SAM Smart Approaches to Marijuana
preventing another big tobacco

IMPACT REPORT

2026-2027

Lessons Learned from State Marijuana Legalization

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Data and Policy Background

Contrary to federal law, under which the possession and sale of marijuana are illegal (Controlled Substances Act, 1971), several states have legalized the cultivation, commercial sale, and use of marijuana since 2012—though a majority of states continue to reject recreational legalization. The vast majority of localities in "legal" states also ban the production and retail sale of marijuana, which remains illegal at the federal level as a Schedule I substance; however, pro-marijuana lobbyists are actively working to undo this.

Smart Approaches to Marijuana (SAM) compiled publicly available federal and state-level data, reports, investigatory findings, peer-reviewed studies, and government health surveys to assemble this report. We have attempted to be as transparent as possible in our evaluation and allow readers to trace our steps and further their own research.

A note on 2020 and 2021 data. The data collected during 2020 and 2021 are unique because of the COVID-19 pandemic and the ensuing changes to lifestyles and day-to-day lives. School-age children spent their time learning at home and were less influenced by peers. Fewer drivers were on the road during peak crash times while drivers overall were more reckless. Many bars and restaurants were closed for long periods. Many employees worked from home. On the inverse, millions of Americans struggled with their mental health, overdose deaths skyrocketed, and many Americans missed health care appointments and postponed care. Because each state's COVID-related regulations were different, national-level data for this period should be viewed through this lens. If the data require additional qualifiers, we have noted this.

In 2013, the U.S. Department of Justice (DOJ) decided to take a hands-off approach toward the legalization of recreational marijuana at the state level. Officially, the DOJ stated it would only get involved if any of the eight requirements laid out in the so-called "Cole Memo" (e.g., sales to minors, increased drugged driving) were violated. Unfortunately, according to the U.S. Government Accountability Office (GAO), the DOJ took no meaningful action as states routinely violated the Cole Memo. However, as we will outline in this report, public health and safety departments and law enforcement agencies in "legal" states have produced primary data and impact reports that illustrate how current marijuana policies are failing to protect the health and safety of Americans.

In 2018, the DOJ rescinded the Cole Memo, signaling an uncertain future for the profit-driven marijuana industry. One thing is clear: by legalizing marijuana, states continue to violate federal laws. We now have more than a decade of data to show how these marijuana policy changes—and the industry they created—harm families and communities. This industry is chiefly driven by higher use rates and increased normalization, seeking to convert casual users and non-users into life-long customers. As we are only now beginning to address the far-reaching and devastating consequences of the overdose epidemic—driven largely, but not exclusively, by opioids—the rise of additional corporate promotion of drug use comes at an inopportune time.

Following the transition to the Biden administration, Attorney General Merrick Garland signaled that the DOJ would not pursue the prosecution of individuals who use marijuana in accordance with their state's respective marijuana laws. Garland defended this position, in part, by arguing that, "Criminalizing the use of marijuana has contributed to mass incarceration and racial disparities in our criminal justice system" (Berman, 2021).

The Biden administration also fired would-be appointees who had previously used marijuana, highlighting the continued tension between federal and state-level marijuana laws (Berman, 2021). Additionally, in the administration's Fiscal Year 2025 budget proposal, they again blocked Washington, DC, from legalizing marijuana sales (e.g., allowing dispensaries to open) (Suebsaeng et al., 2021).

In October 2022, President Joe Biden issued a pardon to all individuals convicted under federal law for the simple possession of marijuana (Shear & Kanno-Youngs, 2022). He also urged governors across the nation to adopt a similar policy. While Biden's announcement was commended by supporters of criminal justice reform, it was later discovered that no one was in federal prison solely for the possession of marijuana. Thus, although his policy retroactively helped 6,500 individuals who were previously charged, it did not free a single person from prison. Many of the people affected by this action also likely pled down from other charges. In November 2022, Oregon Governor Kate Brown followed President Biden's steps, pardoning more than 40,000 individuals who had been charged with marijuana possession. Additional states, including Maryland and Massachusetts, have since followed suit.

In December 2022, President Biden signed the SAM-drafted Medical Marijuana and Cannabidiol Research Expansion Act (H.R. 8454) into law. This groundbreaking and bipartisan bill is the first stand-alone marijuana reform legislation to become law in United States history.

The most recent attempt at federal reform, which remains ongoing at the time of writing, is the rescheduling of marijuana, which is currently classified as a Schedule I substance, meaning it has a high potential for abuse and no accepted medical benefit. However, President Biden directed the Department of Health and Human Services (HHS) to review this. In August 2023, HHS unilaterally changed the criteria for determining a Schedule I substance and recommended that marijuana be moved to Schedule III, which would indicate that it has an accepted medical use and a lower potential for abuse. Marijuana has no currently accepted medical use and is not Food and Drug Administration (FDA) approved to treat or cure any disease or condition. The final decision rests with the Drug Enforcement Administration (DEA), within the DOJ, which has yet to finalize its decision. SAM has played an active role throughout the rescheduling process, including by publishing a rebuttal to the FDA's rationale (Smart Approaches to Marijuana [SAM], 2023a), submitting public comments to the DEA, and being invited to participate in the DEA's hearing for rescheduling.

In December 2024, President Biden issued commutations for nearly 1,500 individuals who had been convicted of various crimes; the White House said, "39 individuals receiving pardons today were convicted of non-violent crimes, including drug offenses, and have turned their lives around" (White House, 2024).

RESEARCH ON HARMS CAUSED BY MARIJUANA

There is abundant scientific literature on the harms of marijuana use that will be discussed in this report. More than 20,000 peer-reviewed research articles have linked marijuana use to adverse mental health outcomes, ranging from depression to psychosis, as well as consequences for physical health and even negative outcomes for neonates exposed in utero. The connections between marijuana use and negative consequences for mental and physical health, among other risks, are often

lost in the debate surrounding legalization. The distinction between medical and recreational marijuana has been deliberately blurred by an industry with significant investments in both markets. A study found that despite evidence that lower THC dosage is more appropriate for medical purposes, the medical marijuana products that are advertised in retail stores contain around the same amount of THC as recreational marijuana products, which generally contain upwards of 15% THC (Cash et al., 2020). And a 2022 study suggests that the risk of developing a cannabis use disorder (CUD) increases as marijuana's THC level increases (Petrilli et al., 2022). Though there is potential for the medical use of certain components found within marijuana plants, these components should be researched through well-designed clinical studies under the guidance of the FDA.

What follows are just a few examples of the conflict between data-driven research and the normalization of marijuana. The science is clear. Yet proponents of legalization continue to march forward, single-mindedly pursuing profits.

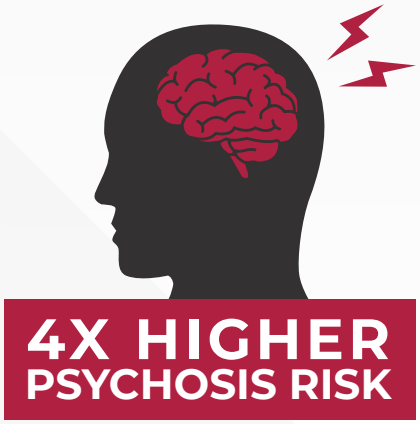
KEY OUTCOMES

As with the nation's troubled past with tobacco and alcohol, the full consequences of the legalization and commercialization of marijuana will take decades to materialize fully. However, researchers do not need to wait that long to understand certain key outcomes regarding commercialization. For example, the data in this report—and many others—show that states legalizing marijuana often have the highest rates of marijuana use in the country. The data also show that use is sharply increasing in vulnerable demographics, including young adults whose brains are still developing.
These states also have:

1. Higher rates of marijuana-related driving fatalities.
2. Issues with "legally" sold but contaminated marijuana products.
3. More marijuana-related emergency department visits, hospitalizations, and accidental exposures.
4. Expansive and lucrative criminal markets.
5. Exacerbated racial disparities in marijuana industry participation and criminal justice enforcement.
6. Increases in workplace problems, including labor shortages and accidents.

Public opinion on marijuana is also changing. Since 2022, seven out of ten recreational legalization ballot measures have failed. A 2024 Gallup poll found a majority of Americans believe marijuana has a negative impact on society (54%) and on users (51%). This represents a 10-point (53% to 43%) shift between 2022 and 2024 (Brenan, 2024). The reason for this dramatic shift in sentiment is clear: as marijuana use increases, Americans are seeing the negative impacts firsthand.

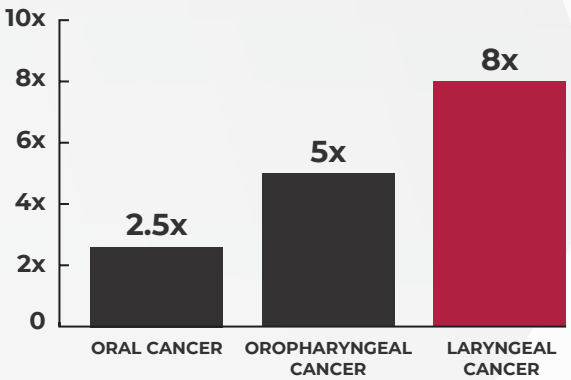
DATA HIGHLIGHTS



Daily high-potency cannabis use associated with 4x higher psychosis risk.

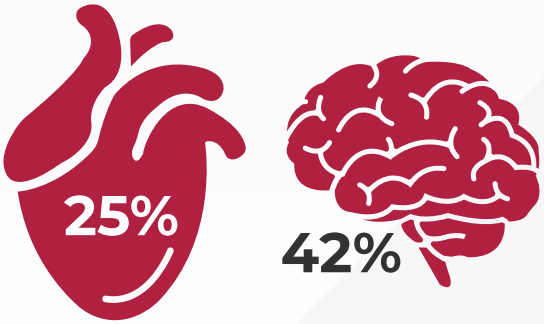
Marijuana legalization increased hospitalizations for marijuana-induced psychosis.

DAILY MARIJUANA USE:



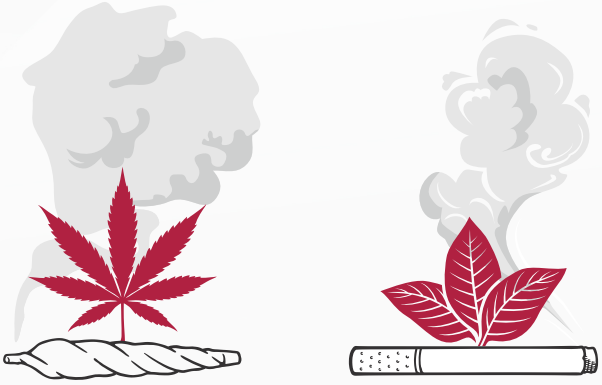
DAILY MARIJUANA USE: 2.5X HIGHER RISK FOR ORAL CANCER, 5X HIGHER FOR OROPHARYNGEAL CANCER, 8X HIGHER FOR LARYNGEAL CANCER.

Daily marijuana use increases heart attack risk by 25% and stroke risk by 42%.

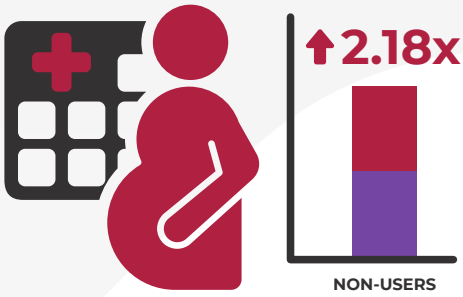


Marijuana use correlates with a 300–800% increase in head and neck cancers.

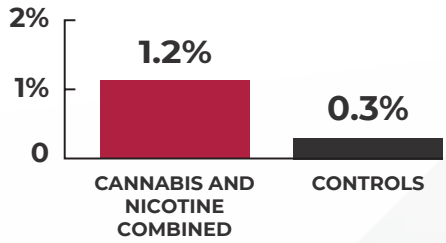
AIR POLLUTION COMPARISON



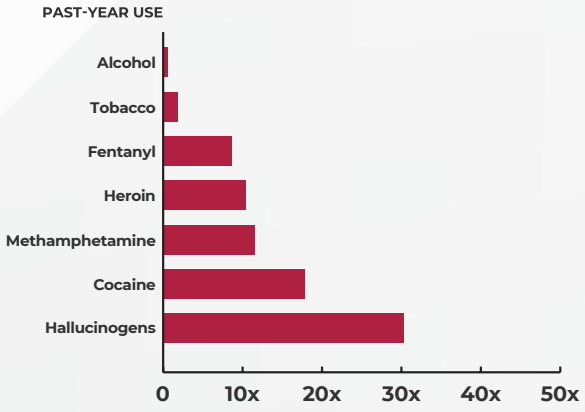
MARIJUANA SMOKE GENERATES 3X MORE AMMONIA AND 3.5X MORE INDOOR AIR POLLUTION THAN TOBACCO SMOKE.



In a Colorado-based study, cannabis use during pregnancy was associated with a 2.18x higher risk of infant mortality compared to non-users.

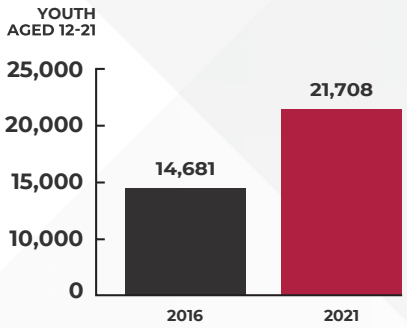


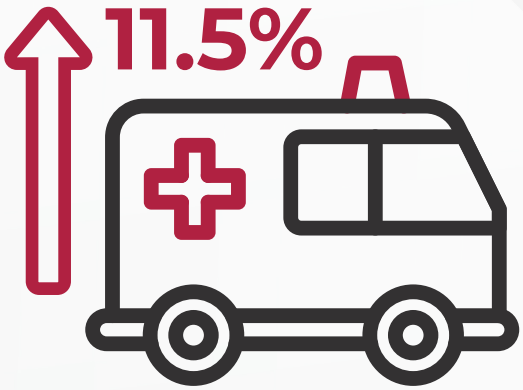
Co-use of marijuana and nicotine linked to a 2.18 times higher infant mortality risk. Marijuana alone: 65% increase.



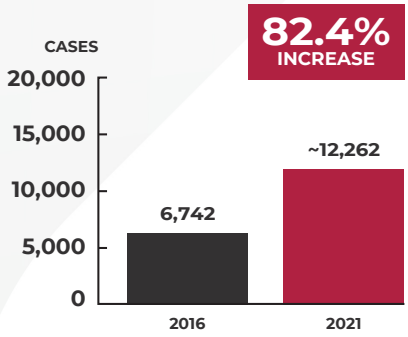
Marijuana users compared to non-users are significantly more likely to use hallucinogens (31x), cocaine (18.5x), methamphetamine (12.3x), heroin (11x), fentanyl (8x), tobacco (2.8x), and alcohol (1.5x).

Marijuana accounted for 52.2% of youth substance-related hospital visits (ages 12–21) from 2016 to 2021.



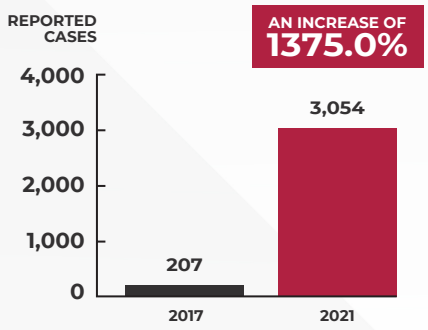


Marijuana-related emergency department visits increased 11.5% from 2021 to 2023.

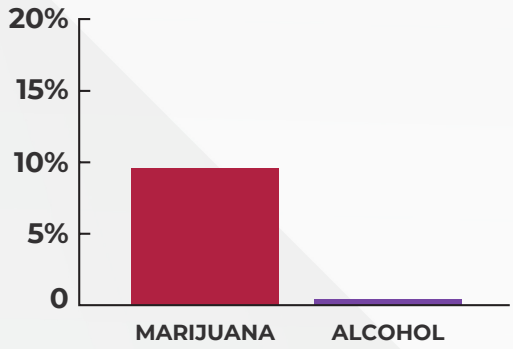


Marijuana-related pediatric emergency visits increased by 82.4% (2016–2021).

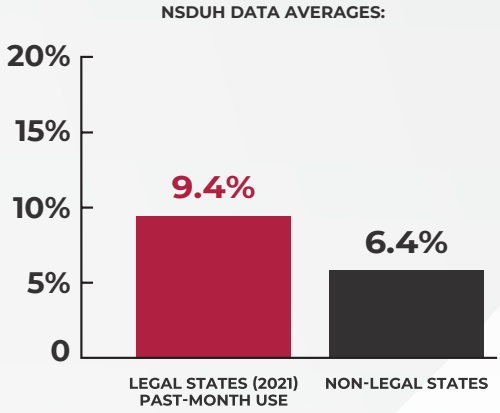
Pediatric (kids under the age of 6) accidental edible marijuana exposure increased by 1,375% (2017–2021).



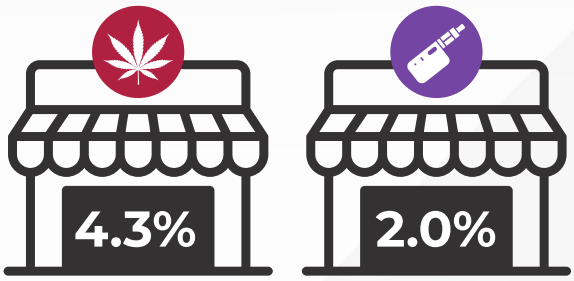
9.7% of teens (12–17) using marijunana reported daily use, far higher than alcohol (0.3%).

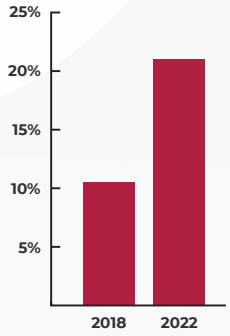


Adolescents in legalized states have significantly higher marijuana use rates.



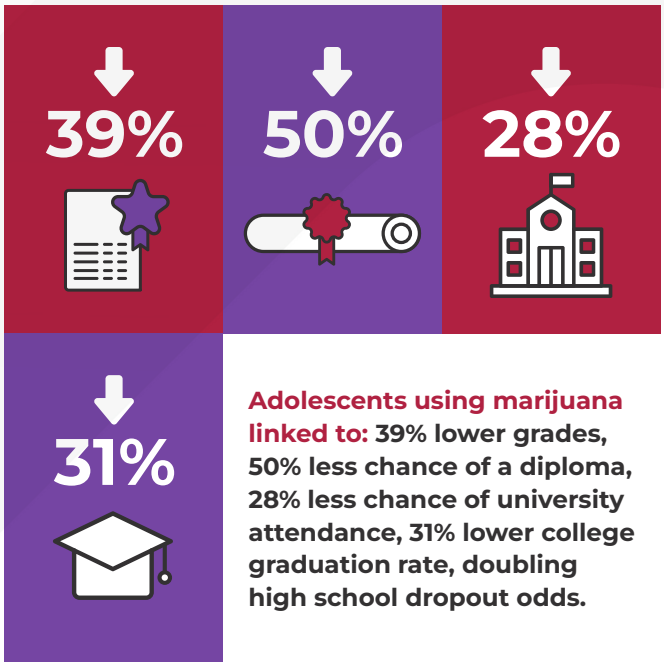
Massachusetts teens were twice as likely to buy marijuana from stores (4.3%) than tobacco from vape shops (2.0%).





The percentage of 12th graders in Arizona that used marijuana and purchased it from a dispensary nearly doubled (11.3% to 21.0%) from 2018 to 2022.

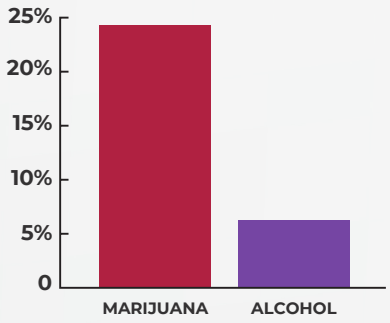
Cannabis Use Disorder among youth (12–17) rose by 25% in legalized states.



Adolescents using marijuana linked to: 39% lower grades, 50% less chance of a diploma, 28% less chance of university attendance, 31% lower college graduation rate, doubling high school dropout odds.

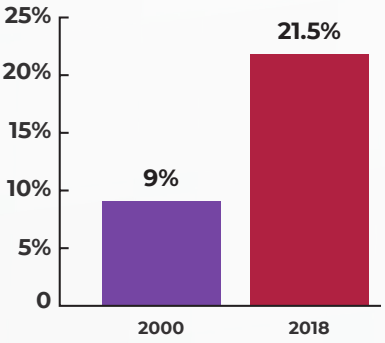
Youth marijuana use linked to losing 5.5 IQ points on average in adulthood compared to lifelong non-users.

