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High-THC Cannabis Concentrates and Their (Scary) Effect on the Teenage Brain

Is dabbing causing mental health problems for Colorado kids?

LINDSEY B. KING [HTTPS://WWW.5280.COM/BYLINE/LINDSEY-B-KING/] • 5280 JULY 2021 [HTTPS://WWW.5280.COM/MAGAZINE/5280-JULY-2021/]

Editor's note: After 5280*'s July issue went to press, Governor Jared Polis signed into law HB 21-1317, which requires further study of the possible health effects of high-THC cannabis and*

aims to reduce access to cannabis among teenagers. This article has been updated to reflect the new law.

There's no shortage of sensational, hide-the-children, marijuana-is-the-devil's-lettuce stories on the internet. This is not one of those stories. Colorado is, after all, the cradle of recreational cannabis in this country, and by most accounts, the destruction of civilized society wreaked by commercialized medical and recreational pot was greatly exaggerated. Given the opportunity to comment, most Coloradans—roughly 71 percent, according to a 2020 survey—say legalization has been mostly or completely successful. However, that number leaves plenty of room for dissent, and in that remaining 29 percent lies a contingent that believes Centennial Staters were naive about what kinds of products would be lining dispensary shelves, what their health effects could be, and what might happen when kids got their hands on them.

For those who haven't ventured inside one of the state's 1,047 dispensaries—that's probably most of us, since only about 19 percent of Colorado adults say they've used marijuana in the past 30 days—the diversity of merchandise might be surprising. Although shoppers in Colorado still overwhelmingly choose to smoke flower, the fuzzy green bud we're all familiar with, there are dozens of other versions of cannabis that don't look or perform anything like the four percent THC (tetrahydrocannabinol) grass you toked in college. There are things with names like shatter, budder, wax, crumble, and live rosin, all of which fall under the umbrella of cannabis concentrates and can contain more than 90 percent THC, pot's primary psychoactive compound.

Cannabis concentrates are not new; some evidence suggests concentrates have been around in some form since the 1940s. What is relatively new is that commercialization, which started in Colorado in 2009 with medical dispensaries, has allowed the marijuana industry to safely produce concentrates in high-tech labs, perfect old-school iterations and invent new ones, and wrap them all up in slick, convenient, discreet packaging that's often messaged as medicine.

Commercialization did something else, too: It allowed 18-, 19-, and 20-year-olds in Colorado to apply for medical marijuana red cards without caregiver supervision. And

since 2012, people 21 and older have been able to walk into a recreational dispensary and walk out with 28 grams of flower or eight grams of concentrates in whatever strengths they desire every day.

So what's the problem? The truth is that the human brain continues experiencing huge jumps in development up until the age of 25, and while cannabis of any sort can impact neural pathways, high concentrations of THC appear to be particularly damaging. "We started seeing the changes in 2009," says Dr. Christian Thurstone, a child and addiction psychiatrist who has worked in Denver Health's adolescent substance treatment program for 18 years. "We saw the use of edibles and dabs, the more potent products, start to go up. But kids' perception of the harmfulness of cannabis has gone way down in more recent years. I don't think it's a coincidence that we're seeing the cases we're seeing now."

Denver Health's substance treatment program sees roughly 500 youths each year for substance abuse, and Thurstone says 95 percent of the referrals he gets are for marijuana, which, despite popular opinion, has been proven to be addictive. Concentrates, with their higher THC levels, may be even more so. But it's not just the standard trappings of dependence that are worrisome to health care professionals; it's also that they're observing a correlation between cannabis concentrates and mental health issues, such as depression, suicidal ideation, psychosis, and schizophrenia, as well as disturbing physical conditions such as cannabinoid hyperemesis syndrome, characterized by severe vomiting.

It is, of course, illegal in Colorado for anyone under 21 without a red card to purchase or use cannabis. The reality is that according to data from the state's 2019 Healthy Kids Colorado Survey [https://cdphe.colorado.gov/hkcs] , 20.6 percent of Centennial State high schoolers and 5.2 percent of middle schoolers say they have used marijuana in the past 30 days. Those numbers haven't changed much over the years, but one critical statistic has: The same survey found that between 2015 and 2019, the percentage of high schoolers who had recently dabbed (translation: inhaled concentrated doses of vaporized cannabis) went from 5.7 percent to 10.2 percent.

