in other states)[16,17] or a substantial portion overestimate how many of their peers frequently use cannabis.

The pattern was similar for alcohol. Nearly half (46%) of Minnesota high school students thought that most students in their school used alcohol at least once a month, despite only 7% self-reporting use of alcohol at least once a month. For tobacco, approximately one-quarter (24%) of students thought that most students in their schools used tobacco at least once a month, compared to 1% self-reporting use of tobacco at least once a month.

Figure 10: Percentage of Minnesota 9th and 11th Graders Who Think Most Peers Use Cannabis at Least Once per Month and Who Report Using Cannabis Themselves at Least Once per Month (with Other Substances), 2022



Source: SHADAC/CRC analysis of Minnesota Student Survey

Conclusion and discussion

The data presented in this report provide important context for understanding youth cannabis use, as well as use of other substances, just prior to Minnesota's legalization of adult-use cannabis in 2023. Contrary to common belief, the 2022 Minnesota Student Survey data rebut the idea that use of cannabis — and longtime legally available substances, alcohol and tobacco — is ubiquitous among youth.

Instead, we found that fewer than one in five Minnesota high school students reported having *ever* used cannabis, and fewer than one in ten reported using it in the past 30 days. Our analysis also found that self-reported use of cannabis, alcohol, and tobacco by Minnesota high school students was declining over time, a trend consistent with national data on youth substance use.[18]

This is not to say there is no reason for vigilance. Even with historically low rates nationally and in Minnesota, substance use by young people still poses public health risks for many. In Minnesota alone, extrapolating an 8% rate of past-month cannabis use to all the children enrolled in public high schools would represent more than 22,000 students — and doubtless even more students when considering kids enrolled in private schools and kids who are home-schooled.[19]

Ideally, strict controls on availability of cannabis to minors could cut those numbers further. This goal seems possible, considering research suggesting that may have occurred in some other states that legalized cannabis prior to Minnesota.[20,21] But reduction in youth cannabis use is not certain, and it will likely require carefully crafted regulations and enforcement.

Educating students on the actual prevalence of their peers' cannabis use may be helpful given that youth apparently overestimate the prevalence and frequency of cannabis use by peers. Studies are mixed on whether social norms can influence cannabis use by youth, and it may not be easy to correct misconceptions that underage cannabis use is common.[22,23] Minnesota's cannabis legalization law requires that schools implement comprehensive education programs on cannabis and other substance use, so it will be important to identify and adopt programs that are more likely to be successful.

Another area for concern from our findings is the disparities in the prevalence of youth cannabis use across demographic subgroups. For instance, students from marginalized and oppressed social groups — including those who identify as LGBQ+ and not cisgender, as well as American Indian and Alaska Native — reported higher rates of past-month cannabis use. This pattern could represent a phenomenon of youth using cannabis in an effort to cope with adverse childhood experiences (ACEs) and trauma. Studies have found that gay, lesbian, and bisexual people and American Indian and Alaska Native children are exposed at higher rates to ACEs than their peers.[24,25] Since research has shown exposure to ACEs to be associated with mental health conditions, such as anxiety and depression, it is possible that marginalized youth are more likely to use cannabis in part to cope with traumatic experiences and their consequences.[26] Notably, while not presented in this brief, our analysis of Minnesota Student Survey data also found similar patterns of higher rates of tobacco, nicotine vaping, and alcohol use among marginalized and oppressed social groups that reported higher rates of cannabis use.

As cannabis policy evolves in Minnesota — from a longtime status of legal prohibition to legalization of use by adults in 2023 to the expected start of commercial sales in 2025 — it will be crucial to monitor trends in youth cannabis use. It will also be important for policymakers to consider adjustments aimed at maximizing potential benefits of cannabis legalization and minimizing potential harms, including limiting non-medical use by youth.

About the Cannabis Research Center

In 2023, the Minnesota State Legislature passed H.F. 100, legalizing cannabis in Minnesota for non-medical use for individuals age 21 and older. This followed legislation establishing the state's medical cannabis program a decade earlier. As part of the 2023 law, the legislature designated funding to the University of Minnesota School of Public Health to establish a Cannabis Research Center (CRC).

The CRC strives to understand the public health implications of cannabis legalization. To accomplish its mission, the center will:

- Provide, interpret, and disseminate research to guide policy and practice related to cannabis.
- Conduct timely, cutting-edge research on the positive and negative public health effects of legalization.
- Study issues pertaining to equity in cannabis production, sales, marketing, and use.
- Address research questions asked by community members and leaders, policymakers, and other Minnesota partners.
- Train and support future practitioners and scholars to study cannabis policy and its effects on health and health equity.

To learn more about the Cannabis Research Center, visit https://www.sph.umn.edu/research/centers/cannabis.

Cannabis Research Center
University of Minnesota

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[10] Survey question: How often do you use … marijuana (pot, hash, hash oil)? **Never; Tried once or twice; Once or twice a year; Once a month; Twice a month; Once a week; Daily**

[11] Survey question: During the last 30 days, on how many days did you use marijuana? **0 days; 1 to 2 days; 3 to 5 days; 6 to 9 days; 10 to 19 days; 20 to 29 days; All 30 days**

[12] Survey question: During the last 30 days, on how many days did you drink one or more drinks of an alcoholic beverage? **0 days; 1 to 2 days; 3 to 5 days; 6 to 9 days; 10 to 19 days; 20 to 29 days; All 30 days**

[13] To account for the fact that race/ethnicity sub-groups are part of the population total, we employ dependent samples t-tests in this section. For other demographic sub-group analyses (i.e., sex, gender identity, sexual orientation, geographic region), we employ an independent samples t-test to compare the dichotomous variables (e.g., comparing female cannabis use to male cannabis use).

[14] This approach of aggregating not-cisgender subgroups into a single category poses limitations, as it may mask differences in patterns of cannabis use among subgroups — a possibility that is not limited to gender identity. For instance, there could also be meaningful differences in cannabis use patterns among non-heterosexual subgroups when analyzing data by sexual orientation. Examining more-granular data on subgroups may be an important area of further study in the future.

[15] For this section, we used students' responses about frequency of cannabis use (ever) rather than frequency in the past 30 days, as it aligned more closely with the question about students' perceptions of peers' cannabis use. The relevant questions are:

- Survey question: How often do you use … marijuana (pot, hash, hash oil)? **Never; Tried once or twice; Once or twice a year; Once a month; Twice a month; Once a week; Daily**
- Survey question: In your opinion, how often do you think MOST STUDENTS in your school use … marijuana (pot, hash, hash oil)? **Never; Tried once or twice; Once or twice a year; Once a month; Twice a month; Once a week; Daily**

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