5.5 Points vs 0.7



Daily marijuana use among past-year users 12+ years old (24.4%) greatly exceeds alcohol (6.6%).

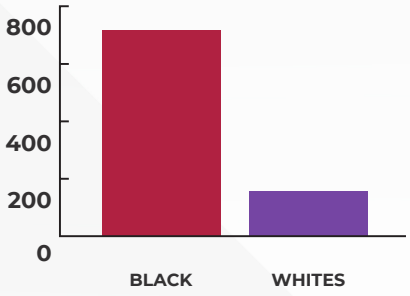
1 in 4 Colorado road deaths involve marijuana



In Colorado, the share of traffic deaths involving marijuana rose from 9% in 2000 to 21.5% in 2018.

Higher marijuana dispensary density has been documented in racially diverse, lower-income neighborhoods.

The rate of marijuana-related emergency departmentvisits among Black individuals was 4 times higher than the rate among white individuals in 2023

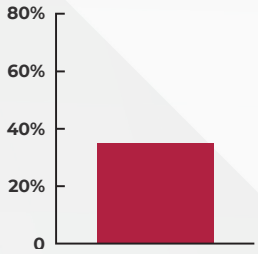


717 VS. 167 PER 100K

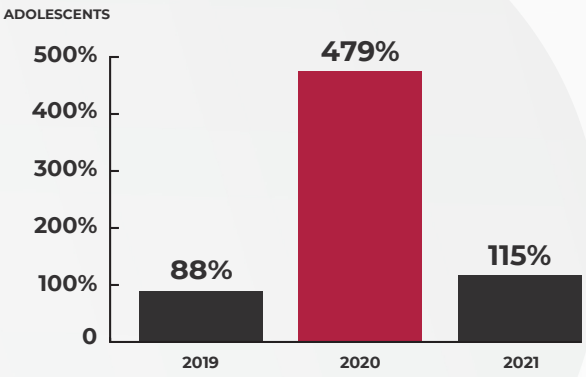
Marijuana dispensary openings correlated with a 30% crime increase within 500 meters in Chicago.

LEGALIZATION LINKED TO HOMELESSNESS

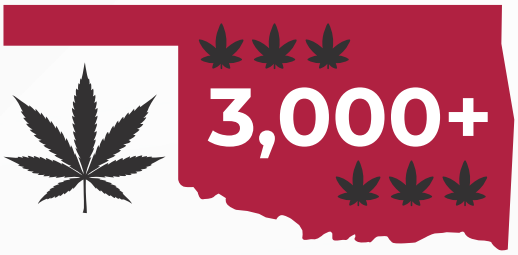
Chronic homelessness increased by 35% in marijuana-legalized states.



Violent crime increased in legalized states such as Alaska, Colorado, Oregon, and California following marijuana legalization.



States with legal marijuana saw overdose deaths increase by 88% (2019), 479% (2020), and 115% (2021) over non-legal states.



Over 3,000 illegal marijuana grows in Oklahoma tied to foreign mafias; 80% linked to Chinese criminal groups.

COMMERCIALIZATION: A GROWING CONCERN

The commercialization of marijuana results in negative consequences for public health, social justice, and public safety, including through the promotion and sale of these products. Medical marijuana legalization gave way to recreational marijuana legalization in states across the country; the industries maintaining both sectors have been heavily capitalized. The result is the creation of a new and powerful addiction-for-profit industry.

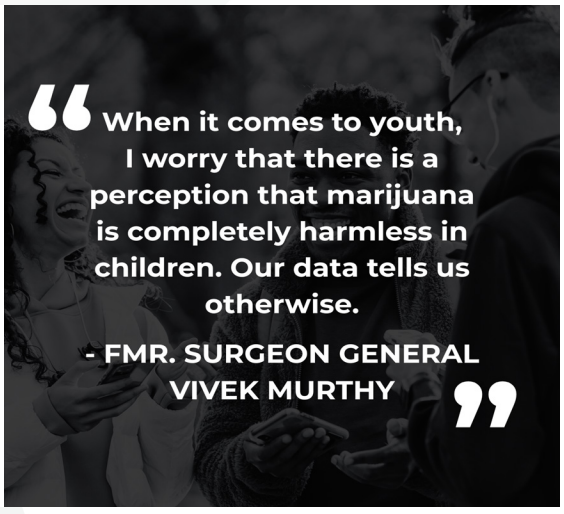
More people are using marijuana while remaining largely ignorant of its negative consequences. Additionally, usage rates are surging across the United States after years of declines. More than 61.8 million Americans reported marijuana use in 2023, an 88% increase from 2012 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2023b, 2019b). In 2023, 47% of all adults reported trying marijuana at least once in their lifetime. And 29% of 12th graders also reported that they used marijuana in 2023 (Monitoring the Future, n.d.-c), though the COVID-19 pandemic caused rates of youth use to decline (they have not yet rebounded to pre-COVID levels).

The United Nations World Drug Report noted a "General increase in cannabis use, with a narrowing gender gap and a more pronounced increase in frequent use among young adults" following legalization (UN Office on Drugs and Crime, 2022). The alarming increase in use among young people, and in particular pregnant women, prompted then-U.S. Surgeon General Dr. Jerome Adams to issue a first-of-its-kind advisory on marijuana use (Office of the Surgeon General, 2019). Coinciding with increases in use, the concentration of THC in marijuana has steadily increased as well. Marijuana's THC concentration quadrupled between 1995 and 2022, from 3.94% to 16.14%, and concentrated products, such as vapes, now contain up to 99% THC.

Though Dr. Adams' advisory specifically addressed significant increases in use among youth and pregnant women, he did not shy away from cautioning against marijuana use more generally. At one congressional hearing, Adams told senators, "I don't want anyone to mistake what I'm saying as implying that these products are considered safe for general adult usage" (Marijuana and America's health, 2019).

In 2021, Surgeon General Dr. Vivek H. Murthy made similar comments in a Senate Finance Committee Hearing:

> Our data tells us otherwise. Our data tells that in fact a portion, a substantial minority, of people who use marijuana will actually develop an addiction to marijuana. That number is significantly higher among youth. When kids also have underlying mental health conditions, the impact of marijuana use can also be more significant. And, so, I worry Senator about the messages we may send that say this is "utterly harmless" and "there's no problem here." We need to be responsible in how we teach our kids about marijuana. I think how we talk to families about marijuana use and I think health care providers also need to be empowered to have these conversations early on as well as teachers. (U.S. Senate Committee on Finance, 2022)



HIGH POTENCY MARIJUANA

In the 1970s, "Woodstock Weed" contained approximately 1–3% THC (ElSohly et al., 2000). Since then, marijuana products have become increasingly potent, driven in large part by industry-led innovation, market demand, and a shift in consumption methods.
THC concentrates such as shatter, budder, and waxes—as well as gummies and edibles—are packed with more THC than joints everywhere. Now, even the marijuana plant itself is being genetically engineered to contain a higher percentage of THC. According to the DEA, the average marijuana potency increased from 3.96% in 1995 to 16.14% in 2022 (National Institute on Drug Abuse [NIDA], 2024b). Independent studies in "legal" states have also found the percentage to be even higher, such as an average THC percentage of 18.7% in plant material in

4X HIGHER PSYCHOSIS RISK

Daily high-potency cannabis use associated with 4x higher psychosis risk.

Colorado (Colorado Department of Public Health & Environment [CDPHE], 2020). Concentrates, which contained an average potency of 6.7% THC in 2008, contained an average potency of 55.7% in 2017 (Chandra et al., 2019). The National Institute on Drug Abuse (NIDA) found that solvent-based products have been documented with an average of 54–69% THC and have been known to exceed 80% (NIDA, 2020).

The market for marijuana flower hybrids and concentrates continues to rise with the increase in demand for products with higher THC potency levels. In Washington state, market share for flower products with 10–15% THC declined by 60.4% between 2014 and 2017, while the market share for flower products with more than 20% THC increased by 48.8% during that same period (Smart et al., 2017). In 2020, amid the coronavirus outbreak in Washington state, the retail sales share of recreational marijuana generally increased with a 0.7% increase in edibles and a 3.5% increase in flower from Jan-March to Apr-May (Statista, n.d.-b).

In Oregon, concentrates and extracts surpassed flower marijuana in sales and comprise an increasingly large proportion of all marijuana sales. In December 2019 alone, nearly a million units of concentrates and extracts were sold in the state, and the number of units of edibles sold exceeded the pounds of flower marijuana sold (Oregon Liquor Control Commission [OLCC], 2020). Retailers increasingly promote higher-potency marijuana to drive profits—the fact is, high-potency marijuana sells.
A leaked draft report from the Washington State Health Authority on THC potency recommended enacting several policies to curb the rapidly increasing high-THC-potency products. These recommendations included an additional tax on products with more than 35% THC potency, raising the purchasing age of such products to 25, prohibiting marketing and advertising of them, including high-THC warning labels on products, and requiring point-of-sale education about the risks of high-THC products (Addictions, Drug & Alcohol Institute, 2022). A state-commissioned report from California

also recommended reforms to restrain the industry's ability to sell high-potency products, suggesting a THC cap of 25% on flower and 60% on concentrates (California Department of Public Health, 2024).

The demand for stronger marijuana threatens public health. The use of high-potency marijuana exacerbates many of the consequences of marijuana use. Frequent marijuana users and users of high-potency marijuana are more likely than regular users to develop schizophrenia and psychosis (Di Forti et al., 2019). Users of Butane Hash Oil (BHO), a marijuana concentrate that yields a potency of between 70–99% THC, are more likely to have lifetime diagnoses of depression and anxiety while being more likely to report other substance use (Chan et al., 2017).

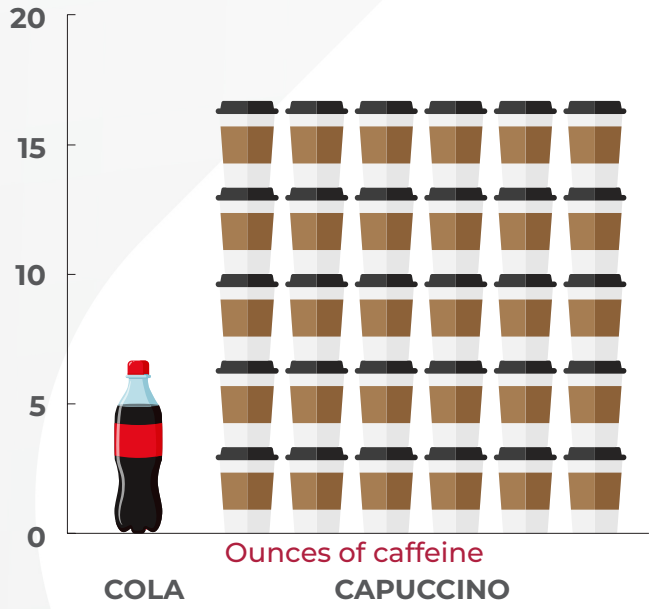
Ultra-processed high-potency products are also more likely to contain residues and contaminants from production. This is not isolated to the illicit market. A study of 57 concentrates legally sold for dabbing in California found that almost 72% of the samples contained residual solvents, including isopentane, butane, and propane. One-third of those samples also contained pesticide residues (PRSC Cannabis Concentration Workgroup, 2020). This year, the Los Angeles Times reported that nearly 60% of products in California had pesticide levels above either state limits or federal tobacco standards. Lab results suggested that the state had 250,000 contaminated vapes and joints sold in dispensaries (St. John & Halperin, 2024).

The lucrative cash potential of high-potency marijuana also emboldens illegal BHO producers to force raw marijuana and butane into a reaction chamber, which creates a highly combustible liquid that can easily explode when introduced to an ignition source. This has implications not only for public health but public safety as well.

Products with high amounts of THC proliferate due to market demand and, as such, consequences associated with high-potency marijuana become more apparent. However, as the industry continues to develop new and stronger products, many of these health-related consequences remain largely unknown. A 2024 commentary in the American Journal of Psychiatry stated: "While data accumulated over the past decades about the effects of now 'low dose' THC has been very valuable, significant research efforts in preclinical models are needed, focused on THC potency relevant to today's products" (Hinckley et al., 2024). Researchers are playing catch-up to understand the risks of these products.

NOT ONLY POTENCY BUT CONSUMPTION PATTERNS

The change in the typical marijuana user today versus 20 years ago, according to Carnegie Mellon professor Jonathan Caulkins, is akin to that of a typical caffeine drinker of the past consuming one 20-ounce cola's worth of caffeine versus about 30 16-ounce cappuccinos today.



It's important to think about legalization as akin to commercialization, which is very different than simply removing criminal penalties for personal possession. Case in point: As soon as a state legalizes, the industry moves to open as many shops as possible. According to the Pew Research Center (Chapekis & Shah, 2024), "There are nearly 15,000 cannabis dispensaries in the United States," while there were 13,449 McDonald's in the United States in 2023 (SAMHSA, 2023b; Statista, n.d.-a). The overwhelming presence of marijuana stores promotes and further normalizes its use. A 2022 twin study found that use increases by about 20% after legalization (Zellers et al., 2023). Put another way, a 2024 study in Addiction found that "Between 2008 and 2022, the per capita rate of reporting past-year use increased by 120%, and days of use reported per capita increased by 218% (in absolute terms from the annual equivalent of 2.3 to 8.1 billion days per year)" (Caulkins, 2024).

There is no question that marijuana legalization is associated with increases in use and lowered perceptions of risk.

> **"LEGALIZING MARIJUANA IN AMERICA AND CANADA IS ONE OF THE GREATEST MISTAKES OF ALL TIME."**
>
> **- ELTON JOHN**

In 2023, according to the National Survey on Drug Use and Health (SAMHSA, 2023b), 21.8% of Americans aged 12 or older used marijuana in the past year. By sex, the prevalence of past-year marijuana use was 23.9% among males and 19.8% among females. The prevalence of use, by race, was 10.0% among Asians, 18.2% among Hispanics, 23.1% among white people, 24.5% among Black people, 30.2% among American Indian and Pacific Islanders, and 32.9% among those of two or more races (SAMHSA, 2023b).

STATES STRUGGLE WITH THE NUMBER OF LICENSED SHOPS

One significant problem with high-potency products is the lack of regulation. Numerous studies have found that product regulation in "legal" states is limited (Lamy et al., 2016; Peace et al., 2016; Yates & Speer, 2018). Internal audits conducted by state governments have exposed gaping holes in regulatory frameworks. In Oregon, for example, the Liquor Control Commission found that there is an average of one state inspector for every 83 marijuana licenses (OLCC, 2020).

Vermont and Connecticut became the first states to cap the potency of concentrates at 60% (still 30 times the strength of just a few decades ago) and flower at 30%;
Montana capped the potency of flower at 35% but did not place a comparable cap on concentrates. In all other states that have legalized medical or recreational marijuana, these sensible attempts have been quickly blocked by the marijuana industry (Vermont Cannabis Control Board, 2022).

The mislabeling of products also plagues the "legal" market. A 2023 study found that sellers often overstate the THC potency of

their products, noting that "~70% of the samples were more than 15% lower than the THC potency numbers reported on the label" (Schwabe et al., 2023). Consumers are often unaware of the contents of what they are smoking or ingesting, potentially leading users to consume more of a psychoactive product than they intended to.

Furthermore, the adaptability of marijuana gives way to mass-market products modeled after popular consumer goods. A 2022 study found that 15% of reviewed products "resembled product knockoffs," adding that many of these came in the form of gummies, candy, chocolate, and baked goods. This study warned that "Existing laws have not adequately limited content appealing to youth on U.S. cannabis-infused edibles packaging" (Tan et al., 2022). A 2024 study in Drug and Alcohol Dependence found that marijuana products are being designed to appeal to younger individuals, including features such as cartoon characters, bubble fonts, berry flavors, and gummy bear shapes, concluding that: "Youth-appealing attributes on cannabis edible packages are associated with higher appeal ratings, more visual attention towards those attributes, and less visual attention towards warning labels among young adults in the United States" (Cooper & Shi, 2023).

Marketing tactics make use of bright colors and catchy names, replicating images or appropriating the brands of well-known commercial food products. For example, "Pop Tarts," a widely consumed kid-friendly breakfast product, was used by one marijuana producer to market "Pot Tarts." Unfortunately, it is believed that these products contribute to increased accidental marijuana exposures among children and others. Stemming from the wide array of consumption methods and ways that marijuana can be infused with products, the American Addiction Center updated its definition of edibles in December 2022 to be "food products that have been infused with marijuana," meaning a marijuana edible can essentially be any consumable product (American Addiction Centers, 2024).

These kinds of growth tactics by the marijuana industry are not new. They largely mirror the boom of Big Tobacco in the early 1900s— and not by accident (Ayers et al., 2019; Richter & Levy, 2014). Although many operators in the marijuana industry claim to be up-and-comers, they are now well-financed and advised by professionals from the tobacco industry. For example, Altria, the corporate owner of Marlboro, purchased a 35% stake in Juul shortly after acquiring a 45% stake in Cronos, one of the largest international distributors of marijuana (LaVito & Hirsch, 2018). The UK-based Imperial Brands invested around CAD $123 million (~ USD 94 million) in Auxly, a Canadian marijuana company. This partnership, which gave Imperial Brands a 20% stake in the company, will focus on utilizing Imperial Brand's vaping technology to develop marijuana vaping products.

The marijuana industry has also caught the attention of Big Pharma and Big Alcohol. In March 2022, Pfizer finalized a $6.7 billion deal with Arena Pharmaceuticals, a company that develops cannabinoid-type therapeutics (Pfizer, 2022). Former Purdue Pharma executive John Stewart left the pharmaceutical industry to create his own

marijuana company (Murphy, 2016). Teva Pharmaceuticals signed an agreement to become a medical marijuana distributor in Israel (Helfand, 2016). And Sandoz, a subsidiary of Novartis, signed an agreement with Tilray to distribute marijuana products (Cherney, 2018).

Constellation Brands, the maker of Corona, purchased a 9.9% stake in Canopy Growth for $191 million, then upped the stake to 38% for $4 billion in 2018. The company has the option to increase its investment and purchase up to 139.7 million new shares at a price of up to $5 billion more (Sheetz, 2018). Anheuser-Busch has also been working to develop THC-infused beverages (Food Manufacturing, 2018).

The full impact of these investments has been brought to light with the establishment of CPEAR, Altria, and Constellation's advocacy organization funded to lobby for legalization at the federal and state levels (Coalition for Cannabis Policy, Education, and Regulation, 2023). In March 2022, CPEAR issued a problematic paper purportedly revealing that use by youth does not increase in legalized states. In reality, CPEAR made conclusions based on national-level data trends, which of course include non-legal states, instead of only looking at state-level data for states with legal marijuana. Their analysis did not mention any of the dozens of studies showing increased use as a result of legalization (Davidson, 2022).

The investments of these big industry players coincide with more covert action taken to push legalization forward. In an investigative report that examined marijuana interests in the United Kingdom, journalist Jonathan Gornall linked several commercial organizations with vested interests in the creation of a recreational marijuana market with individuals and activists pushing for more access to medical marijuana. What's more, he found that several tobacco companies were funding studies on medical marijuana, an activity that calls for questioning the validity of that research (Gornall, 2020).

These connections are unsurprising. Marijuana commercialization presents addiction-for-profit industries, which have long been under public scrutiny, with new and innovative pathways to profits.

THE HARMFUL EFFECTS OF MARIJUANA

MENTAL HEALTH

Despite the assumption of many users that marijuana is harmless, it comes with numerous risks, the most concerningly of which are perhaps related to mental health. These range from anxiety and depression to schizophrenia and suicidal thoughts.

According to the 2023 National Survey on Drug Use and Health (NSDUH), 17.9 million Americans aged 18 or older had cannabis use disorder, of which 52.5% had a mental illness. For comparison, only 39.4% of adults with alcohol use disorder had a mental illness. In a footnote, SAMHSA explained, "Mental illness aligns with DSM-IV criteria and is defined as having a diagnosable mental, behavioral, or emotional disorder, other than a developmental or substance use disorder" (SAMHSA, 2023h).

Among the 58.7 million American adults with a mental illness, 16.1% had CUD. Put together, while not everyone with a mental illness will use or misuse cannabis, more than half of those who have CUD have a co-occurring mental illness.

The 2023 NSDUH also found that:

- 24.0% of adults with CUD had a major depressive episode in the past year, compared to only 8.5% of the national population of those aged 18 or older. Moreover, 17.8% of adults with CUD had a major depressive episode with severe impairment, compared to 5.9% of

that age group nationwide.