"The scary thing about this," says Dr. Christian Hopfer, an addiction psychiatrist at UCHealth's Center for Dependency, Addiction, and Rehabilitation [https://www.uchealth.org/locations/uchealth-cedar-center-for-dependency-addiction-and-rehabilitation/] (CeDAR), "is that this is a relatively recent phenomenon. We don't know much about how extremely high doses of THC affect people, children or adults. We're seeing greater risks of psychotic disorders and serious effects to cognition in our kids, but we have no real understanding of what these concentrates do to the developing brain." That is why so many different stakeholders—doctors, researchers, legislators, psychologists, school districts, advocacy groups, and parents—have been throwing up flares. Their question: *Are you sure your kids aren't dabbing?*

Perhaps unsurprisingly, potential fixes to the conundrum of underage concentrate consumption often run afoul of the marijuana industry, put politicians in uncomfortable positions in a state where voters legalized cannabis, require effective policies by government agencies, panic patients who use medical pot responsibly, and necessitate a level of nuance that anyone with authority to make change rarely wields. In short, regular Coloradans may have to be the solution. With that in mind, we've put together an explainer for those who need to know exactly what's out there, so they can protect the young people in their lives.

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Know the Lingo

Photo by Cappi Thompson/Getty Images

Marijuana might be the most synonymized noun in the world, but dabbing has a language all its own. Trust us, your kids know the lingo; you should, too.

Concentrates: Broadly refers to any cannabis product that has been made through a process where extraneous plant matter is mostly removed, leaving behind only aromatic oils called terpenes and cannabinoids, like cannabidiol (CBD) and THC

Dabbing: The method of flash-vaporizing cannabis concentrates—typically extracted oils of varying consistencies—on a hot surface and inhaling them to get high

Dab rig: Also called an oil rig, this is a water pipe—essentially, a sophisticated glass bong—that has attachments specifically designed for dabs of marijuana concentrate

Dabber: Sometimes called a wand, this is a small tool used to pick up a dab of concentrate and place it on the heated surface of a dab rig

Vape pens: Much like e-cigarettes, these are portable, pen-shaped vaporizers that are typically refillable with cartridges of concentrates

Dabs: A catch-all word for any concentrate or extract that can be flash-vaporized and inhaled

E-nail: A dabbing device that electronically heats the nail

Extracts: A specific type of concentrate made using solvents, like alcohol, butane, propane, or CO2; all extracts are concentrates, but not all concentrates are extracts

Hash: A pressed cannabis concentrate—made without using solvents—of the plant's sticky glands that is commonly smoked and vaped but can also be dabbed

Nail: The metal, glass, or ceramic spike attached to a water pipe; dabs are applied to the nail once it has been heated up electronically or with a torch

Torch: A handheld butane or propane torch often used to heat the nail of a dab rig; a jet lighter also works

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Types of Cannabis Concentrates

Concentrates and extracts don't look like bud, get packaged like bud, or smell quite like bud, making them somewhat easier to conceal. Here, a not-at-all-comprehensive

inventory of products that could be hiding in your teenager's nightstand.

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Shatter

An amber-colored extract that has a transparent, stiff, glasslike quality and breaks easily

Typically used with: a dab rig

Sugar

An extract that comes in a wide range of colors—very light yellow to almost amber—and has the consistency of wet, sappy sugar

Typically used with: a dab rig

Budder

A dark yellow extract that has a creamy, butterlike texture

Typically used with: a dab rig

Live Rosin

A high-quality solventless extract, usually pale yellow to golden in color with a gooey, honeylike consistency

Typically used with: a dab rig, a glass bowl, a joint, or a concentrates vape pen

Crumble

An extract that can be yellow, orange, or light brown and that has a soft, crumbly texture

Typically used with: a dab rig or sprinkled over flower in joints, pipes, and bongs

Wax

An extract that has a soft, waxy consistency

Typically used with: a dab rig or a concentrates vape pen

Distillate

A potent cannabis oil extract that has been stripped of all materials and compounds except for certain cannabinoids, like THC or CBD

Typically used with: a concentrates vape pen (with refillable cartridges)

Tell-Tale Signs That Your Kids Might Be Using Concentrates

Where there is a will, there is a way for your kids to consume concentrates.

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Just because you *think* your teenagers don't have the wherewithal to buy concentrates—much less a dab rig—doesn't mean they can't improvise ways to do both. If you've been finding soda cans or water bottles cut in half; if you're missing butter knives from your drawers; if you've found unwound paperclips; if you can't find your crème brûlée torch… your 15-year-old might be more resourceful than you realize. All of these items can be used to fashion a homemade dab rig. "You need to be paying attention to these things," says Denver Health's Dr. Christian Thurstone. "It's reasonable that if you see something funny that you trust your gut and investigate." What else should you be looking for? Lighters, small glass or silicone jars, and parchment sheets can be clues your kid is using. Money or sellable items that go missing are other hints. "A lot of parents struggle with parenting teens, especially when it comes to privacy," says CeDAR's Dr. Christian Hopfer. "If you're concerned, privacy should not be respected, especially if there are mental health concerns. Parents are often unwilling to play cop—and that can have tragic consequences."