- 10.7% of adults who used marijuana in the past year had serious thoughts of suicide in the past year, compared to 5.0% of adults in the national population. For reference, 5.5% of adults who used alcohol in the past year had serious thoughts of suicide, which is slightly above the national average but nearly half the rate among marijuana users.
- 3.2% of adult marijuana users made a suicide plan in the past year, compared to the national adult population of 1.4%. Again, for reference, the rate was 1.6% among alcohol users.
- 1.4% of adult marijuana users actually attempted suicide, compared to 0.6% of the national adult population. Among adult alcohol users, 0.6% attempted suicide.

Compared to the national population of those aged 18 or older, adult marijuana users are more than twice as likely to have serious thoughts of suicide, make any suicide plans, and attempt suicide. Looking the other way, among those who had serious thoughts of suicide in the past year, made any suicide plans, and attempted suicide, 49.3%, 50.8%, and 56.4% used marijuana in the past year, respectively (SAMHSA, 2023h).

It is important to note that there is a bidirectional relationship between substance use and mental health: those who use drugs are more likely to experience mental health issues, while those with preexisting mental health issues are more likely to use drugs. The latter is exacerbated by the narrative that marijuana is a medicine. Many who are struggling with mental health issues are given false hope by the industry and marijuana supporters, who claim that the drug can relieve their symptoms. Unfortunately, many are using marijuana for relief from their mental health issues.

A range of studies have quantified more specific outcomes related to the link between marijuana and mental health. For example, researchers have found that marijuana

Marijuana legalization increased hospitalizations for marijuana-induced psychosis.

is an addictive drug (Volkow et al., 2014). Brain scans of marijuana users show changes in the structure of the brain's reward center to be consistent with addiction (Gilman et al., 2014), and up to 47% of regular users experience withdrawal symptoms when they cease use (Hasin et al., 2008; Bahji et al., 2020). NIDA reports that between 22% to 30% of marijuana users have some form of marijuana use disorder (NIDA, n.d.). One recent study found that marijuana vaping may support "conditioned drug-seeking behavior," a cause for concern as vaporized marijuana gains popularity (Freels et al., 2020). A 2022 study found that youth who use e-cigarettes are significantly more likely to report marijuana use within one year (Sun et al., 2022).

Using fNIRS technology, which measures brain activity, researchers at the Massachusetts General Hospital found that the impairment associated with marijuana may be caused by the "disruptive influence of THC on the neural dynamics of the prefrontal cortex" (Karunakaran et al., 2024).

Marijuana has also been found to cause even more severe consequences for mental health. Marijuana is increasingly linked to the onset of psychosis and schizophrenia (Henquet et al., 2005; Marconi et al., 2016; Mustonen et al., 2018; Niemi-Pynttäri et al., 2013) and shows a more modest association with depression

and anxiety (Agrawal et al., 2017; Duperrouzel et al., 2018; Gobbi et al., 2019). In one of the most comprehensive studies to date on marijuana and psychosis, Di Forti and colleagues found that daily marijuana use is associated with an increased likelihood of developing psychosis. What's more, researchers reported a more than four-times odds of daily users of potent marijuana developing psychosis (Di Forti et al., 2019). Additionally, a 2021 study found that CUD in Denmark has been increasingly associated with schizophrenia; 2% of cases of schizophrenia were linked to CUD in 1995, but this increased to 8% in 2010 (Hjorthøj et al, 2021). It was also estimated that one-fifth of schizophrenia cases among young males could be prevented if CUD were averted (Hjorthøj et al., 2023). A study summarized the issue, stating: "Cannabis is involved in approximately 50% of psychosis, schizophrenia, and schizophreniform psychosis cases" (Shrivastava et al., 2014).

A randomized clinical trial published in 2022 found that upon obtaining a medical marijuana card, patients suffered an "increased incidence and severity of CUD and resulted in no significant improvement in pain, anxiety, or depressive symptoms, but improved self-reported sleep quality" (Gilman et al., 2022).

"Compared with never users, participants who used high-potency cannabis daily had four-times higher odds of psychosis in the whole sample" (Di Forti et al., 2019).

There was a 25% increase in CUD among 12–17-year-olds in "legal" states. This population is also more likely than adults to develop a CUD if they begin using marijuana at that age (Cerdá et al., 2017).

Chronic marijuana use increases the likelihood of anxiety in adults in their late twenties and older, and those who met the criteria for CUD had a high risk of adverse mental health symptoms across all ages (Leadbeater et al., 2019). A 2024 study also found that individuals with ADHD face a nearly three times greater risk of developing CUD (Froude et al., 2024).

These studies are worth noting, particularly as marijuana is increasingly marketed as a solution for anxiety and other mental health ailments.

Frequency of marijuana use, as well as higher THC potency, is associated with the most severe impact on mental health, evidenced by psychosis, suicidality, the reshaping of brain matter, and addiction (Cinnamon Bidwell et al., 2018; Di Forti et al., 2019; Fischer et al., 2017; Pierre et al., 2016). The increasing demand for high-potency marijuana products and the coinciding prevalence of CUD are indicative of a future maelstrom with unknown consequences for public health, especially as the industry engages in a concerted effort to undermine scientifically proven risks of marijuana use. For example, a 2024 study found that the use of high-potency marijuana at age 16 or 18 more than doubled the likelihood of experiencing incident psychotic experiences from ages 19 through 24, prompting the researchers to conclude "Use of high-potency cannabis appears to be associated with increased likelihood of psychotic experiences" (Hines et al., 2024). It's also important to recognize that the development of symptoms may occur months or years after marijuana use. One study found that "development of schizophrenia-spectrum disorders was often delayed, and 47.1% of patients received a diagnosis more than a year after seeking treatment for a cannabis-induced psychosis (Arendt et al., 2005).

The legalization of marijuana coincides with a nationwide increase in CUD. According to the Substance Abuse and Mental Health Services Administration's (SAMHSA) National Survey on Drug Use and Health (NSDUH),19.2 million Americans had CUD in 2023 (SAMHSA, 2023f), up from 14.2 million in 2020 (SAMHSA, 2020).

One study comparing the marijuana use of respondents before and after legalization in their home state found a nearly 25% increase in people aged 12 to 17 who reported marijuana use disorder (Cerdá et al., 2020).

Commercialization advocates have also suggested that marijuana may help those with PTSD, a claim with particularly important implications for veterans. This may be a dangerous assumption. Two studies conducted on military personnel experiencing PTSD found an elevated risk for suicidal thoughts and behaviors among those using marijuana (Allan et al., 2019; Gentes et al., 2016).

Summarizing the scientific literature, the CDC warned that marijuana is "associated with depression; social anxiety; and thoughts of suicide, suicide attempts, and suicide" (Centers for Disease Control and Prevention [CDC], 2024b). NIDA explained that "long-term marijuana use has been linked to mental illness in some people," including temporary hallucinations, paranoia, and worsening in symptoms in patients with schizophrenia, and added, "marijuana use has also been linked to other mental health problems, such as depression, anxiety, and suicidal thoughts among teens" (NIDA, n.d.). SAMHSA warned: that "Studies link marijuana use to depression, anxiety, suicide planning, and psychotic episodes." Continued use of marijuana can "cause permanent IQ loss of as much as 8 points when people start using it at a young age." Lost IQ points do not come back, even after quitting marijuana. (SAMHSA, n.d.)

PHYSICAL HEALTH

Of course, the harms of marijuana extend beyond one's mental health. There are numerous risks to the user's physical health.

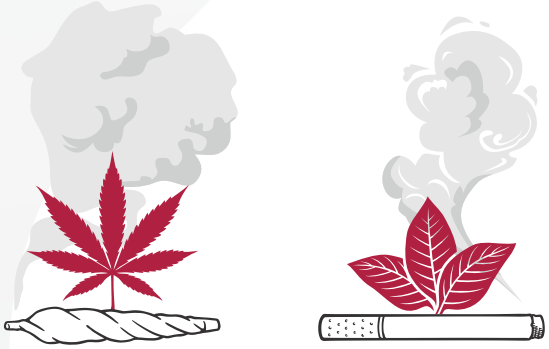
Marijuana is also linked to significant physical ailments. Researchers have described it as a "genotoxic" substance because it "damages a cell's genetic information, which can lead to DNA mutations, accelerated aging, and cancer" (Society for the Study of Addiction, 2024). Researchers believe this genotoxicity may be transmitted to the user's offspring via damaged egg and sperm, meaning the risk of marijuana use could have generational impacts.

Daily marijuana use carries the highest risks. Daily marijuana use is associated with a two-and-a-half times higher risk for oral cancer, fivefold risk for oropharyngeal cancer, and eight times higher risk of laryngeal cancer than nonusers (Gallagher et al., 2024). Researchers have also found that the risk of heavy use is not isolated to the user.

Marijuana smoke creates three times more ammonia and higher levels of toxic metals in the air than tobacco smoke and marijuana smoke creates 3.5 times more indoor air pollution than tobacco smoke (Ott et al., 2021).

Researchers have found a connection between marijuana use and lung damage (Hancox et al., 2022). The American Lung Association has highlighted the health impacts of marijuana, noting the specific risks associated with the ways it can be consumed, such as via pipes, bongs, and paper-wrapped joints (American Lung Association, 2022).

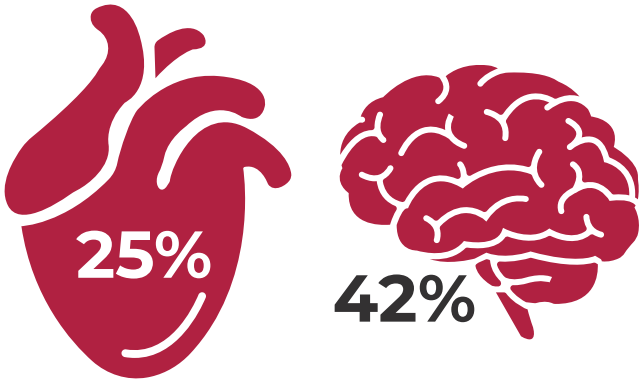
AIR POLLUTION COMPARISON



MARIJUANA SMOKE GENERATES 3X MORE AMMONIA AND 3.5X MORE INDOOR AIR POLLUTION THAN TOBACCO SMOKE.

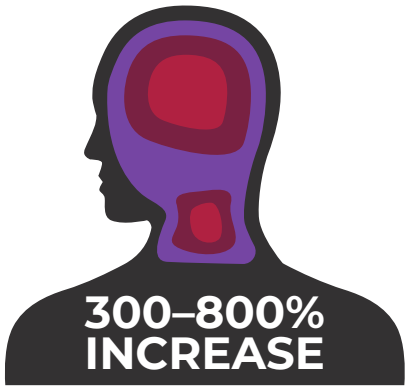
There is also a link between marijuana use and cardiovascular harm. A 2024 study in JAMA Network Open found: "In this cohort study of 121,895 participants, in the fully adjusted model among females, the risk for CVD [cardiovascular disease] mortality was significantly higher among heavy cannabis users compared with never users" (Vallée, 2024). Likewise, a 2023 study found a statistically significant association between "cannabis use, an undetermined manner of death, and the presence of an arrhythmogenic cardiac condition" (Cotier et al., 2023). NIDA notes that marijuana raises one's heart rate, which "may increase the chance of heart attack." Research from the *Journal of the American Heart Association* found that daily marijuana use results in a 25% and 42% increase in the odds of having a heart attack and stroke, respectively (Jeffers, Glantz, Byers, & Keyhani, 2024).

Daily marijuana use **increases heart attack risk by 25% and stroke risk by 42%.**



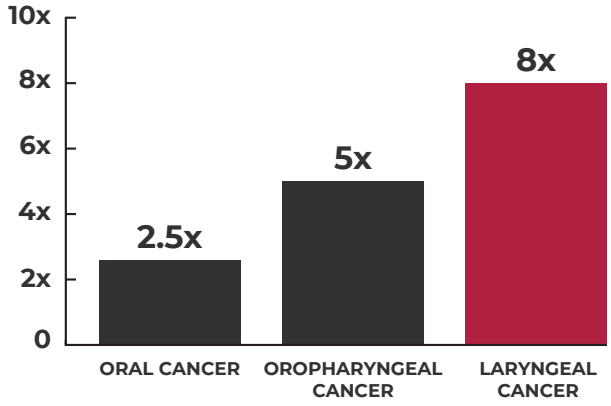
Studies have found marijuana to be linked to certain types of cancer (Liu et al., 2020), including testicular cancer (Ghasemiesfe et al., 2019; Gurney et al., 2015). In 2024, the American Head and Neck Society published data showing that marijuana use is correlated with a 300–800% increase in certain head and neck cancers (Gallagher et al., 2024).

Marijuana use correlates with a **300–800% increase in head and neck cancers.**



Heavy marijuana use is also associated with sleep and memory issues (Brown et al., 2024). Recent research has also shown that marijuana use is associated with worse outcomes among those who have COVID-19. For example, a 2024 study in JAMA Network Open found that "individuals who used cannabis had a higher risk of hospitalization and intensive care unit admission compared with those not using cannabis after controlling for other risk factors" (Griffith et al., 2024).

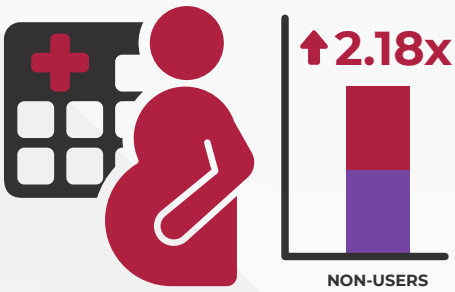
DAILY MARIJUANA USE:



DAILY MARIJUANA USE: 2.5X HIGHER RISK FOR ORAL CANCER, 5X HIGHER FOR OROPHARYNGEAL CANCER, 8X HIGHER FOR LARYNGEAL CANCER.

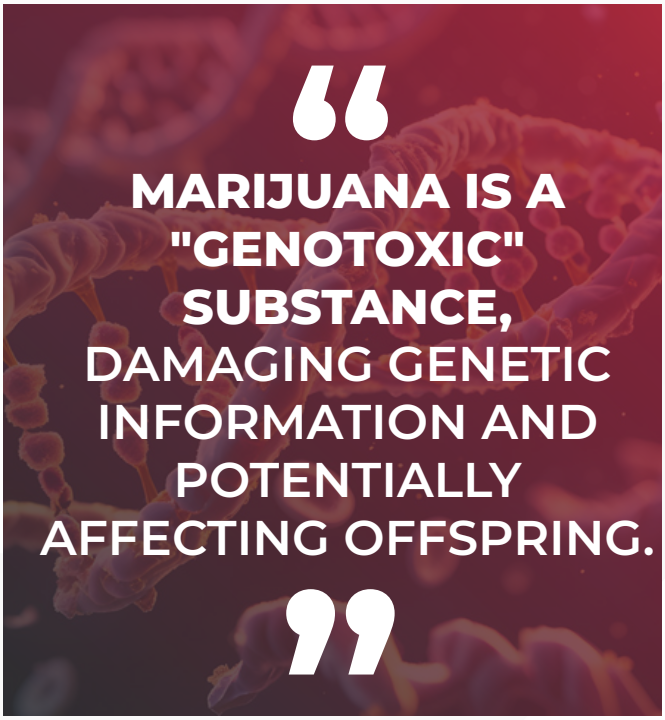
NIDA also warned that marijuana can cause problems with child development during and after pregnancy. They found that in one study of dispensaries, nonmedical personnel were recommending marijuana to pregnant women for nausea, despite medical experts warning against this. (NIDA, 2024a)

Likewise, it was found that "Nearly 70% of Colorado cannabis dispensaries contacted recommended cannabis products to treat nausea in the first trimester" (Dickson et al., 2018). SAMHSA echoed the concern about the harm that marijuana can cause to pregnant women and fetuses: "Marijuana use during pregnancy may cause fetal growth restriction, premature birth, stillbirth, and problems with brain development, resulting in hyperactivity and poor cognitive function" (SAMHSA, n.d.).



In a Colorado-based study, cannabis use during pregnancy was associated with a 2.18x higher risk of infant mortality compared to non-users.

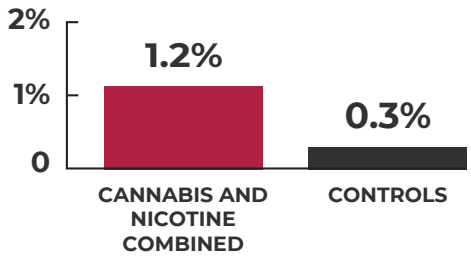
Government officials are increasingly sounding alarms on marijuana use during pregnancy after research and reports have revealed that more pregnant women are using the drug. In Alaska, for example, 9% of women who delivered a baby in 2017 reported having used marijuana during their pregnancy (Alaska Department of Health and Social Services [ADHSS], 2020). In fact, in Colorado, researchers found that seven in 10 dispensaries recommended marijuana to women posing as pregnant women (Nedelman, 2018). The University of Georgia found that 6% of pregnant women reported using marijuana during the last month and 70.9% who used perceived little to no risk associated with marijuana use during pregnancy (Techo, 2024).



An emerging concern among public health professionals is the rise in cannabinoid hyperemesis syndrome (CHS). CHS is a condition that presents as episodes of screaming and vomiting, dubbed "scromiting," and the only effective treatment is the immediate stoppage of marijuana use. The disease primarily affects heavy, daily users of marijuana. SAMHSA notes that CHS may require "emergency medical attention." The Boston Globe interviewed a doctor about CHS, who estimated that between 5–20% of chronic marijuana users will experience it (Cristantiello, 2024). An estimated 2.75 million Americans suffer from CHS annually (Angulo, 2024).

Researchers at Boston University found that marijuana use among men may double the risk of partner miscarriage—regardless of the woman's use (McAlpine, 2019). Additionally, marijuana use during pregnancy is accompanied by a host of risks for the baby. Use during pregnancy may

affect cognitive development by increasing the risk of hyperactivity, impulsivity, and inability to focus (Huizink & Mulder, 2006; G. S. Wang et al., 2017). Prenatal exposure to marijuana also predisposes offspring to neuropsychiatric disorders (Frau et al., 2019). A mother's marijuana use during pregnancy may also increase the risk of low birth weight, preterm birth, neonatal intensive care unit placement, and developmental problems (Gunn et al., 2016; Kharbanda et al., 2020). According to the Mayo Clinic, "Cannabis crosses the placenta and has been linked to higher rates of low birth weight, preterm birth and need for admission to the neonatal intensive care unit" (Mayo Clinic, n.d.).



Co-use of marijuana and nicotine linked to a 2.18 times higher infant mortality risk. Marijuana alone: 65% increase.

A 2022 retrospective cohort study in Colorado found that "legal" recreational marijuana is associated with a two-fold increase in marijuana-related hospitalizations of pregnant women (Wang et al., 2022). Of course, the risk to mothers is not the only concern. A 2023 study found that prenatal exposure to THC has long-term effects and inhibits brain and neural development in babies (Peng et al., 2023). In 2022, the largest long-term study of brain development and health in children and teens in the United States, the Adolescent Brain Cognitive Development Study, reported attention, social, and behavioral problems in children who were exposed to marijuana in the first trimester (NIDA, 2022b). A 2019 study found that parental marijuana use increases the likelihood of marijuana use among children in the household, as well as increases their risk of tobacco and opioid use (Madras et al., 2019). Perhaps not surprisingly, a 2024 study found that the co-use of marijuana and nicotine made the risk of infant mortality 2.18 times more likely, while the use of marijuana alone made it 65% more likely and the use of nicotine alone made it 62% more likely (Crosland et al., 2024).

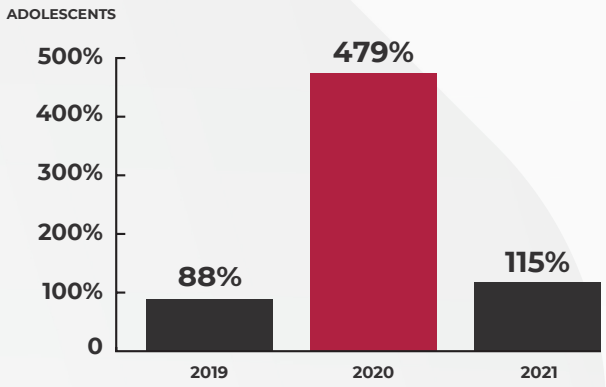
Dr. Nora Volkow, the director of the NIDA, published a report in response to this alarming trend developing across the country, warning of the detrimental health risks of in utero cannabis exposure (Volkow et al., 2017). Tragically, in 2019, a newborn whose mother reportedly used marijuana while pregnant was found dead at just 11 days old and doctors believed the cause was acute marijuana toxicity (Bao & Bao, 2019). The trend in marijuana use during pregnancy even prompted the U.S. Surgeon General to issue an advisory that warned women not to use marijuana to alleviate nausea during pregnancy (Office of the Surgeon General, 2019).

Spanning the mental and physical harms of marijuana on users, a study found that approximately one-third of past-year marijuana users in Canada reported at least one adverse health effect in the past year. Approximately 10% of users experienced panic reactions, 8% felt dizzy or passed out, 7% had nausea or vomiting, 5% had lung or breathing problems, and 3% had heart or blood pressure problems, among others (Marquette et al., 2024).

MARIJUANA AND CO-USE WITH OTHER SUBSTANCES

Some industry proponents claimed that legalizing marijuana would reduce the use of other substances in the United States, such as alcohol and opioids. Common industry rhetoric holds that former alcohol users will switch to marijuana if it is made legal. They also suggested that legalization would be "the exit to the opioid crisis" (MadMoney, 2018) and cited a since-debunked and severely flawed study that seemed to show a decrease in opioid overdoses in states that legalized medical marijuana.

In 2024, researchers found that the legalization of marijuana is associated with overdose deaths in American adolescents (Bleyer et al., 2024). States with legal marijuana saw the greatest increase in overdose deaths and outpaced non-legal states by 88% in 2019, 479% in 2020, and 115% in 2021.



States with legal marijuana saw overdose deaths increase by 88% (2019), 479% (2020), and 115% (2021) over non-legal states.

For instance, a 2021 study found that the implementation of recreational marijuana laws in 2017 was associated with a decline in opioid-related emergency department visits; however, the decline did not continue after the six-month mark, suggesting that marijuana users began using opioids again (Drake et al., 2021). Researchers in 2022 found that the legalization of marijuana was associated with a statistically significant increase in opioid overdose deaths, and this was especially pronounced in Black Americans (Bleyer et al., 2022).

A 2014 study (Bachhuber et al., 2014) suggested medical marijuana legalization was associated with a decrease in opioid-related deaths until 2010. However, a more recent study of that data showed the opposite. This 2019 study, which now includes more years of data, found instead that marijuana legalization coincided with a 23% increase in opioid-related deaths after 2010 (Shover et al., 2019). (However, the study notes that medical marijuana legalization, more likely than not, had no impact on opioid-related deaths.) Medical marijuana users, according to the findings of this study, represent 2.5% of the U.S. population; consequently, the legalization of medical marijuana is likely incapable of exerting a demonstrable impact on opioid overdose deaths. Other studies have supported this finding (Caputi, 2019).

The positive correlation found in this study is still worth further examination, given the relationship between marijuana use and opioid misuse. A 2021 study found that marijuana use was 34% higher in study participants who also misused prescription opioids as opposed to those who did not misuse prescription opioids, which undermines the premise of the possibility of marijuana being a solution to opioid misuse (Arora et al., 2021).

The Centers for Disease Control and Prevention (CDC) stated, "Importantly, using

cannabis either alone or in combination with opioids has been shown to increase risk for opioid misuse. There is no evidence that cannabis works to treat opioid use disorder" and that:

> Although some research suggests that states that legalize cannabis use for medical purposes experience a reduction in opioid prescribing and opioid-related deaths, other research that examines the impact of medical cannabis policies over a longer period of time indicates cannabis legalization is not associated with decreases in opioid overdose deaths and that prior research findings could be coincidental. (CDC, 2024a)

The CDC cited a study that found that "among both men and women, prior marijuana use was 2.5 times more likely than no prior marijuana to be associated with subsequent abuse of prescription opioids" (Fiellin et al., 2013).

Studies have found a link between marijuana and opioid use as well as marijuana and future use of other drugs. In particular, marijuana exposure in adolescence seems to impact future opioid use (Ellgren et al., 2007). A large proportion (44.7%) of lifetime marijuana users ultimately use other drugs (Secades-Villa et al., 2015). A study by Azagba and colleagues (Azagba et al., 2019) found marijuana users were more likely than nonusers to report prescription opioid misuse, echoing an earlier study that demonstrated that participants who reported marijuana use in the previous year were 2.6 times more likely to misuse nonprescription opioids (Olfson et al., 2018). A 2021 study also found an association between the implementation of marijuana home cultivation and an increase in opioid-related hospitalizations and emergency department visits (Jayawardhana & Fernandez, 2021).

A body of research shows early marijuana use can more than double the likelihood of other drug use later in life (Olfson et al., 2018; Secades-Villa et al., 2015). The scientifically validated relationship between substance misuse and marijuana use is difficult to ignore.

Marijuana is often lauded as a plausible substitute for opioids in the treatment of pain. But mounting evidence suggests that marijuana use—particularly chronic use—is associated with poor pain control (Salottolo et al., 2018). A 2022 meta-analysis found that marijuana is no better than a placebo at relieving pain (Gedin, 2022). A study found adults with pain are vulnerable to adverse marijuana use outcomes, a finding that calls into question the prescribing of marijuana as a pain reliever (Hasin et al., 2020). Considering that severe pain continues to be one of the most common reasons for obtaining a medical marijuana card—90% of registered cardholders in Colorado reported severe pain as the reason for marijuana use (Colorado Division of Criminal Justice, 2021)—current state policies should be reconsidered.

A four-year prospective study in the highly respected journal *The Lancet Public Health* followed patients with chronic non-cancer pain and found no evidence marijuana use mitigated pain severity or interference or that marijuana affected rates of opioid prescribing or opioid discontinuation (Campbell et al., 2018).

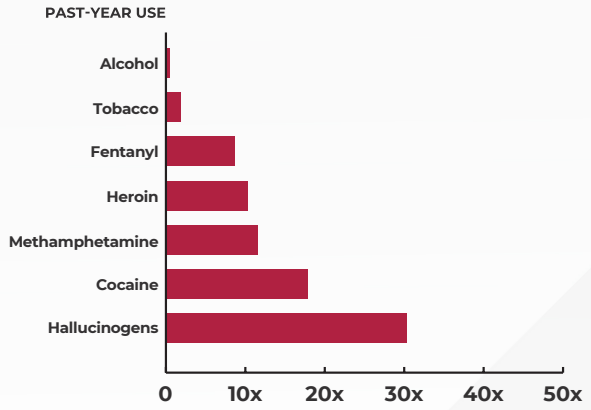
Rising alcohol use is also an issue, and some have suggested that marijuana may be a substitute for alcohol use. However, a 2022 report found that alcohol consumption did not go down in states with legal marijuana; instead, legalization resulted in an increase in the co-use of marijuana and alcohol (Gonçalves et al., 2023). According to a 2018 report, Washington state saw a 9% increase in gallons of beer consumed since legalization (Sauter, 2018). And according to America's Health Rankings, 20.5% of adults in Colorado reported binge drinking in 2021, compared to a national average of 17.3% (America's Health Rankings, 2022). Other studies showed no meaningful

decrease in alcohol use since legalization (Haughwout et al., 2016). Further analysis found that "Allowing for changes in the adult population over the period 2005–2017, the data show a continuing increase in wine servings alongside... legalization" (Pellechia, 2018).

Rather than discouraging polysubstance use (the use of multiple drugs), marijuana legalization is associated with further use, misuse, and dependence on other drugs. For example, marijuana dependence was found to be predictive of alcohol and nicotine dependence (Shephard et al., 2023). While the "gateway" effect of marijuana is sometimes considered outdated, the association between the use of marijuana and other drugs is supported by science. Marijuana use often predicts future drug use—ranging from tobacco and alcohol use to opioid use.

While the use of marijuana may not lead to the use of an additional substance, those who use marijuana are more likely to use other substances than those who do not use marijuana. According to the 2022 National Survey on Drug Use and Health , compared to those who did not use marijuana, past-year marijuana users were:

- 31 times more likely to have used hallucinogens in the past year (12.4% vs 0.4%).
- 18.5 times more likely to have used cocaine in the past year (7.4% vs 0.4%).
- 12.3 times more likely to have methamphetamine in the past year (3.7% vs 0.3%).
- 11 times more likely to have used heroin in the past year (1.1% vs 0.1%).
- 8 times more likely to have used illegally made fentanyl in the past year (0.8% vs 0.1%).
- 2.8 times more likely to have used tobacco in the past year (45.7% vs 16.1%).
- 1.5 times more likely to have used alcohol in the past year (85.8% vs 56.2%).



Marijuana users compared to non-users are significantly more likely to use hallucinogens (31x), cocaine (18.5x), methamphetamine (12.3x), heroin (11x), fentanyl (8x), tobacco (2.8x), and alcohol (1.5x).

Marijuana use itself may be forecasted by other, seemingly less harmful drugs, such as tobacco and alcohol. Among high schoolers who first initiated alcohol use by 12th grade, subsequent marijuana use was more likely. Marijuana seems to both impact—and be impacted by—tobacco use in younger age groups (Keyes et al., 2019). Moreover, a 2021 study found that "Respondents reporting at least one family member or peer using e-cigarettes were more likely to use e-cigarettes" compared to respondents whose family members did not use them, illustrating how one's social environment influences his or her usage of drugs (Coleman et al., 2021).

A 2018 study published in the *Journal of Studies on Alcohol and Drugs* found that, similar to tobacco and alcohol co-users, marijuana and alcohol co-users were more likely than non-marijuana alcohol users to overvalue alcohol, signaling a dependence on both drugs (Morris et al., 2018). Marijuana use is also associated with an increased likelihood of alcohol use disorder (Weinberger et al., 2016). In 2021, researchers found co-users of alcohol and marijuana were over three times more likely to suffer from alcohol use disorder (Waddell, 2021). Another study in the same year from the CDC found that "During 2015–2019, one-third (34.4%) of Colorado adults

who binge drank used marijuana compared with one-tenth (9.9%) of nondrinkers" (Crawford et al., 2021).

The commercialization of marijuana perpetuates an understatement of the dangerous consequences of marijuana use, adding to the social burden of addiction rather than subtracting from it.

MARIJUANA VAPING

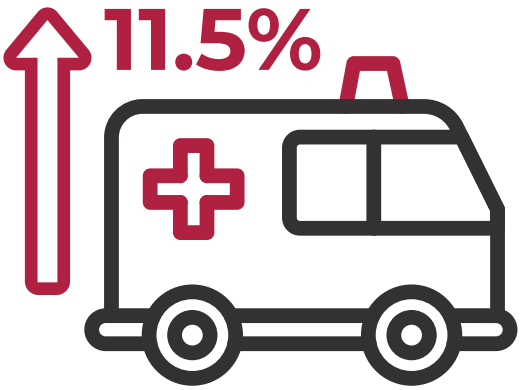
The vaping of marijuana in THC oil pods and cartridges is a relatively new, yet rapidly exploding, marijuana-industry innovation. Vaping quickly delivers 70–90% THC concentrates to users by heating extracted oils so that they can be inhaled as vapor. No studies on consumer safety were conducted prior to the mass marketing of vaporizers, which are also popular among tobacco users.

Vaping is prominent among youth because vapes are easily concealed and produce less (if any) odor, as compared to other consumption methods. In 2023, 19.6% of 12th graders reported vaping marijuana in the last year. Vaping has been normalized among youth, and many have transitioned from smoking marijuana to vaping it. Between 2017 and 2023, the percentage of 12th graders who vaped marijuana more than doubled from 9.5% to 19.6% (Miech et al., 2023b). A study in *Addiction* found that: "cannabis vaping is increasing as the most popular method of cannabis delivery among adolescents in the United States, and that frequent (six or more times per month) use is increasing faster than occasional use" (Keyes et al., 2022).

The CDC's 2019 Youth Risk Behavior Surveillance System found 50.1% of high school students had tried electronic vapes and 10.7% of high schoolers used those products on 20 or more days in the past 30 days. (NIDA, 2022a).

EMERGENCY ROOM VISITS AND HOSPITAL ADMISSIONS

The widespread availability and accessibility of high-potency marijuana due to legalization has resulted in an increasing number of marijuana-related poison control calls, emergency department visits, and hospitalizations. Between 2022 and 2023, the number of marijuana-related emergency department (ED) visits increased by 4.6%, from 857,289 to 896,418, according to the federal Drug Abuse Warning Network (DAWN (SAMHSA, 2024b). This represents an 11.5% increase compared to the 804,285 marijuana-related ED visits in 2021 (SAMHSA, 2022a).



Marijuana-related emergency department visits increased 11.5% from 2021 to 2023.

Notably, the number of marijuana-related ED visits increased by 4.6%, even as the number of alcohol-related ED visits decreased by 3.6%, opioid-related ED visits decreased by 3.7%, and methamphetamine-related ED visits decreased by 6.4%. What's more, the number of marijuana-related ED visits surpassed the number of opioid-related ED visits, at 896,418 and 881,556, respectively.

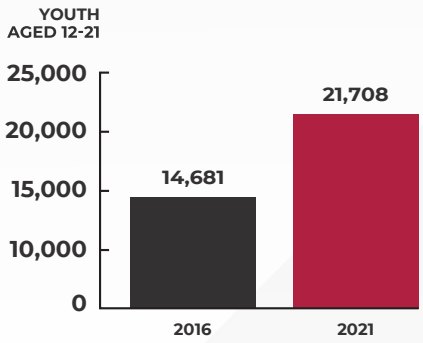
Additionally, 43.1% of the marijuana-related ED visits involved an additional substance. The top three substances involved in marijuana-related ED visits were alcohol, cocaine, and methamphetamine. Marijuana was the most common substance involved in polysubstance alcohol-related ED visits, the second most common substance involved in polysubstance cocaine-related ED visits, and the third most common substance involved in polysubstance methamphetamine-related ED visits.

In 2023, 10.4% of the marijuana-related ED visits (approximately 93,227) were for individuals between the ages of 0 and 17. This is 29% higher than the approximate 72,144 in 2022 (Ball et al., 2024; SAMHSA, 2023a).

A 2024 study that reviewed the Pediatric Health Information System Database, which tracks visits to pediatric hospitals for youth aged 12–21, found that there were 106,793 substance-related visits between 2016 and 2021, of which 52.5% were due to marijuana. What's more, it found that the annual number of marijuana-related visits increased by 82.4% over the study period, representing the greatest increase of any substance, likely due to the legalization and commercialization of marijuana.

A 2022 study published in Pediatrics found a 1,375% increase in accidental edible marijuana exposure in children under the age of 6 from 2017 to 2021 (Tweet et al., 2023). Additionally, a 2022 study found that hospital discharges for marijuana-associated psychosis were higher in states with legal marijuana (Moran et al., 2022). These results are underlined by an earlier study that found the commercialization of recreational marijuana is associated with a 66–77% increase in marijuana exposures. State-specific data shed greater light on this phenomenon (Shi & Liang, 2020).

Marijuana accounted for 52.2% of youth substance-related hospital visits (ages 12–21) from 2016 to 2021.



A study published in March 2022 found that after California legalized marijuana, there was a significant increase in hospitalizations and emergency room visits by children who had some sort of marijuana exposure. Researchers found that 43% of patients presented with complaints of suicidal ideation (Harvey et al., 2022).

A study by the Colorado Department of Public Health and Environment found that in 2018, over 23,000 homes in the state with children aged one to 14 years had marijuana products stored in an unsafe manner (CDPHE, 2018). Even when packaging is compliant with Colorado's regulatory requirements, it often fails to discourage or prevent children from accessing potent and dangerous marijuana. There has also been a steep increase in youth marijuana exposures nationwide. There were 598 in-home exposures involving children younger than 12 in 2018; in 2020, that number increased to 2,473 (Russo, 2021).

Researchers who studied the impact of medical marijuana legalization also found many pediatric marijuana exposure cases in the state, despite childproof packaging and warning labels (Whitehill et al., 2019). During the eight-year study period, the Regional Center for Poison Control and Prevention recorded a 140% increase in single substance (marijuana) exposures,

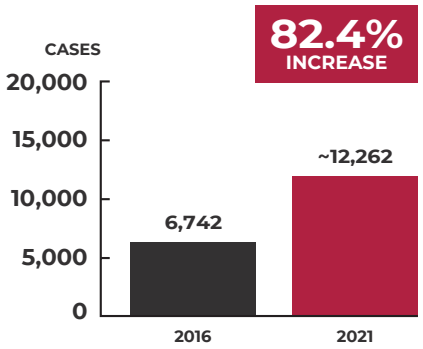
with 81.7% of these calls regarding marijuana exposures of 15–19-year-olds.

A study conducted in Washington state found that the rate of pediatric exposures to marijuana (children aged 9 or under) was 2.3 times higher following legalization (Thomas et al., 2019). Poison control center cases in Washington state have increased 103.2%. Cases for children aged 5 and younger increased by 176.5%. In 2018, there were 497 calls—compared with 245 when legalization in the state began (Washington Poison Center, 2018).

More recently, the Ohio Poison Center reported a "sharp rise" in marijuana-related incidents among children, following the legalization of marijuana, with the organization's director attributing the issue to the fact that the marijuana industry produces products that look like candy or snacks (Cadigan, 2024). Marijuana-related poison control calls regarding children to the North Texas Poison Center increased by more than 1,000 between 2019 and 2023 (Summerville, 2024). In Illinois, the number of marijuana-related poison control calls among children aged five or younger increased from 37 in 2019 to 244 in 2023 (Mike, 2024). Following legalization in Illinois, hospitalizations for children who accidentally consumed edibles spiked. In Cook County, three children were hospitalized in 2017 for THC exposure, but in 2021, 124 children in Cook County were hospitalized (Ponce, 2022).

Notably, marijuana is not harming only adolescents and young adults. A study in California found that the number of cannabis-related emergency department visits for adults aged 65 or older increased from 20.7 per 100,000 in 2005 to 395.0 per 100,000 in 2019, or by 1,804% (Han et al., 2023). As the use of marijuana persists across all major age groups, its harms will continue.
In Alaska, in 2017, there were a total of 3,296 inpatient discharges and 6,639 outpatient discharges related to marijuana (ADHSS, 2020). In Illinois, just several days after legalization, doctors reported a surge in emergency room visits and hospitalizations for marijuana, including several cases of marijuana-induced psychosis (McCall, 2020).

From 2010 to 2014, researchers recorded a 46% increase in CHS cases in Colorado (Bhandari et al., 2019). Another study of CHS in Colorado found at least two deaths that were caused by CHS and recorded a third death that CHS is believed to have contributed to (Nourbakhsh et al., 2019).



Marijuana-related pediatric emergency visits increased by 82.4% (2016–2021).

This phenomenon was not reported before 2004, and Cedars-Sinai said, "CHS was only recently discovered" (Cedars Sinai, n.d.). In a recent article about marijuana's harms, the New York Times stated, "Researchers estimate that today about six million near-daily marijuana users in the United States could have symptoms of CHS" (Twohey et al., 2024).

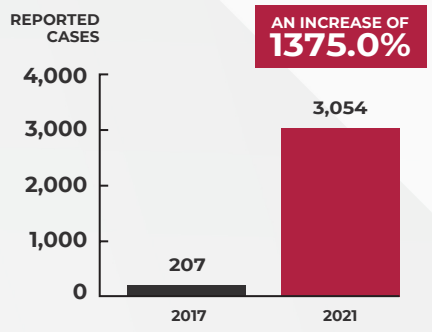
A similar trend has been observed in Nevada, where the rate of emergency department visits for CHS doubled after commercialization. Similarly, there are now more emergency department visits in the state for marijuana than for opioids (Soh et al., 2024; Kim et al., 2019).

Internationally, the BBC reported that

"One in four admissions to Guernsey's adult mental health ward in 2023 were likely to be linked to cannabis use, a States report has found. This compares with 4% of cases in 2019, when medicinal cannabis prescriptions were introduced" (BBC News, 2024).

Additionally, there is mounting evidence that marijuana users are more likely to be hospitalized for serious adverse health events, including bodily injury (Wang et al., 2017, Sophocleous, A., Robertson, R., Ferreira, N. B., McKenzie, J., Fraser, W. D., & Ralston, S. H. (2017), falls (Workman et al., 2021), skeletal fractures (Sophocleous et al., 2017), acute trauma (Vozoris et al., 2022). In fact, a 2022 study found that marijuana users were nearly 25% more likely than nonusers to be hospitalized or go to the emergency room (Vozoris et al., 2022).

Pediatric (kids under the age of 6) accidental edible marijuana exposure increased by 1,375% (2017–2021).



The dramatic increase in emergency cases related to marijuana exposure highlights the danger of commercialization. In many instances, the danger impacts children or people who mistakenly consume marijuana. Innocent, unwitting citizens are subjected to the consequences of a situation that they did not create.

A 2022 study "observed a higher proportion of hospital discharges for psychosis associated with cannabis use in areas with more liberal cannabis legalization laws" (Moran et al., 2022).

Altogether, it should not be surprising that a 2024 study in JAMA Network Open found that the rate of health care encounters for marijuana increased from 2017 through 2022 (Perez-Vilar et al., 2024). This mirrors similar trends in the prevalence of use, in which more people are using marijuana—and using it more heavily. The study also found that "rates were greatest in states or territories with both adult and medical use legalization," followed by jurisdictions with only medical marijuana, followed lastly by jurisdictions with neither, in which cannabis is not legalized or commercialized.