A Colorado Right of Passage: Medical Cards at 18

Turning 18 in the Centennial State is a momentous occasion—and it's not because the right to vote kicks in.

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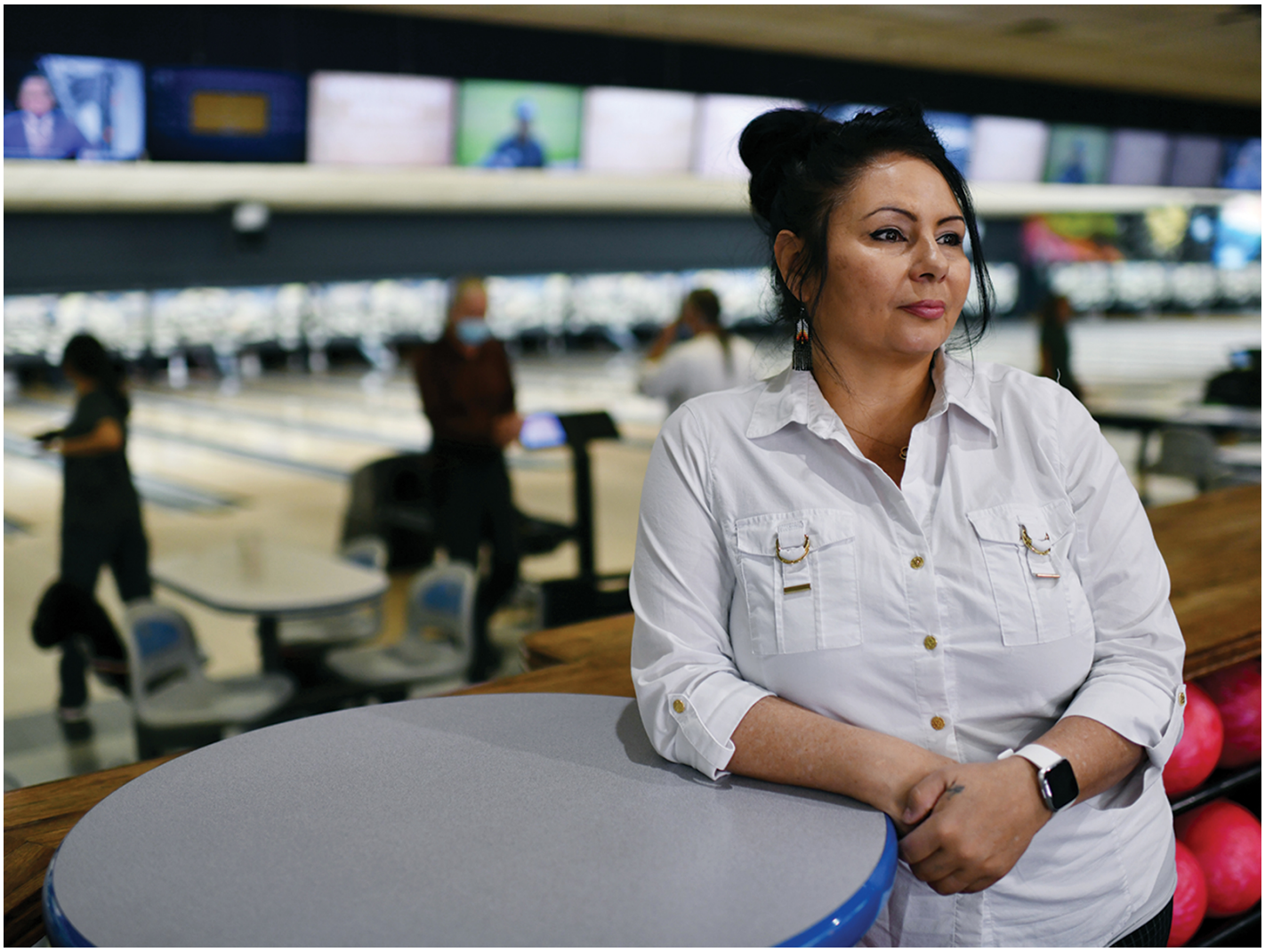
There was no escaping it for the 17-year-old. Weed was everywhere at her Pueblo-area high school. It was in the school parking lot. It was there during free periods. It was at every party. It was everywhere she went. "As a parent," says LaFonna Pacheco, the young woman's mother, "it was like pushing the ocean back with a broom. Kids with medical marijuana cards were pushing shatter in her face."