SOCIETAL IMPACTS

YOUTH

The legalization of marijuana has had a profound impact on rates of youth use, coinciding with decreases in risk perception.

Years of playing catch-up to alcohol and tobacco normalization have resulted in important downward trends in youth alcohol and cigarette use. But a new wave of substance use among children is appearing. Given the relationship between marijuana use, alcohol use, and cigarette use, it is important to note that usage rates of all substances among youth may rise if the dangers of youth marijuana use are ignored.

Teenagers' relationship with marijuana is vastly different than with almost any other drug. According to the 2022 National Survey on Drug Use and Health, 9.7% of teens aged 12–17 who used marijuana in the past year reported using it daily or

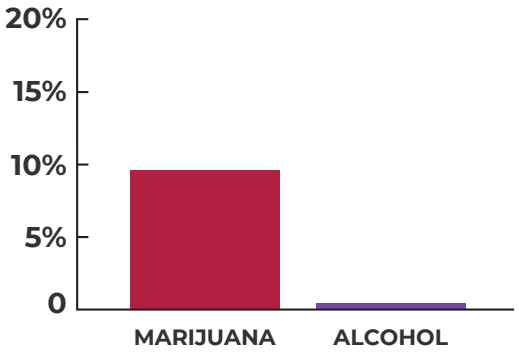
near daily. The daily or near-daily rates among teens for inhalants and alcohol were 1.2% and 0.3%, respectively. We see a similar dynamic among adults. Among past-year users aged 12 and older, 24.4% used marijuana daily or near daily, compared to just 6.6% for alcohol. In fact, marijuana had the highest daily or near-daily use rate among all drugs surveyed other than heroin (SAMHSA, 2022b).

While some marijuana industry proponents have suggested that a strict legal marijuana market would limit youth use, marijuana use among youth is rapidly increasing concurrently with legalization—while perceptions of risk associated with use are decreasing. For instance, a 2022 analysis of a longitudinal cohort study of 21,863 individuals found that youth in states with legal recreational marijuana were more likely to use it than youth in non-legal states (Knopf, 2022). A 2021 study found that 33% of 16–18-year-olds reported marijuana use (Masonbrink et al., 2021). A 2022 study found that this demographic of users, aged 16–17, are more likely to have severe CUD than adult users (Lawn et al., 2022).

Risk perception is directly related to use. A 2022 study found that in "legal" states, youth have lower perceptions of the risk of marijuana use and higher rates of use compared to non-legal states (Bhatia et al., 2022). The pro-legalization Cato Institute also found, "All states that have legalized marijuana fall below the average U.S. risk perception" (Dills et al., 2021).

A systematic review and meta-analysis published in the *Journal of the American Academy of Child and Adolescent Psychiatry* found that the legalization of recreational marijuana is associated with increases in past-month marijuana use among adolescents and young adults (Pawar et al., 2024). As opposed to lifetime or past-year use, past-month use is indicative of more frequent use. Notably, the meta-analysis found that recreational marijuana laws were associated with a 13% increase in past-month marijuana use among youth, defined as those between the ages of 12 and 17. Likewise, among studies with datasets only after 2008, it found that recreational marijuana laws were associated with a 22% increase in past-month marijuana use among young adults, defined as those between the ages of 18 and 25.

9.7% of teens (12–17) using marijuana reported daily use, far higher than alcohol (0.3%).



The Connecticut Department of Public Health reported:

> Young adult residents continue to report low perceived risk from cannabis use, use it frequently, experience higher rates of cannabis-related adverse health outcomes, and report that they think about or attempt quitting cannabis at a higher rate than adults in older age groups. (Connecticut Department of Public Health, 2024)

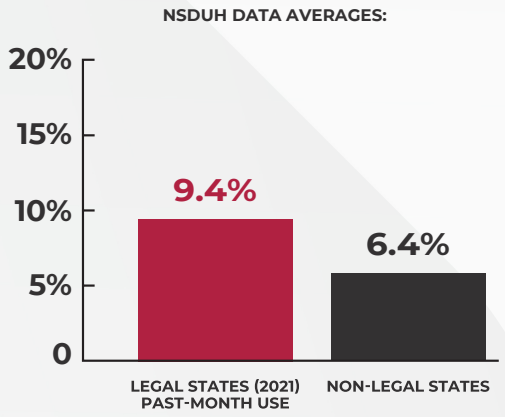
Compounding this problem are the increasing rates of use by adults. According to a Monitoring the Future report, the percentage of 19–30-year-olds that used marijuana in the past 12 months increased from 28.1% in 2012 to 42.4% in 2023 (Patrick et al., 2024).

In part, the ease of obtaining marijuana has contributed to youth use in "legal" states. Restrictions on selling to minors have not stopped state-sanctioned vendors from

selling the drug to underage consumers in "legal" states. According to the 2022 Arizona Youth Survey, when high school users in Arizona were asked how they obtained marijuana, 21.0% of 12th graders, 13.1% of 10th graders, and 8.2% of 8th graders said they "bought it from a dispensary within Arizona" (Arizona Criminal Justice Commission, 2022d).

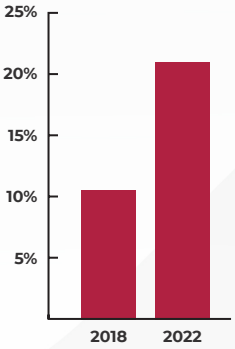
Similarly, the 2021 Washington State Healthy Youth Survey found that 12% of 12th graders, 6% of 10th graders, and 3% of 8th graders who obtained marijuana in the past month answered, "I bought it from a store" (Washington State Healthy Youth Survey [WSHYS], n.d.). The 2021 Massachusetts Youth Health Survey found that 4.3% of high school students who used marijuana in the past month answered, "I bought it from a store" (Massachusetts Department of Public Health, 2022).

Adolescents in legalized states have significantly higher marijuana use rates.



When past-month high school users in Colorado were asked to identify the *one source* where they "usually" obtained marijuana, 4.9% answered, "I bought it at a marijuana store or center," the 2021 Healthy Kids Colorado Survey found. An additional 1.7% answered, "I used a marijuana delivery service" (CDPHE, n.d.).

The California Healthy Kids Survey looked at the issue from a slightly different angle, asking students to identify where their peers obtained marijuana. According to the 2017/19 survey, 19.3% of 11th graders, 12.0% of 9th graders, and 5.0% of 7th graders said their peers "buy it at a marijuana dispensary." The report added, "This suggests that the expanding adult retail market may be influencing current and future use among adolescents" (Austin et al., 2021).



The percentage of 12th graders in Arizona that used marijuana and purchased it from a dispensary nearly doubled (11.3% to 21.0%) from 2018 to 2022.

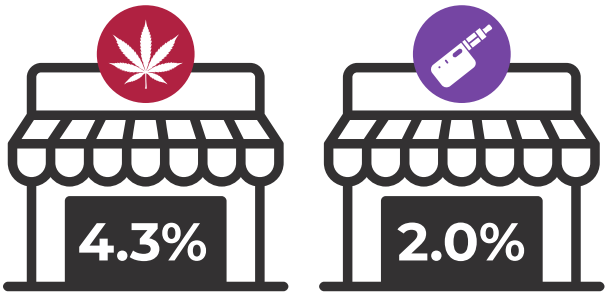
The Arizona Youth Survey also indicates that 12th-grade users are just as likely to buy marijuana from dispensaries as they are to buy it from drug dealers. Statewide, in 2022, 21.0% of 12th-grade users said they bought marijuana from an Arizona dispensary, compared to 23.1% that said they "bought it from a drug dealer." In Pinal, Yavapai, Coconino, and Navajo counties (the first two are Arizona's third- and fourth-largest counties), 12th-grade users were more likely to buy marijuana from a dispensary than from a dealer (Arizona Criminal Justice Commission 2022c, 2022e, 2022a, 2022b).

Moreover, the Arizona Youth Survey found that minors are more likely to buy marijuana from dispensaries than they are to buy alcohol from stores. In Arizona, in 2022, 21.0% of 12th graders, 13.1% of 10th graders, and 8.2% of 8th graders that used marijuana bought it "from a dispensary within Arizona," whereas 13.0% of 12th graders, 8.5% of

10th graders, and 4.0% of 8th graders that used alcohol "bought it at a store" (Arizona Criminal Justice Commission, 2022d).

The 2021 Massachusetts Youth Health Survey found that high school marijuana users were twice as likely to have bought marijuana from a store than were tobacco users to have bought tobacco products from a "vape shop or vapor store," at 4.3% and 2.0%, respectively (Massachusetts Department of Public Health, 2022).

Massachusetts teens were twice as likely to buy marijuana from stores (4.3%) than tobacco from vape shops (2.0%).



The issue of dispensaries selling to minors has been worsening. Between 2018 and 2022, the percentage of 12th-grade users in Arizona who bought marijuana from a dispensary nearly doubled from 11.3% to 21.0%. In Washington, the percentage of 12th-grade users that bought marijuana from a store increased from 7% in 2016 to 12% in 2021 (Washington State Healthy Youth Survey, n.d.).
To make matters worse, a 2023 study in *JAMA Pediatrics* found that many online dispensaries "did not ask users to verify their age to enter the website and ...did not ask users to verify their age before purchasing or receiving the product," providing one potential avenue for minors to purchase marijuana (Terala et al., 2023).

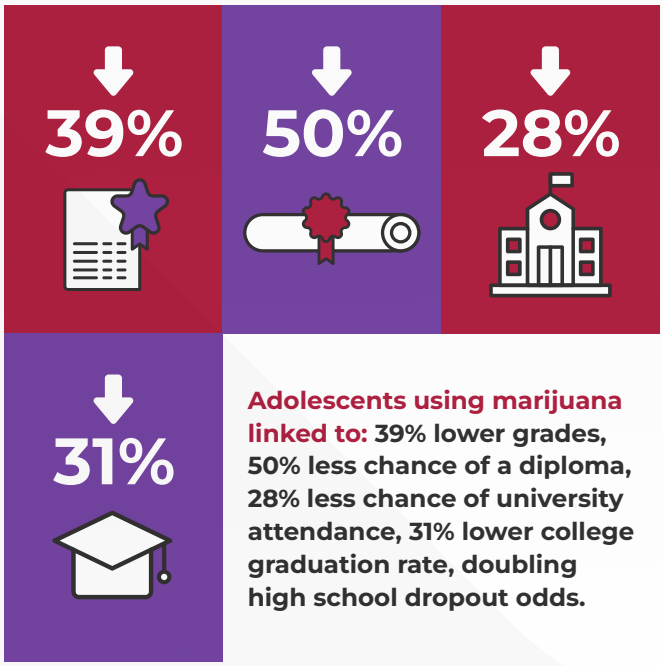
Youths not only use marijuana differently but are affected by it differently. Developing brains are particularly susceptible to both short- and long-term negative repercussions. A 2022 study found that youth marijuana users are more likely to have severe CUD and are more likely to have greater psychotic-like symptoms than adult marijuana users (Lawn et al., 2022). A 2024 study found evidence of an age-dependent link between cannabis use and risk of psychotic disorder, noting that "compared to no cannabis use, cannabis use was significantly associated with psychotic disorders during adolescence" and found that the use of cannabis, compared to non-use, was associated with over 11 times "greater risk of psychotic disorder at any point during adolescence (ages 12–19 years)" (McDonald et al., 2024).

Research highlighted by Columbia University from 2023 found that teenagers addicted to marijuana are up to 450% more likely to struggle with negative mental health and behavioral outcomes (Cantor, 2023).

Additionally, marijuana use impacts educational outcomes. A meta-analysis published in 2024 found marijuana use in adolescence was linked to:

- 39% higher odds for lower school grades,
- 50% less chance of attaining a high school diploma,
- 28% lower likelihood of going to university,
- 31% lower odds of getting a college degree,
- More than doubling the odds of dropping out of high school, and
- More than doubling the odds of school absenteeism (Chan et al., 2024).

According to the 2023 Monitoring the Future (MTF) survey, 8th and 10th graders who reported seeing advertisements for marijuana on billboards were more likely to have used marijuana in the past year and the past month. Compared to those who never saw these marijuana billboards, those who reported seeing them more than once a day were 4 times more likely to have used



marijuana in the past year and 7 times more likely to have used marijuana in the past month (Miech et al., 2023a).

Among 11th graders in Oregon who currently use marijuana, 67% reported obtaining it from a friend (Oregon Health Authority, 2016). Furthermore, 37.2% of 8th and 49.5% of 11th graders reported being exposed to online marijuana advertisements in the past 30 days (Oregon Health Authority, 2017). A study found that one in three youth living in a state where marijuana is "legal" engaged with marijuana promotions on social media. The same study found that youth who engaged with marijuana promotions were five times as likely to use marijuana (Trangenstein et al., 2019).

In Washington state, 44% of 8th graders believed there to be no or low risk from regular marijuana use, 40% of 10th and 12th graders reported no or low risk from regular marijuana use, and 67% of 10th and 12th graders reported no or low risk of trying marijuana once or twice (WSHYS, n.d.).

Youth marijuana vaping has added to the already alarming trend of increasingly prevalent marijuana use among young people amid widespread commercialization. Trends in youth vaping have given way to a countrywide epidemic (CDC, 2019) that presents implications for youth marijuana use. Youth vaping of any kind (tobacco or flavors) has been shown in several studies to increase the likelihood of subsequent marijuana vaping or marijuana use generally (Chadi et al., 2019; Kowitt et al., 2019; Sun et al., 2022).

Past-year youth vaping of marijuana has increased dramatically since the MTF survey began recording data on the subject in 2017. Among 8th graders, the percentage that vaped marijuana in the past year more than doubled from 3.0% in 2017 to 6.5% in 2023. Marijuana vaping by 10th graders increased from 8.1% in 2017 to 13.1% in 2023. Among 12th graders, it doubled from 9.5% in 2017 to 19.6% in 2023 (Monitoring the Future, n.d.-c). A 2021 study found that vaporized marijuana was among the most socially acceptable modes of use among youth (Romm et al., 2021).

As marijuana legalization advocates have argued that youth marijuana use falls in conjunction with legalization, it is important to note trends in use in states that have legalized the drug. More young people use marijuana in "legal" states—and they use it more frequently. A recent study "suggests an increase in adolescent past-month consumption of cannabis following legalization" (Lachance et al., 2022). These trends are driven by the decreased perception of risk, as well as the increased availability of marijuana that accompanies legalization. Nationally, fewer people, especially youth, perceive a risk from smoking marijuana. This downward trend is driven by the relaxed approach to marijuana in states where it's "legal."

A 2023 study found that not only do rates of youth past-month marijuana use increase in "legal" states, but the perception of harm decreases. This study also found that despite higher use in youth and young adults, fewer people are receiving treatment for CUD (Mennis et al., 2023). Researchers were careful to note that lower CUD treatment utilization does not mean lower

rates of CUD but does mean more people need treatment and fewer are receiving it. Rates of CUD are increasing as potency increases and perception of harm decreases; in fact, one in three past-month users of marijuana in the United States meet the criteria for CUD diagnosis (Lehman, 2022).

Youth marijuana use linked to losing 5.5 IQ points on average in adulthood compared to lifelong non-users.

5.5 Points vs 0.7

A study found legalization "in California was associated with an increase in adolescent marijuana use in 2017–2018 and 2018–2019," which is troubling because "increases observed in California may portend continued increases in adolescent marijuana use in future years if marijuana use becomes more popular among legal age adults and more normative in California." The study also found that after California legalized, teens were 18% more likely to consume marijuana at any point in their lives and 23% more likely to consume it in the last 30 days (Paschall et al., 2021).

These nationwide increases far exceed marijuana use rates among youth aged 12 to 17 in states where marijuana remains illegal.

According to 2018/2019 pre-pandemic, NSDUH state-specific data, 12.4% of youth in non-legal states reported past-year marijuana use and 6.6% of young people in those states reported past-month use. Comparatively, use rates for 12–17-year-olds in "legal" states are several percentage points higher: 16.5% for past-year use and 9.2% for past-month use (SAMHSA, 2019a).

Higher marijuana dispensary density has been documented in racially diverse, lower-income neighborhoods.

Marijuana commercialization—and the subsequent normalization of marijuana use—plays an important role in the increased marijuana use by young people. A 2017 study found that a longer duration of legalization and higher dispensary density were associated with increased use of vaping and consumption of edibles by 14–18-year-olds (Borodovsky et al., 2017). Marijuana dispensary density has been linked to more use among youth, with 16% of 11th graders reporting marijuana use in areas with less dispensary density compared to 24.3% of the same age group reporting use in more retail-dense areas (Hatch, 2017). And a 2020 study found that regular exposure to marijuana advertising raises the likelihood of adolescents using marijuana (Fiala et al., 2020).

The commercialization of marijuana has also adversely impacted schools and youth academic performance. According to Joe Zawodny, director of secondary education for the Anchorage School District, "Because it's legal in the community, I think, the stigma around marijuana use is decreasing. The data would seem to say there is increasing use" (Wohlforth, 2018). In Washington state, high schoolers reporting marijuana use also reported lower grades (more Cs, Ds, and Fs) than those of their peers who did not smoke marijuana (WSHYS, n.d.).

In Alaska, the number of youths referred for marijuana-related crimes jumped to a high of 302 (ADHSS, 2020). A study also found about 22% of students in grades 9–12 reported that illegal drugs were "offered, sold, or given to them on school property during the previous 12 months" (National Center for Education Statistics, 2021).

Marijuana use among youth in "legal" states also coincides with marijuana misuse and substance use disorder.

A 2019 study found that recreational marijuana legalization was followed by a 25% increase in adolescent marijuana use disorder. (Cerdá et al., 2020)

Dabbing is a process of heating marijuana concentrate, often of unspecified potency, which can reach up to 99% THC, and inhaling the vapor. This trend speaks to the prevalence of high-potency marijuana products. A 2021 Washington state survey revealed that 33% of 12th graders, 36% of 10th graders, and 37% of 8th graders who used marijuana reported that they dabbed it. These numbers are up significantly from 2018, which showed 13% of 8th and 10th graders and 19% of 12th graders reported dabbing marijuana (WSHYS, n.d.). One study on dabbing found that the process may deliver significant amounts of additional toxins, such as methacrolein and benzene (Meehan-Atrash et al., 2017). A 2020 study found that adolescents who dabbed were six times more likely to continue using concentrated forms of marijuana later in life (Hopper, 2020).

There are intense ramifications to marijuana use by youth. Developing brains are especially susceptible to the negative effects of marijuana use, and young users have demonstrated changes in grey matter volume, indicating negative consequences for brain development (Orr et al., 2019). Young users are also at a greater risk for mental health problems, dependence on marijuana, and future substance misuse (Coffey & Patton, 2016). Chronic adolescent marijuana use has been correlated with cognitive impairment and worsened academic or work performance (Arria et al., 2015; Meier et al., 2015; Salmore & Finn, 2016; Schuster et al., 2018; Silins et al., 2014). Meier et al. found that "the most persistent adolescent-onset cannabis users evidenced an average 8-point IQ decline from childhood to adulthood" (Meier et al., 2012).

A 2022 study found that adolescent users of marijuana lost an average of 5.5 IQ points in adulthood, compared to an average loss of 0.7 points among lifelong nonusers (Hill & Hsu, 2022).

Youth marijuana use poses a significant risk for depression and suicide (Gobbi et al., 2019; Silins et al., 2014). In Colorado, where teen suicides have become the cause of one in five adolescent deaths (Daley, 2019), youth suicide toxicology reports have demonstrated this devastating effect. In 2024, the editorial board of the Denver Gazette sounded the alarm over the fact that "Suicides among Colorado adolescents ages 15-19 have nearly doubled since legalization," pointing to the harms of marijuana (Gazette Editorial Board, 2024). One study found that marijuana was the most common substance found in post-mortem toxicologies of youth suicide decedents (Choi et al., 2019). Additionally, a 2021 study found that poly-substance use of marijuana, alcohol, and tobacco was associated with depressive symptoms, anxiety, and lower grade point averages (Crane et al., 2021).

The efforts to legalize marijuana are playing out with devastating effects on youth across the country, while public health agencies are ill-equipped to mitigate the consequences. But youth are not the only group at risk.

YOUNG ADULTS

Though the legal age for marijuana consumption in "legal" states is 21, marijuana use during young adulthood carries a host of adverse effects. Marijuana has a particularly strong impact on developing brains, which continue to develop through a person's late twenties. Unfortunately, marijuana use in this age group is higher than that of any other.

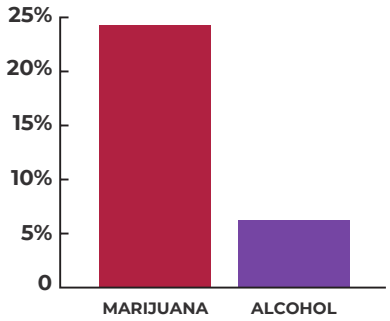
The low perception of risk associated with marijuana use, as well as the highest use rates of all age categories, makes marijuana an unexamined issue for many young adults.

According to the Monitoring the Future (MTF) survey, the percentage of 19–30-year-olds that used marijuana in the past year increased from 28.1% in 2012 to 42.4% in 2023. The past-month use of marijuana among this age group increased from 16.6% in 2012 to 28.7% in 2023. Between 2012 and 2023, the daily use of marijuana among 19–30-year-olds increased from 5.6% to 10.4% (Patrick et al., 2024).

The 19–20-year-old age group is interesting to look at, given that they have completed high school but remain below the legal age to purchase marijuana. The past-year use of marijuana by 19–20-year-olds increased from 33.3% in 2012 to 40.0% in 2023 (Monitoring the Future, n.d.-a).

Legalization no doubt plays a role in the rising use of marijuana in young adults. The prevalence of past-month marijuana use among 18–25-year-olds has increased in the first four states that legalized recreational marijuana: Colorado and Washington legalized in the 2012 election cycle and Alaska and Oregon legalized in the 2014 cycle. Past-month use—as opposed to lifetime or past-year use—is indicative of heavier, more frequent use.

The 2023 NSDUH reported increases in the prevalence of past-month marijuana use among 18–25-year-olds in these



Daily marijuana use among past-year users 12+ years old (24.4%) greatly exceeds alcohol (6.6%).

states between 2013–2014 and 2021–2022: Washington 24.47% to 30.93%; Alaska 21.30% to 33.33%; Colorado 31.24% to 34.67%; and Oregon 24.85% to 35.24 % (SAMHSA, 2014; SAMHSA, 2023e).

The prevalence of past-month marijuana use has increased in the first states that legalized recreational marijuana. For the sake of comparison, we can also look at changes in neighboring states that have not legalized recreational marijuana: Utah 11.55% to 17.06%; Nebraska 16.19% to 18.72%; Wyoming 16.00% to 19.46%; Idaho 14.28% to 21.57%; and Kansas 15.11% to 21.88% (SAMHSA, 2014; SAMHSA, 2023e).

While 30–35% of 18–25-year-olds in the first states that legalized recreational marijuana were past-month users of marijuana in 2021–2022, this was closer to 18–22% in the states that have not legalized marijuana (SAMHSA, 2023e). This trend is especially concerning for the 18–25-year-old demographic, given that their brains are developing. The CDC warns: "The teen brain is actively developing and continues to develop until around age 25. Cannabis use during adolescence and young adulthood may harm the developing brain" (CDC, 2024c).

According to the NSDUH, in 2023 young adults across the country had the lowest percentages of perception of risk associated

with marijuana use. Only 11.3% of those between the ages of 18 and 25 believed that smoking marijuana once a month was risky and only 14.5% perceived a great risk from smoking marijuana once or twice a week. This is far lower than the perception of risk of people aged 26 and up: 21.8% perceive a great risk from smoking once a month and 26.1% perceive a great risk from smoking once or twice a week (SAMHSA, 2023e).

Young adults report the highest rates of marijuana use. According to the NSDUH, in 2023, 36.5% of 18–25-year-olds used marijuana in the past year, including 38.1% of 21–25-year-olds, representing the highest of the age groups. In 2023, 16.6% of 18–25-year-olds had CUD, representing 45% of those who used it in the past year (SAMHSA, 2023c, 2023g).

Given what we know about marijuana's effects on the developing brain, young adults should be discouraged from using it. However, the commercialization of marijuana heavily promotes its use—without providing any warnings about risks. The same health dangers faced by teen marijuana users affect young adult users.

Although initiating marijuana use during the early teen years is thought to be associated with a greater risk of psychosis than if use begins in young adulthood (Arseneault et al., 2002), this does not mean continuing use through young adulthood is safe even for those who have not yet exhibited marijuana-induced psychosis, nor that commencing use is safe after age 20. Often, marijuana-induced psychotic symptoms develop in young adulthood, with the consolidation of those symptoms into a chronic disorder occurring over eight or more years (Niemi-Pynttäri et al., 2013). Frequency of use and potency of the product have been found to be more important than the age at which use began for increasing the odds of a psychotic outcome (Di Forti et al., 2019), while cessation of use is protective (Gonzalez-Pinto et al., 2011; Schoeler et al, 2016).

Co-use also presents compounded harm to young adult users. As this age group goes off to college—where drinking, drug use, and other kinds of experimentation are prevalent—marijuana may be used in conjunction with other drugs, presenting a risk for future substance use disorder. Researchers from Oregon State University found that college students who were binge drinkers before the age of 21 saw relatively large increases in marijuana use after legalization (Kerr et al., 2017).

What's more, many of these college students are using marijuana in public places. A survey of 14,005 college students in Texas, published in 2023 in the journal *Addictive Behavior,* found that nearly 40% of students had ever tried marijuana and that 26% of these students who had tried marijuana had used it on their college campus (North & Loukas, 2023). Summarizing various studies, Samba Recovery said:

> research has shown that heavy marijuana use during college is associated with delays in enrollment or dropouts from post-secondary education. Individuals with marijuana use disorder are more likely to drop out of college, and heavy marijuana users who do enroll are more likely to experience gaps in enrollment. (Samba Recovery, 2024)

A 2023 study found that college students who used marijuana and alcohol were at a significantly higher risk of serious adverse consequences (Hatch et al., 2023). A 2021 study in *JAMA Pediatrics* also found that:

> Young adults who reported co-use of alcohol and marijuana or met criteria for alcohol use disorder and/or marijuana use disorder accounted for 82.9% of young adults with prescription drug use disorder and 85.1% of those with illicit drug use disorder. (McCabe et al., 2021)

MARGINALIZED POPULATIONS

Marijuana legalization poses a significant threat to low-income and minority communities. Though industry proponents suggest that marijuana legalization will alleviate injustices against socioeconomically disadvantaged populations, disparities in use and criminal offense rates have persisted in states that legalized marijuana.

While it is important to evaluate the impact of incarceration within certain communities, it is also important to understand the impact of marijuana legalization on those same communities. It is inappropriate to suggest that only through marijuana legalization will social justice be achieved or criminal justice inequity remedied. In fact, no such effect has been demonstrated in the states where marijuana has been made "legal."

Instead of addressing social justice disparities in one fell swoop, legalization exacerbates these problems in lower-income and minority communities. What's more, the marijuana industry has identified them as an important new consumer base.

Higher marijuana dispensary density has been documented in racially diverse, lower-income neighborhoods.

In Oregon, the state conducted an analysis of the distribution of state-sanctioned dispensaries and found that sites were concentrated among low-income and historically disenfranchised communities (McVey, 2017; Smith, 2017). A 2020 study found that racial minorities in California were disproportionately exposed to unlicensed marijuana sellers, which comes at the cost of "potentially exacerbating health disparities by selling unregulated products or selling to minors" (Unger et al., 2020). A dissertation fro m a Harvard PhD student in 2024 found that "quintiles with more racialized populations had increased odds of more cannabis retail density per square mile and per 10km of roadway" (Kephart, 2024).

Even though dispensaries are often located in low-income communities of color, those communities do not reap the profits.

Fewer than 2% of marijuana business operators are Black (Gibson, 2021). Less than 20% of business owners and founders are minorities (Koski, 2022). In Denver, 88.5% of marijuana license owners were white while only 5.3% were Black in 2023 (City of Denver, 2024).

As a result, the harms associated with marijuana dispensary locations (such as increased use and substance misuse, normalization, hospitalizations, etc.) are disproportionately concentrated within particularly vulnerable communities—while profits are redirected outside of such communities. Additionally, the proximity to a marijuana dispensary reduces adjacent home values by 3-4% (Thomas & Tian, 2021).

The importance of this cannot be overstated. Historically disadvantaged communities lack many of the resources to combat this kind of targeting by industry, and also often lack adequate access to proper drug treatment facilities, thereby exposing community members to an increased likelihood of substance misuse with limited resources to combat the consequences (Kneebone & Allard, 2017). What the country

has seen in the fallout from the opioid epidemic and the expansion of Big Tobacco (Truth Initiative, 2018) is being replicated by Big Marijuana.

In 2023, according to the NSDUH, the use of marijuana among people of color was higher than the national average. While the prevalence of past-year marijuana use was 21.8% among those 12 or older, it was 24.5% among Black people, 30.2% of American Indian or Alaska Natives, and 32.9% of those who were two or more races (SAMHSA, 2023b). In turn, these same groups also have higher rates of CUD. While 6.8% of Americans aged 12 or older had CUD in 2023, the rate was 8.7% among Black people, 12.6% among those of two or more races, and 12.9% among American Indian or Alaska Natives (SAMHSA, 2023f).

The decreased perception of risk associated with marijuana use during pregnancy has a particularly damaging impact on socioeconomically disadvantaged communities. A study by the American College of Obstetricians and Gynecologists reported that young, urban women from lower income levels have a 15–28% rate of marijuana use during pregnancy (American College of Obstetricians and Gynecologists, 2017). As previously stated, marijuana use during pregnancy has a host of dangerous consequences for neonates. A 2021 study found that cannabis use or dependence is highest among pregnant women who are 25 years old or younger, low-income, Medicaid-insured, and receiving care at urban teaching hospitals (Gesterling & Bradford, 2022).

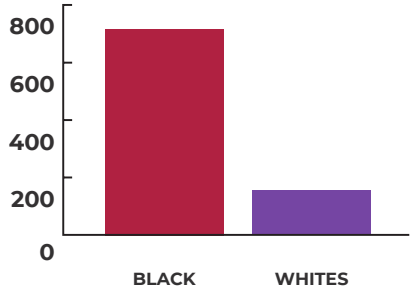
From an economic standpoint, advocates of the marijuana industry often argue that any detrimental effects of marijuana will be offset by the cash potential of the drug. Proponents of legalization suggest that the new industry presents previously disenfranchised groups with new economic opportunities. Although some states have attempted to use legislation to protect and provide for minority marijuana business owners, in reality, the industry is largely bereft of diversity. Nationally, fewer than 2% of all marijuana businesses are owned by minorities (Bailey, 2021).

Massachusetts serves as a case study for this phenomenon. As of 2021, only 10 of the 280 cannabis business licenses awarded in the Commonwealth were to Economic Empowerment or Social Equity applicants (Cotter, 2021). The state requires all "Marijuana Agents" (persons who work at marijuana businesses) to register with the state. Demographic analysis revealed that of 1,306 agents who applied in the city of Boston, 6% were Hispanic and 4% African American. This is unrepresentative of the city's population (U.S. Census Bureau, 2019). Indeed, an exposé by the *Boston Globe* revealed that a handful of out-of-state marijuana corporations had locked-in almost all the licenses through shell companies (Wallack & Adams, 2019). In 2021, 72.4% of these "Marijuana Agents" identified as white, while only 7.6% identified as Hispanic and 6% identified as Black (Smith, 2021).

In Chicago, not one of the 11 existing growers licensed to sell recreational marijuana was African American; the city council's Black Caucus pushed back. Soon after the state legislature legalized recreational marijuana, local African American legislators took issue with the obvious discrepancy (Koziarz, 2019). Still, Chicago Mayor Lori Lightfoot, who received $123,000 from the marijuana industry in her contentious bid for mayor, suggested that those council members take the issue up with the state legislators in Springfield. Legalization was implemented on schedule. In 2022, only one dispensary in Illinois was minority-owned (Vinicky, 2022).

According to SAMHSA's Drug Abuse Warning Network, the rate of marijuana-related ED visits among Black people was more than four times greater than the rate among white people in 2023, at 717 per 100,000 and 167 per 100,000, respectively (SAMHSA, 2024b).

The rate of marijuana-related emergency departmentvisits among Black individuals was 4 times higher than the rate among white individuals in 2023



717 VS. 167 PER 100K

The legalization of marijuana also has concerning implications for sexual minorities. The 2023 National Survey on Drug Use and Health found that 43.5% of Lesbian, Gay, and Bisexual (LGB) individuals aged 12 or older used marijuana in the past year, compared to the national average of 21.8%, and 52.8% of LGB individuals between the ages of 18 and 25 used marijuana in the past year, compared to 36.5% of this national age demographic. Among 12–17-year-olds, 20.5% of those who identified as LGB used marijuana in the past year, compared to the national average of 11.2% (SAMHSA, 2024a, 14; SAMHSA, 2023d).

The CDC's 2023 report for its Youth Risk Behavior Survey noted, "LGBTQ+ students were more likely than cisgender and heterosexual students to currently use marijuana." 25% of LGBTQ high school students were currently using marijuana, defined as having used it in the past 30 days, compared to 14% of cisgender and heterosexual students (CDC, 2024d).

Legalization is not a blanket solution to social injustice. In fact, it may perpetuate it.

HOMELESSNESS

Though the extent to which a correlation in the increasing homeless population may have with the legalization of marijuana is unclear, some trends in this area are notable.

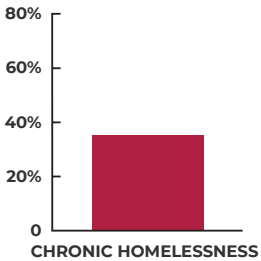
A 2023 report from the Federal Reserve Bank of Kansas City included a difference-in-difference test and found that chronic homelessness " increased by 35%, consistent with frequent anecdotes from residents and policymakers in states with legalized marijuana" (Brown et al., 2023).

A 2022 comprehensive study from Clemson University determined that data "strongly suggest that RCL [recreational cannabis legalization] adoption may cause an increase in aggregate rates of homelessness" (Sanderson, 2022).

Youth homelessness is often negatively impacted by marijuana use. A 2018 study found that daily marijuana use among young men substantially increases the probability of becoming homeless (McVicar et al., 2019). Additionally, a 2022 study found that the co-use of marijuana and tobacco was common among youth experiencing homelessness, with 85.4% having reported marijuana usage in the past month (Glasser et al., 2022). Considering the impact of homelessness on communities—and the resources required to help those impacted by it—is worth further investigating the correlation between homelessness and legalization.

LEGALIZATION LINKED TO HOMELESSNESS

Chronic homelessness increased by 35% in marijuana-legalized states.



IMPAIRED DRIVING

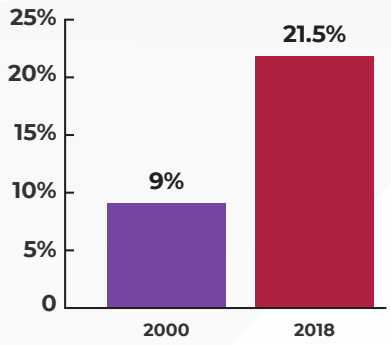
Driving while under the influence of marijuana has proven itself to be an increasingly damaging phenomenon due to the legalization and normalization of marijuana in the United States. An estimated 1 in 5 automotive deaths involves marijuana (Lira et al., 2021). In 2022, 20.6% of past-year marijuana users over the age of 16 drove under the influence of marijuana, compared to 8.9% of past-year alcohol users over the age of 16 who drove under the influence of alcohol, according to the NSDUH (SAMHSA, 2023c, 2023i). Marijuana users who drive high are twice as likely to be involved in a crash (Edmonds, 2019). A 2020 analysis of crash data in "legal" states found that if marijuana were legalized nationwide, the United States would suffer an additional 6,800 excess fatal crashes every year (Kamer et al., 2020).

In turn, there has been increased media attention on this concerning public health issue. In 2024, Bloomberg's editorial board wrote an article with the headline: "Legal Marijuana Is Making Roads Deadlier" (Bloomberg Editorial Board, 2024).

A 2021 study in the *American Journal of Public Health* found that the percentage of traffic fatalities that involved marijuana more than doubled from 9.0% in 2000 to 21.5% in 2018, while the percentage that involved marijuana and alcohol together more than doubled from 4.8% in 2000 to 10.3% in 2018 (Lira et al., 2021). A 2022 report from the National Transportation Safety Board found that marijuana was the second most common drug detected in impaired driving incidents, behind alcohol (National Transportation Safety Board, 2022).

In Michigan, a survey found that 51% of medical marijuana users admitted to driving while "a little high," and one in five of those surveyed admitted to driving while very high (LaPook, 2019). A 2022 Virginia survey found that 60% of past three-month users reported driving while under the influence in the last few months and 26% of past three-month users reported driving under the influence of marijuana at least once a week (Stratacommm, 2022). For teen drivers, 48.8% who currently use marijuana reported driving under the influence (Li et al., 2020).

"Legal" states are chasing the science on in-field THC testing and hoping it catches up to policy, as opposed to allowing good science to dictate policy. The science is clear: driving under the influence of marijuana is dangerous. The NIDA maintains that marijuana use impairs driving in several ways: slowing reaction time, decreasing coordination, and impairing judgment of time and distance. According to a 2021 AAA study, speeding on residential streets when co-using alcohol and marijuana was 55% compared to 35% for alcohol-only, and aggressive driving was marked at 52% compared to 28% for alcohol-only (Edmonds, 2021).



In Colorado, the share of traffic deaths involving marijuana rose from 9% in 2000 to 21.5% in 2018.

A 2020 double-blind randomized clinical trial to assess the impact of vaped marijuana on driving found that THC impairs driving skills. Drivers who consumed THC had more difficulty maintaining lane position for up to five hours after consuming THC (Arkell et al., 2020). This study confirms previous findings. A 2010 study found THC use affects multitasking (Lenné et al., 2010) and a 2013 study found that smoking increases lane weaving, slows reaction times, and hurts a driver's ability to perform divided-attention tasks (Hartman & Huestis, 2013).

Polysubstance use—using marijuana along with alcohol or another drug—compounds the risk of a vehicle crash more than drugs being used alone (NIDA, 2020). Drivers under the influence of marijuana and alcohol are more dangerous than drivers who have consumed marijuana alone or alcohol alone (Hartman & Huestis, 2013). Nevertheless, marijuana-impaired driving is rising while the perception of its negative consequences is decreasing.

The reduced perception of risk and the prevalence of stoned drivers on the road bear consequences for road safety and raise questions for legislators and law enforcement going forward. This false perception that marijuana makes people better drivers is growing, especially among frequent users. A 2022 Virginia survey found that 68% of people who used marijuana in the last three months claimed that marijuana actually makes people safer drivers (Stratacomm, 2022).

A survey conducted by AAA found that only 65% of drivers perceived driving within an hour of using marijuana as extremely dangerous or very dangerous, compared with 94% who felt that driving under the influence of alcohol above the legal limit was extremely or very dangerous. The answers from younger drivers were even more alarming. Of respondents between the ages of 19 and 24, only 63.1% believed that driving under the influence of marijuana was extremely or very dangerous, but 100% of respondents in that age group said that driving while over the legal limit for alcohol is extremely or very dangerous (AAA Foundation for Traffic Safety, 2022). This disconnect is concerning. The overall downward trend in the perception of risk has coincided with an increased percentage of marijuana-impaired drivers on the road.

According to the biological results of Washington's Roadside Survey, "nearly one in five daytime drivers may be under the influence of marijuana, up from less than one in 10 drivers prior to the implementation of marijuana retail sales" (Grondel et al., 2018). A 2021 study found that 29.5% of cannabis users have driven under the influence of marijuana, and daily cannabis users had a 57% predicted probability of driving under the influence (Salas-Wright et al., 2021). The state of Washington's Healthy Youth Survey found that in 2021, 9% of 12th graders drove after using marijuana and 15% rode with a driver who was using marijuana (WSHYS, n.d.). In Alaska, one in 10 high school students had driven after using marijuana (ADHSS, 2020).

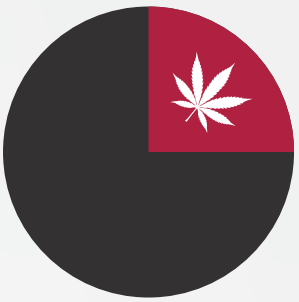
In Colorado, DUIDs (driving under the influence of drugs) have risen in recent years and Colorado traffic fatalities in which the driver tested positive for marijuana have been consistently rising (with a slight decrease in 2018) despite varying numbers of traffic fatalities annually (Rosenthal & Reed, 2022). Now, one in four road deaths in Colorado involves marijuana (Colorado Division of Criminal Justice, 2020). Out of Colorado drivers who were tested for drugs and alcohol in 2019, 47% tested positive for THC; 19% tested positive for alcohol and THC; and 6% tested positive for alcohol, THC, and a third substance. Additionally, there are more intoxicated drivers testing positive for THC and alcohol together than those testing positive for alcohol alone. In fact, 40% of Colorado drivers who are convicted of a DUI test positive for alcohol, THC, and at least one other substance (Rosenthal & Reed, 2022).

In a 2022 Colorado report of DUID data, of all case filings where a cannabinoid screen was conducted after a driver was pulled over for demonstrating impaired driving, marijuana was detected in 2,848 of them—about 90% of drivers who were tested. Of these positive screens, 82.9% tested positive for 1.0 to 5.0+ active THC (Rosenthal & Reed, 2022). What's more, 49.2% of those who tested positive for THC tested positive for extremely high levels of the drug—a THC level of 5.0 or higher.

A report released by AAA found that the number of drivers who tested positive for marijuana after a fatal crash doubled after legalization in Washington state. Researchers found that in the five years prior to legalization in the state, marijuana-impaired drivers comprised around 8.8% of all drivers implicated in traffic fatalities. In the years following, the rate jumped to around 18% (Stratton, 2020). AAA (n.d.): "AAA opposes the legalization of marijuana for recreational use because of its inherent traffic safety risks and because of the difficulties in writing legislation that protects the public and treats drivers fairly."

AAA also reported that "drug use among nighttime weekend drivers has risen by 25% since the previous survey in 2007, and driver use of cannabis has spiked by 46% in that same period of time" (AAA Exchange, 2022).

After Canada legalized marijuana, trauma centers in British Columbia reported double the number of moderately injured drivers who tested with a THC level of at least 2 ng per milliliter (Brubacher et al., 2022). Research by the Highway Loss Data Institute found that the legalization of recreational marijuana in Colorado, Oregon, and Washington coincided with an increase in collision claims (Highway Loss Data Institute, 2018).



1 in 4 Colorado road deaths involve marijuana

Compounding the risk of an increasingly impaired driving population is the difficulty posed to law enforcement officers who attempt to stop and detain marijuana-impaired drivers. The smell of marijuana in a suspected driver's car is no longer enough to make an arrest in many states, including those that have not legalized marijuana (Romo, 2019). Technology that can accurately determine THC levels is underdeveloped and lacks the certainty of traditional breathalyzers. The quick metabolization of THC renders it difficult to detect, requiring tests to be administered quickly in suspected cases.

Additionally, many states have struggled to create a standard level of impairment when THC is detected (Queally & Parvini, 2018). Studies are mixed on what THC level constitutes impairment. Recently, scientists found that drivers may still be impaired from marijuana use well after intoxication, demonstrating an increased likelihood of poor driving performance, increased accidents, and decreased rule-following (Dahlgren et al., 2020). In response, 13 states including Michigan, Arizona, and Pennsylvania, implemented a zero-tolerance policy regarding driving under the influence of any detectable amount of THC (Governors Highway Safety Association, 2021).

Many of the "legal" states failed to establish laws and guidance before legalizing marijuana, leaving law enforcement officers in the dark as legislators played catch-up to dangerous trends. A 2024 study found, "drivers fatally injured in states with laws permitting recreational use of cannabis were significantly more likely to test positive for cannabis use than those in states without such laws," providing evidence for the link between legalization and adverse harms to public health. As a result, legalization has compromised road safety (Leavitt et al., 2024).

TRENDS SINCE LEGALIZATION

CRIME

Marijuana legalization advocates have argued that legalization will reduce overall crime. However, in "legal" states, marijuana crime rates have risen faster than in other states across the country.

Marijuana dispensary openings correlated with a 30% crime increase within 500 meters in Chicago.

While it is difficult to say whether crime can be causally associated with marijuana legalization, some studies shed light on a correlation. A 2019 study found that the prevalence of both recreational and medical marijuana dispensaries in Denver neighborhoods was significantly and positively associated with increased crime (Hughes et al., 2019).

A 2021 study found that:

> On average, following legalization, Oregon experienced an increase of 365.4 cases of property crime (per 100,000 population) relative to the non-legalized states, and an increase of 103.6 cases of burglary, 56.2 cases of motor vehicle theft, 49.4 cases of violent crime, 39.4 cases of aggravated assault, and 205.3 cases of larceny per 100,000 population relative to the non-legalized states. (Wu et al., 2021)

Researchers found that Denver neighborhoods adjacent to marijuana businesses saw 84.8 more property crimes each year than those without a marijuana shop nearby (Freisthler et al., 2017). Similarly, a 2023 study found that "the opening of a recreational marijuana dispensary in Chicago led to about a 30% increase in crime within a 500-meter radius of the dispensary" (Kong, 2023).

A 2022 study "found that counties in [Oregon] have experienced increases in simple assault rate following legalization, relative to rates in the 19 non-legalized states" (Wu & Willits, 2022).

Colorado's crime rate in 2016 increased 11 times faster than the 30 largest cities in the nation since legalization (Mitchell, 2017). In 2018, data from the Colorado Bureau of Investigation demonstrated a 14.2% increase in property crime since 2013 (157,360 to 179,650) and a 36.5% increase in violent crime since 2013 (18,475 to 25,212).

Though arrests for marijuana offenses had declined in the years prior to legalization in Colorado, they are increasing again. In 2013, arrests for marijuana sales offenses were at a low of 337, having decreased 52.1% since 2008. From 2013 to 2018, arrests for marijuana sales offenses increased 29.4%.

The aforementioned report from the Federal Reserve Bank of Kansas City noted, "Although overall crime rates did not significantly change, arrest rates for both violent and property crimes rose, suggesting a potential increase in law enforcement activity" (Brown et al., 2023).

Overall, while increased crime has not been definitively linked to marijuana legalization, these upward trends in property and violent crime—as well as crimes against society—warrant further investigation.

Recreational marijuana legalization is associated with a 20% rise in intimate partner violence (Baggio et al., 2024).

Impact on individuals:

- An individual-level data point from NIDA published found the rate of violent behavior in daily marijuana users aged 18–34 was nearly twice the violent behavior rate of nonusers (Volkow et al., 2024).
- Consistent marijuana use during adolescence was the most predictive indicator of intimate partner violence (Moore & Stuart, 2005).
- Studies found that one-third of incarcerated subjects who committed homicide had used marijuana 24 hours before the homicide (Berenson, 2019).
- In a case review of 14 cases of violence, chronic marijuana users who suffered from preexisting medical conditions and used marijuana in an attempt to alleviate their symptoms actually worsened their conditions over time (Miller et al., 2020).
- Drug use was linked to a fivefold increase in violence in a study of 6,000 British and Chinese men. The drug used was almost always marijuana (Berenson, 2019).

On a population level:

- A 2021 study found that "On average, following legalization, Oregon experienced an increase of 365.4 cases of property crime (per 100,000 population) relative to the non-legalized states, and an increase of 103.6 cases of burglary, 56.2 cases of motor vehicle theft, 49.4 cases of violent crime, 39.4 cases of aggravated assault, and 205.3 cases of larceny per 100,000 population relative to the non-legalized states" (Wu et al., 2021).
- Violent crime rates per 100,000 increased after recreational marijuana was legalized in four states: Alaska, Colorado, Oregon, and California. It's important to note that the FBI's uniform crime reporting platform changed in 2021, so it's somewhat unfair to take pre-2021 numbers and compare them to recent data because of the change in methodology. The numbers referenced were calculated with data before that change was implemented (SAM, 2023c).
- The Federal Reserve Bank of Kansas City's research found legalization increases violent and property crime-related arrests by 18% and 16%, respectively (SAM, 2023b).

Violent crime increased in legalized states such as Alaska, Colorado, Oregon, and California following marijuana legalization.

A THRIVING UNDERGROUND MARKET

Commercialization advocates have long argued that legalization will reduce black market marijuana activity in "legal" states. They claim legalization will prevent the exportation of marijuana to non-legal states, serve as a money-maker for state budgets, bolster consumer safety, drive out drug trafficking organizations (DTOs), and free up law enforcement time. However, the legalization and commercialization of marijuana have led to greater black-market activity than ever before. States do not see a surplus in funds, consumer and environmental protections prove meaningless, DTOs are operating in "legal" states and not trying to hide it; however, because of legalization, law enforcement officers now have fewer tools to combat illegal activity.

The unchecked proliferation of the marijuana industry has abetted some of these significant problems. The market saturation and overproduction permitted and written into law by "legal" states have caused tremendous problems for regulators and law enforcement.

All "legal" states have failed to curtail the illicit market, but no state has fared as poorly as California. A bombshell *Los Angeles Times* series published in September 2022 found the state's illegal marijuana market is much worse than the government wants to acknowledge. The *Times* calculated that the illegal grows outnumber legal grows by as much as 10:1 (St. John, 2022a), with counties not equally equipped to deal with the illicit market. The 56% of counties that have opted out of marijuana sales are prohibited from using state government funds to combat illegal grows and instead rely on federal funds. This misguided policy, in combination with the lowering of criminal penalties for illegal grows, has driven down the cost of business for illicit operators and emboldened their actions.

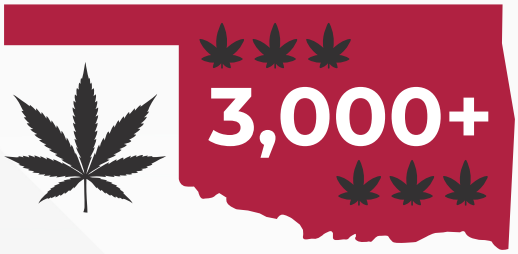
Not only are these illegal grows relying on trafficked workers for labor, they are also completely ignoring environmental regulations, including pesticide limits and water restrictions during one of California's most severe water shortages in recent memory (St. John, 2022b). These illegal grows set up shop on federal land or commandeer private property and engage in coercion and acts of violence; many landowners have given up (LaMalfa, 2022).

An NBC report found that 70–80% of marijuana sold in state-legal dispensaries in California was produced and grown illegally (NBC News, 2022). The illegal supply is naturally being diverted to other states. Even California Governor Gavin Newsom in 2016 admitted that 85–90% of the California-produced marijuana was exported (Fuller, 2019). Instead of solving that issue, the governor has conceded and, in September 2022, signed legislation permitting the export of California marijuana to other "legal" states, a clear violation of constitutional interstate commerce powers (Office of Governor Gavin Newsom, 2022).
In 2024, the DEA's National Drug Threat Assessment noted:

> Despite these measures, the black market for marijuana continues, with substantial trafficking by Mexican cartels, and Chinese and other Asian organized crime groups profiting from illegal cultivation and sales, as well as exploitation of the "legal" market. The price of marijuana in illegal U.S. markets has remained largely stable for years, even as the potency of marijuana has increased exponentially. (Potter, 2024)

"Legal" states also have a proliferation of illegally produced marijuana, even in their state-licensed dispensaries. In "legal" states, illegal grow operations have easily blended production facilities with "legal" ones and taken advantage of rural cover to hide from law enforcement. In Washington, Okanogan County Chief Criminal Deputy Steve Brown told *NPR* that prior to legalization, operations of the kind he continues to uncover were "hidden up in the hills." Now he finds some just off roads and within sight of neighbors. Other investigations have uncovered illegal operations run by people licensed in other "legal" states (Kaste, 2018).

In California, according to recent reports, the black market outsells the "legal" marijuana market at a rate of three to one. These illicit sellers have brazenly opened shops in cities across the state, hiding in plain sight and giving way to a perpetual game of "whack-a-mole," as one law enforcement officer described it. These companies also advertise on the popular marijuana website, Weedmaps, blending in with "legal" sellers. When the state warned Weedmaps to stop permitting illegal operators to advertise, CEO Chris Beals complained that the problem was not his company's fault but rather a result of the state prohibiting more retail marijuana licenses (Romero, 2019).



Over 3,000 illegal marijuana grows in Oklahoma tied to foreign mafias; 80% linked to Chinese criminal groups.

Local illicit actors are not the only beneficiaries of "legal" marijuana. The proliferation of black-market marijuana bolsters the businesses of well-financed international cartels, which extend as far north as Alaska (Alaska State Troopers, 2016). The DEA found that Asian DTOs were operating grow facilities across the state of Washington (Drug Enforcement Administration [DEA], 2020). In 2024, *ProPublica* reported, "Oklahoma has quickly become a top supplier of illicit weed" and continued that "state investigators have found links between foreign mafias and over 3,000 illegal grows—and they say that more than 80% of the criminal groups are of Chinese origin" (Rotella et al., 2024).

In 2024, Donald Im, a retired Assistant Special Agent in Charge at the DEA, testified to Congress:

> While Chinese criminal organizations launder Mexican and Colombian Cartel drug proceeds, the same Chinese criminal organizations and networks have been cultivating tens of thousands of marijuana farms and grows houses throughout the United States and Europe, namely, in states that legalized marijuana. With billions of dollars and Euros in profit generated, and with limited chances of being prosecuted and imprisoned, this lucrative cash cow has become a source of cheap capital, directly, or indirectly, for China's wealthy, provincial BRI projects, various debt, and for failing state-owned enterprises (SOEs) on the verge of bankruptcy. Furthermore, the expansion of marijuana cultivation sites combined with China's rising unemployment rate, continue to lure thousands of Chinese migrants into the United States to work in these sites generating massive profits that help create liquid capital for China-based entities. (Select Committee on the CCP, 2024)

In Maine, China's role in the illicit market is especially notable and concerning. A July 2023 memo from the U.S. Department of Homeland Security noted that there were 270 properties in the state—producing more than $4 billion in revenue—used by Chinese organizations (Taer, 2023). A February 2024 investigation by *The Maine Wire* "identified more than 200 properties in rural Maine that were purchased by Chinese out-of-staters since 2020 and now appear to be operating as illegal marijuana grows" (Tomic, 2024).

Cartel presence in California has only expanded since legalization. Authorities there suspect—based on phone records and wire transfer activity, as well as figurines commonly associated with cartels, such as those depicting Jesus Malverde—that illegal marijuana activity is tied to the Sinaloa and La Familia Michoacana cartels (Magdaleno, 2018). In 2021, the Oregon-Idaho High Intensity Drug Trafficking task force identified 136 DTOs with foreign and domestic connections (Oregon-Idaho High Intensity Drug Trafficking Area, 2018).

A 2022 report found the Sinaloa Cartel, previously led by the Mexican drug trafficker Joaquín "El Chapo" Guzmán (now serving a life sentence in U.S. federal prison) was lobbying in favor of marijuana legalization in Mexico, presumably because cartels could find a "legal" way to get into the drug business and launder money from other drugs as well (Chaparro, 2022).

The corruption permeates the state-legal market. The DEA reports that financial

backing for some state-legal marijuana businesses flows from illicit revenue and DTOs that illegally shelter profits from marijuana businesses and undercut tax revenues anticipated by state governments (DEA, 2020).

The DEA concluded in their 2020 National Drug Threat Assessment: "Domestic production and trafficking of marijuana will likely increase as more states adopt or change current marijuana laws to establish medical or recreational marijuana markets, allowing criminals to exploit state legality" (DEA, 2020). Sadly, we have continued to see this prediction play out to the detriment of public health and safety.

AN UNFULFILLED PROMISE: TAX REVENUE

Regulated marijuana has not been the revenue cash cow that industry advocates promised. Despite having some of the highest marijuana taxes in the country, California has still not seen a boom in tax revenue. The FY21–22 marijuana tax revenue was only 0.49% of the state's entire budget (California Department of Tax and Fee Administration, 2022).

The U.S. Census Bureau measured the share of states' budgets that are attributable to marijuana excise taxes, finding that marijuana did not account for more than 1.5% of a state's tax revenue in any state listed (U.S. Census Bureau, 2024). In the first quarter of 2024, as a share of the state's total tax revenue, marijuana excise taxes accounted for:

- 1.43% in Montana
- 1.24% in Alaska
- 1.18% in Colorado
- 1.13% in Washington
- 0.77% in Oregon
- 0.75% in Michigan
- 0.74% in Arizona
- 0.62% in Vermont
- 0.54% in Maine
- 0.49% in Missouri
- 0.47% in Illinois
- 0.42% in Massachusetts
- 0.42% in Rhode Island
- 0.39% in Connecticut
- 0.32% in California
- 0.13% in New Jersey
- 0.08% in New York

Against these estimates, states also need to weigh the associated costs. Most notably, a study in Colorado found that every $1 in tax revenue from marijuana was associated with $4.50 in costs, ranging from additional health care expenditures to more students dropping out of school (Centennial Institute, 2018).

In 2022, California cut several marijuana-related taxes in hopes of saving "failing" marijuana businesses (Yee, 2022). In reality, many state-legal growers had already given up on the bureaucracy and had gone illegal (Elmahrek et al., 2022). Marijuana license holders complain that "legal" states are excessively regulated and that taxes on the drug are too high (Alfosni, 2019). They go as far as to say that regulation and taxes are the reason the black market continues to dominate. As seen in California, that contention is ill-founded for several reasons. The regulatory and compliance systems instituted in the "legal" states were instituted with little foresight. State compliance officials are left on their heels while various regulatory and compliance issues become exposed. The Oregon Liquor Control Commission wrote in a 2018 report that: "due to the legally required rapid implementation of the recreational program, OLCC has not been able to implement robust compliance monitoring and enforcement controls and processes for the recreational marijuana program" (OLCC, 2018).

LOCALITIES OPTING OUT OF RETAIL MARIJUANA SHOPS

Although marijuana legalization has been passed by ballot measures in several states, the picture at the local level is very different. The perception that legalization is welcomed by the citizens of marijuana-friendly states is not accurate.

Proposition 64, the marijuana ballot measure in California, received just over 57% of the vote when it appeared on the 2016 ballot. Yet 68% of California localities have opted out of allowing marijuana shops to open. This means the "legal" shops are concentrated in a handful of towns and communities. As of October 2021, California has 2.1 dispensaries for every 100,000 residents, Alaska 20.3 per 100,000, Oregon 17.9, and Colorado 14.2, (Nieves, 2021).

What's more, licensed operators have expressed frustration with the restrictive policies of localities, prompting one California legislator to craft a law that would require towns that opted out to permit at least one marijuana business for every four bars or restaurants. According to a Los Angeles Times report, that would result in nearly 2,200 new marijuana shops across the state (McGreevy, 2019a). The legislation runs counter to what the citizenry was promised in the ballot initiative.

Such shocking discrepancies have been replicated across the country. When it comes to marijuana-related ballot measures, voters may think the issue is very important. The picture changes when legalization hits home. Voters choose to opt out of marijuana in their communities in large numbers. This raises questions about the political process of legalization.

In Michigan, where recreational marijuana sales began in December 2019, more than 1,400 of the state's 1,773 municipalities opted out of recreational marijuana—with 40 of 83 counties reporting none of their municipalities allowing the sale of medical marijuana (WXYZ Detroit, 2019). That amounts to approximately 79% of the state's municipalities opting out of marijuana.

In Colorado, another state thought to be marijuana-friendly, 64% of jurisdictions banned both recreational and medical marijuana sales (Rocky Mountain HIDTA Strategic Intelligence Unit, 2019).

In New York, 58% of municipalities have opted out of consumption sites (Rockefeller Institute of Government, n.d.). Over 60% of municipalities and counties in Oregon have opted out of marijuana sales.

In Illinois, similar debates raged, with more community mobilization than many legislators and community organizers had ever seen, according to a report by the *Chicago Tribune* (McCoppin et al., 2019). The wave of anti-marijuana sentiment surprised some since the measure passed fairly easily in the state legislature. That being said, an investigative report by Illinois-based newspapers found that—from January 2017 to spring 2019—marijuana companies, executives, and lobbyists donated over $630,000 to various politicians in the state (Grace, 2019). According to the Chicago HIDTA, which conducted a survey of law enforcement agencies within their jurisdiction, "forty percent of survey respondents reported that their communities opted out of allowing marijuana sales in their jurisdictions" (Chicago HIDTA, 2021).

While it may pay to gain the favor of legislators, localities are far less certain about "legal" marijuana taking over their hometowns.

“LEGAL” PRODUCTS ARE UNSAFE

The lack of oversight also bears consequences for consumer safety.

An investigation by the *Los Angeles Times* found that products sold in California dispensaries contained banned pesticides, including at levels above the limit the state allows—and even above the federal limit for tobacco (St. John & Halperin, 2024). The *Times* noted: “Most of the pesticides found were in low concentrations that risk long-term harm by repeated use, though the extent of the health threat may not be known for years.” The independent tests found chemicals tied to cancer, liver failure, thyroid disease, and genetic and neurological harm to users and their unborn children. Some vapes tested had pesticide levels high enough that users could be harmed from a single exposure, potentially causing lung, eye, and throat irritation and rash, headache, diarrhea, and abdominal pain (Los Angeles Times Editorial Board, 2024).

Banned pesticides have shown up in virtually every corner of the legal market, not just in California. States with recreational marijuana with products that have tested for levels of pesticides exceeding the state’s limit include: Massachusetts (Kohli, 2024), New Mexico (Lohmann, 2024), Arizona (Corrado, 2024), Vermont (Cutler, 2024), Oregon (Zarkhin, 2023), Colorado (Andrews, 2024), and New York (Racino, 2023).

An independent investigation in San Diego found that nearly 30% of marijuana samples purchased from licensed retailers in Southern California tested positive for pesticides (Grover & Corral, 2019). A 2021 study also found that medical marijuana is “prone to contamination of metals, fungii, and pesticides during manufacturing and storage processes” (Dryburgh et al., 2018). States are ill-equipped to handle marijuana testing, and even those with the most stringent regulatory requirements have demonstrated significant lapses, which have allowed contaminated products to reach the market (Crombie, 2017). Licensed marijuana retailers are not incentivized to comply with the law and benefit from that leeway while continuing to point fingers at the black market when problems arise. As a result, states are blurring the lines between “legal” and illegal marijuana by allowing “legal” operators to skirt regulations.

In a *60 Minutes* story on marijuana in California, Sheriff Tom Allman took reporter Sharyn Alfonsi on a helicopter to survey a very obvious illegal grow site in the “Emerald Triangle”—an area of California known for the illicit production of marijuana. He was not surprised that the operation wasn’t hidden. “Allman explained since Prop 64 and the legalization of marijuana, the black-market suppliers try to blend in with legal pot farmers sometimes on the same property” (Alfosni, 2019). In response, the three counties within the “Emerald Triangle” were given $1.5 million to address the increasing rates of illegal marijuana growth and crime (Barringer, 2022).

Another major promise of marijuana proponents was that a “legal” market would eliminate black market weed and allow law enforcement officials to focus on other things. Allman laughed at the idea and told Alfonsi that he was “looking forward to that day” (Alfosni, 2019). The very creation of the “legal” marijuana market in California has ushered in a more powerful illicit market that had never existed before. What’s more, Allman believes that his department lacks resources to combat illegal operations. He estimates that it only has the capacity to handle 10% of the illegal grows. According to a 2019 industry report, $8.7 billion of the revenues made from marijuana sales in California’s massive cannabis market are illegal, compared to $3.1 billion in legal revenues (McGreevy, 2019b).

In Colorado, there has been a rise in product recalls, stemming from the contamination of goods produced and sold by the

"legal" industry. *CPR* reported in 2024:

> Recalls were rising before last year, but expanded when the state began testing for a fungus called Aspergillus, which in rare cases can lead to death in immunocompromised marijuana users [...] Recalls were already rising before the state began catching Aspergillus in testing, but last year was especially busy. The MED issued 17 health and safety advisories, the most in seven years—up from just three in 2019. The advisories affect products sold at dozens of dispensaries across Colorado, and stretch back in some cases to marijuana that was sold in 2020. (Markus, 2004)

In addition to the risks posed by a "bad batch," an emerging concern is the purposeful use of harmful chemicals in controlled products. For example, regulators in Michigan will begin testing for MCT oil, which is linked to respiratory problems and used by the industry on THC distillate oils. *MLive* reported, "MCT oil is not allowed for use in Michigan vaping products, but it's also not tested for, meaning unscrupulous producers are able to slip it in without being detected" (Burns, 2024).

Moreover, after the presence of harmful chemicals is known by regulators, officials trusted to safeguard public health may be unresponsive and instead work to protect the interests of the industry. In California, the *Los Angeles Times* reported how marijuana regulators waited months to recall pesticide-tainted vapes, despite knowing about their contamination (St. John, 2024).

A map of recalls from *Newsweek* further demonstrates that the issue of contaminated products is not isolated to one state or region (Impelli, 2024). While it is better that these harmful products are being recalled, other things equal, it shows that the industry cannot be trusted to produce and sell products that are free of unhealthy chemicals and additives, as was promised to voters.

ENVIRONMENTAL CONTAMINATION

Conversations regarding the legalization of marijuana have largely ignored the threat that the industry poses to the environment. Given the lack of data, it is difficult to predict the full extent of marijuana's impact. However, early indications point to damaging consequences. Research suggests that marijuana indoor grows emit as much CO2 as 3.3 million cars on the road (Larkin & Sweeney, 2022). A 2021 report from the American Chemical Society identified six impact pathways from cannabis cultivation: land-cover change, water use, pesticide use, energy use, air pollution, and water pollution (Wartenberg et al., 2021).

The environment is at risk of pollution from both "legal" and illegal marijuana operations. Regulatory standards are lacking and enforcement is low.

Surrounding communities and ecosystems are at stake. Marijuana facilities on federal land in California are estimated to contain up to 731,000 pounds of solid fertilizer, 491,000 ounces of liquid fertilizer, and 200,000 pounds of toxic pesticides (Bernstein, 2017). These chemicals threaten the surrounding environment and have devastated local animal species. An illegal rodent poison has been associated with a rise in instances of death of the northern spotted owl, a threatened species native to the northwest (Franklin et al., 2018).

In California, officials estimate that 70% of the illegal market is cultivated on public lands. According to one investigative report, nine out of every 10 illegal marijuana farms raided in 2018 contained traces of carbofuran, an extremely toxic and banned chemical. From 2012 to 2017, six times as many chemicals have been found at these operations. "These places are toxic garbage dumps. Food containers attract wildlife, and the chemicals kill the animals long after the sites are abandoned," said Rich McIntyre,

director of the Cannabis Removal on Public Lands (CROP) Project, which is dedicated to restoring lands devastated by criminal grow sites on state and federal property in California. "We think there's a public health time bomb ticking," he said due to 60% of California's water coming from national forest land.

As marijuana legalization expands, so too does the illicit market and the threat it poses to the environment. But illegal marijuana is not the only culprit. Marijuana cultivation uses and requires a significant amount of power. Indoor marijuana cultivation (which makes up 80% of all growing) is highly inefficient. In fact, indoor marijuana cultivation consumes 709 kBtu/sq ft. A normal home or office building consumes just 40–50 kBtu/sq ft (Smith, 2020). The indoor cultivation of one kilogram of marijuana requires 5.2 megawatt hours of electricity and releases 4.5 metric tons of carbon dioxide emissions, comparable to that of a passenger car in one year (Reitz, 2015; U.S. Environmental Protection Agency, 2023). Indoor cultivation in Massachusetts makes up 10% of the state's industrial electricity consumption (Young, 2021). Marijuana cultivation is so energy-intensive that its emissions are similar to levels caused by coal mining in Colorado (Quinn & Summers, 2021).

Marijuana production is nearly four times more energy-intensive than coal or oil production (Mills, 2012). The Alliance to Save Energy found that "Indoor cannabis cultivation is one of the most energy-intensive industries, spending an estimated $6 billion on energy annually. That's a hefty electricity bill, matching that of the federal government powering its facilities" (Reott, 2020).

Energy consumption issues will only worsen. Research estimates that annual marijuana cultivation electricity demand will increase by 65% over the next 10 years (Miller & Bischof, 2020).

A 2015 study on the impact of marijuana cultivation on watersheds in California found that individual marijuana plants require 22.7 liters of water daily. Production facilities range in daily water demand from 523,144 liters to 724,016 liters (Bauer et al., 2015). A 2021 article from the Brookings Institution also found that:

> The scale of the problem is staggering: Even at the end of 2020, illegal cannabis grows sucked up between 11.4 million and 36.3 million liters of water daily! The widespread illegal cultivation contributes to water depletion and conflict over water and has other bad environmental consequences. (Felbab-Brown, 2021)

Additionally, researchers expect the total amount of water used in the legal cannabis market to increase by 86% by 2025 (Felbab-Brown, 2021).

Additional studies have highlighted the need for a better understanding of the consequences of marijuana cultivation. A 2016 study focused on marijuana production in Humboldt County, California, found that 68% of the grow sites were less than 500 meters from developed roads, introducing a risk of landscape fragmentation; that 22% of grows were on steep slopes, posing a risk for erosion, sedimentation, and landslide; and that 5% were less than 100 meters from threatened fish habitats (Butsic & Brenner, 2016). A subsequent study found that marijuana farming has drastic impacts on the surrounding environment, an important observation as the industry seeks to expand (I. J. Wang et al., 2017).

From 2012–2016, the number of marijuana farms in Northern California increased by 58% and the total area under cultivation expanded by 91%. The rapid growth of these farms occurred in locations of extreme environmental sensitivity. However, budgetary accommodations for regulating marijuana farm expansion were relatively low compared with other regulatory programs

(Butsic et al., 2018). Additionally, a study from the University of California, Berkeley, found that "While California only has 8,000 permitted cannabis farms, scientists mapped 15,000 in Humboldt County alone" (Dillis et al., 2021).

In written testimony, the then-Assistant Director of Law Enforcement and Investigations for the Forest Service explained, "The attributes that make the lands of the National Forest System excellent producers of wildlife habitat and clean water are also prized by illegal marijuana growers" (U.S. Sentencing Commission, 2014). Forests have everything illicit growers would need—fertile soil, ample water, a degree of privacy, and trails for transporting materials.

In May 2023, the National Park Service announced that they had found more than 10,000 marijuana plants, worth an estimated $7 million, at a grow in Death Valley National Park. "Upon learning that they were discovered," the National Park Service sai d, "the growers abandoned the site [leaving] behind a damaged landscape, trash and hazardous chemicals" (Death Valley National Park, 2023). It costs up to $100,000 to restore an individual grow site, highlighting another cost of legalization.

Events like this have become all too common. According to the U.S. Department of Agriculture, which oversees the Forest Service, "Drug Trafficking Organizations (DTO) have been identified as the key producers of marijuana on NFS lands. DTO activities are confirmed in 72 national forests and in all regions, except for Region 10 [Alaska]" (U.S. Department of Agriculture, 2018). They estimate that approximately 80% of the marijuana grown on federal land is grown in the Forest Service's jurisdiction.

Illicit grows and extraction labs have also caused wildfires, such as the 125,000-acre Dolan Fire in Los Padres National Park in California in 2020 (Kaplan et al., 2021), which killed endangered condors, destroyed homes and a fire station, seriously injured firefighters, and cost nearly $63 million to contain (Ives, 2022).

Adding to the problem is the fact that illicit grows often use toxic chemicals, such as carbofuran and methamidophos. President Biden's 2022 National Drug Control Strategy stated cartels "transport highly toxic insecticides, chemical repellants, and poisons, some of which are banned in the United States, for use at domestic marijuana grow sites" (U.S. Office of National Drug Control Policy, 2020). Cartels blatantly disregard our drug laws; they could not care less about our environmental and chemical laws.

The U.S. Department of Justice confirmed law enforcement officers have been "injured during the eradication of illegal marijuana cultivation sites on public lands by exposure to powerful Mexican pesticides " (U.S. Attorney's Office, 2021). These chemicals also kill foraging animals, in addition to the animals and insects that eat their carcasses, causing downstream effects throughout the ecosystem.

Legalization has thus far resulted in extreme environmental damage, and outcomes, as the industry further expands, the consequences may not be fully understood in time to prevent worse.

THREATS TO PETS

More pets are inadvertently eating marijuana and marijuana-infused products, stemming from the products being improperly stored in households. Dogs have more cannabinoid receptors in their brains than humans, which means marijuana side effects are much more pronounced in canines (Gollakner & Buzhardt, 2022).

Pets are likely unable to differentiate edibles from regular food or treats so accidental ingestion is a huge risk. The ASPCA's Animal Poison Control Center reported the number

of these cases increased from 330 in 2012 to 5,811 in 2021, representing a 1,660% increase (personal communication from ASPCA via email, October 18, 2022). In 2021, the Pet Poison Hotline reported a 450% increase in accidental marijuana ingestion (Nationwide, 2023). According to the ASPCA (2018): "Signs pets commonly show after ingesting marijuana or marijuana products include unsteadiness on the feet, depression, dilated eyes, dribbling urine, sensitivity to sound and touch, slow heart rate and even low body temperature."

A Colorado study found that the consumption of "medical grade tetrahydrocannabinol butter" resulted in the death of two dogs (Meola et al., 2012). This trend is likely to worsen as more states legalize marijuana and more individuals begin using it more frequently.

The Colorado-based Morris Animal Foundation explained:

> The proliferation of marijuana and similar products in the last decade has led to a dramatic increase in reports of accidental exposure in pets. According to a 2019 report from the Animal Poison Control Center, calls regarding cannabis ingestion increased by 765%, and they now list marijuana among their top 10 reported toxin emergencies. The Pet Poison Helpline reported a similar increase, up more than 400% in cannabis-related phone calls over six years. Ask any veterinarian in emergency practice, and they'll concur that ingesting products containing cannabinoids are becoming more common as their accessibility increases. (Morris Animal Foundation, 2024)

The industry has also heavily marketed unproven, unregulated marijuana products to pet owners, claiming it can help calm anxious pets and relieve pain. Some claim CBD can even cure dog cancer. Studies on THC or CBD use in pets are limited; even if THC is legal in a state, it is only legal for adult human consumption, not pet consumption. One of the few things that is known about CBD consumption in dogs is that can inhibit the effectiveness of medication (Coile, 2021).

HEMP-DERIVED INTOXICANTS

The 2018 Farm Bill descheduled hemp and legalized its use for commercial purposes. Hemp is a non-intoxicating form of the cannabis plant defined as having a concentration of less than 0.3% Delta-9 THC. Hemp has commercial uses, including for paper and clothing. However, policymakers failed to account for the fact that nonintoxicating hemp derivatives, primarily CBD, can be converted into intoxicating Delta-8 THC, mimicking the traditional forms of Delta-9 THC marijuana products. In effect, this policy provided the marijuana industry with a loophole that allows operators to sell hemp-derived marijuana products.

Hemp-derived intoxicants like Delta-8 THC fall into a legal gray area. Congress did not explicitly legalize them, but they also did not explicitly criminalize them. However, it is clear from the language surrounding Delta-9 THC that Congress' intent was not to legalize the psychoactive components of hemp. In turn, many states have taken varying approaches to how they handle these products. According to a map from USA Today, last updated in June 2024, 13 states—including pro-marijuana states like Colorado, Oregon, and Washington—have prohibited Delta 8 entirely, while 15 states have begun to regulate (i.e., legalize) Delta-8, including Tennessee, Virginia, South Dakota, and Vermont. Delta 8 is unregulated in the remaining 22 states, as well as Washington, DC (Kaufman, 2024).

In addition to traditional Delta-9 THC, these hemp-derived variants are harming thousands of Americans each year. Between 2021 and 2022, the number of poison control calls related to Delta-8 THC, Delta-10 THC, or THC-O increased from 1,746 in 2021 to

3,276 in 2022, representing an 86% increase (Nationwide Children's Hospital, 2024). Similar trends are being observed at the state level. The Blue Ridge Poison Center at UVA Health, one of three poison control centers in Virginia, saw calls rise from 20 in 2020 to 112 in 2022, marking a 460% increase (UVA Health, 2022). In Florida , poison centers experienced a 49% increase in calls, from 168 in 2021 to 250 in 2022 (Drug Free American Foundation, n.d.). Tennessee reported approximately 115 calls from 2021 to 2022, with 32 affecting children under six, and in the following year, calls doubled to 248, with 110 involving young children (King, 2023).

Additionally, illicit actors have taken advantage of federal hemp legalization. Because hemp and marijuana are only distinguishable through laboratory testing, these illicit actors shield their illegal marijuana grows in legal hemp fields (DEA, 2020). Even legal hemp fields are not exempt from issues. The New York Times reported that sellers are now offering Delta 8 THC to circumvent a law that prohibits Delta 9 from being sold (Richtel, 2021).

The FDA issued a warning that companies selling Delta-8 THC rely on "marketing, including online marketing of products, that is appealing to children" that are sold as "gummies, chocolates, cookies, candies [and added] these products have not been evaluated or approved by the FDA for safe use in any context" (U.S. Food and Drug Administration, 2022).

Not surprisingly, the Monitoring the Future survey found that 11.4% of 12th graders used Delta 8 THC products in 2023 and 12.3% used them in 2024 (National Institute of Health, 2024). In 2024, Delta-8 THC was used by 2.9% of 8th graders and 7.9% of 10th graders. The Monitoring the Future study's panel survey found that Delta 8 was used by 11.4% of 18-year-olds, 11.2% of 19–20-year-olds, 15.1% of 21–22-year-olds, 13.8% of 23–24-year-olds, 13.2% of 25–26-year-olds, 11.7% of 27–28-year-olds, and 10.2% of 29–30-year-olds in 2023 (Monitoring the Future, n.d.-b).

Urgent action is needed to close this loophole and address the emerging issue of hemp-derived products.

CANADA

In 2018, Canada became one of the first countries to legalize the possession and use of recreational marijuana. Early data are indicative of problematic trends.

Canadian use rates have increased. Among those 16 or older, past-year use increased from 22% in 2018, the year Canada legalized marijuana, to 27% in 2022 (Government of Canada, 2024). Furthermore, past-month use increased from 15% in 2018 to 19% in 2022, indicating that these same users are using the drug more frequently. Among 16–19-year-olds, past-month use increased from 23% in 2018 to 25%. Among 20–24-year-olds, it increased from 30% to 36%. Daily use among those 16 or older has remained largely unchanged, going from 25% of past-year users in 2018 to 26% in 2021 and back to 25% in 2022 (Government of Canada, 2024). Similarly, a 2023 study in Canada found that "cannabis legalisation was not associated with cannabis initiation, but it was associated with an increased likelihood of any cannabis use, daily cannabis use and cannabis dependence" (Imtiaz et al., 2024).

Marijuana use among youth in Canada is high. Past-year use among people aged 16 to 19 increased by more than 22% from 2018, when marijuana was legalized, to 2019. In 2019, 16% of Canadians aged 16 to 19 reported using marijuana almost every day, or every day (Canadian Cannabis Survey, 2019). According to Canada's youth drug survey, 18% of young people in middle school and high school reported past year marijuana use. Over 19% of young people in grades 7–9 and nearly 30% of young people in grades 10–12 reported

dabbing marijuana when they used it, while 17% of young people in grades 7–12 reported using both alcohol and marijuana (Canadian Student Tobacco, Alcohol, and Drugs Survey, 2019). A 2024 scoping review of studies in Canada found "an increase in cannabis use among 18–24-year-olds post-legalization, with mixed results for youth under 18" (Kourgiantakis et al., 2024).

Marijuana-impaired driving is on the rise. A 2022 study found that after legalization, the rate of drivers who tested positive for THC in British Columbia doubled (Brubacher et al., 2022). And 20% of those who reported driving while high reported co-using marijuana with alcohol (Health Canada, 2019). A 2024 study of injured drivers in traffic incidents found that:

> … the most common single substance detected was cannabis, with about one in six drivers (16.6%) testing positive for THC, the main psychotropic ingredient in cann abis, followed by alcohol (16.0%) [and noted that] driving after cannabis use appears to be an emerging problem in Canada and may now be more common than driving after drinking alcohol. (Road Safety & Public Health Research Team, 2024)

The black market continues to dominate in Canada. Reports suggest that the legal market comprises just a third of the total market for marijuana in Canada (Miller, 2018), and 40% of users in Canada reported that they had obtained marijuana illegally since it was legalized (Turvill, 2020). An investigation by Radio-Canada found connections to organized crime in the Canadian legal marijuana market (Denis, 2018).

After Canada expanded the sales of THC products, emergency department visits and hospitalizations of children exposed to marijuana increased nine-fold (Neustaeter & Favare, 2022). Similarly, a 2024 study in *JAMA Internal Medicine* found that:

> Cannabis legalization in Canada was associated with increased rates of ED visits for cannabis poisoning in older adults [and further added that] the largest increases occurred after edible cannabis became legally available for retail sale, a phenomenon similarly observed in Canadian children. (Stall et al., 2024)

RECOMMENDATIONS

Policymakers and the public need real-time data on both the consequences of legalization and related monetary costs. Meanwhile, we should pause future legalization efforts and implement public health measures such as potency caps in places that have legalized. In addition, the industry's influence on policy should be significantly curtailed.

SAM recommends research efforts and data collection focus on the following categories:

- Emergency room and hospital admissions related to marijuana.
- Marijuana potency and price trends in the "legal" and illegal markets.
- School incidents related to marijuana, including studies involving representative datasets.
- The extent of marijuana advertising toward youth and its impact.
- Marijuana-related car crashes, including THC levels even when testing positive for alcohol.
- Mental health effects of marijuana.
- Admissions to treatment and counseling intervention programs.
- Cost of implementing legalization from law enforcement to regulators.
- Cost of mental health and addiction treatment related to increased marijuana use.
- Cost of needing, but not receiving, treatment.
- Effect on the market for alcohol and other drugs.
- Cost to workplaces and employers,

including impact on employee productivity.
- Effect on minority communities, including arrests, placement of marijuana establishments, and quality of life indicators.
- Effect on the environment, including water and power usage.

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