It's not just parents who say they're struggling to keep high-THC concentrates away from their kids: School districts are battling too. Their biggest fight? In what has become a rite of passage in Colorado, high school seniors turn 18, apply for medical marijuana cards under bogus pretenses, purchase two ounces per day, and then sell legally purchased cannabis to other students. "The systems are so porous," says Kirk Quitter, principal of New Vista High School in Boulder. "Eighteen-year-olds can get a card easily, and then they can do what's called looping, or going to dispensary after dispensary in one day to get around the daily limit laws. It doesn't take long for things to unfold in our schools."



Lafonna Pacheco. Photo by Hyoung Chang/the Denver Post/Getty Images

Of course, public schools aren't the ones handing out medical cards. To get one, Colorado residents 18 and older currently must find a licensed physician to certify that

they have a qualifying condition and then submit that certification—along with other documentation and fees—to the Colorado Department of Public Health and Environment's (CDPHE) Medical Marijuana Registry [https://cdphe.colorado.gov/medicalmarijuana] . When asked about the ease with which an 18-year-old can get a card, not to mention the significant jump between medical cards for kids up to 17 years of age (270 on the registry as of February) and 18- to 20-year-olds (3,979 as of February), the CDPHE was careful to say it does not determine medical necessity for patients or regulate physicians, and it suggested inquiries be directed to the Department of Regulatory Agencies (DORA) instead.

For its part, DORA initially responded that the CDPHE's Medical Marijuana Registry and the Marijuana Enforcement Division in the Department of Revenue "may have more substantial information" about these topics. Pressed for more data about physicians being disciplined for violating the Medical Practice Act related to medical marijuana, DORA provided data that show there have been only 18 doctors (out of 44 complaints in total) since 2009 who have faced public discipline for failure to comply in some way.

"How do all these young kids have med cards?" says Dr. Libby Stuyt, a former addiction psychiatrist who worked in Pueblo. "The huge jump between zero to 17 and 18 to 20 doesn't make sense. There's no way all these kids have debilitating, severe pain starting at 18. I want to know who these doctors are—and there are only 438 who have handed out every last one of the 87,216 cards in Colorado—but the CDPHE won't release that information, either."

It seems to many, including Pacheco, that the responsibility for erecting and maintaining guardrails to limit young adults from abusing the system gets passed from one agency to the next. "Medical cards have been poorly regulated," says Pacheco, but she is optimistic about how recently passed legislation (more on that below [#politics]) could close some of the gaps young adults have been able to exploit. The fixes come too late for Pacheco's daughter, though, who became so addicted to high-THC cannabis that she ended up in rehab multiple times. Feeling powerless, Pacheco watched her daughter self-isolate, experience psychosis, and ignore her family. "That was hard,"

Pacheco says. “We’re Native American, and she used to like sitting with the elders. That just stopped. As a parent, you don’t know how the hell to navigate this.”

Your (Kid’s) Brain On THC

The human brain isn’t fully developed until roughly age 25. When THC is introduced to that still-evolving organ, it impacts how neural connections are made. As one Colorado doctor put it, “the brain only gets one shot at growing up,” and THC can stunt that growth in ways we already know—and likely in many others that we don’t.
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Pruning & Myelination

What We Do Know: A process called synaptic pruning begins during early childhood and continues into young adulthood. This streamlining of neural circuitry is likely responsible for the expansion of cognitive skills—necessary for adulting—seen in the late teens and early 20s. Myelination, or the coating of neurons with a protective sheath, helps the connections work better. The brain essentially removes inefficient connections and improves effective ones to create a more powerful system. However, recent studies suggest low blood flow and inactivity in the brain caused by marijuana use can cause abnormal pruning and myelination mishaps.
What We Don’t Know: Some scientists theorize that mental health conditions that often emerge in late adolescence—like schizophrenia—may result from atypical pruning, but more research is necessary to determine if aberrant pruning due to marijuana use could be involved and/or if genetics or other factors are at play.

The Prefrontal Cortex

What We Do Know: The maturation of the human brain begins with the brain stem and works upward and forward toward the prefrontal cortex, which doesn’t finish developing until the mid-20s. The dorsolateral prefrontal cortex is where executive functioning skills that are critical to adulthood are located. It’s important to note the prefrontal cortex has a large array of CB1 receptors, which THC targets.

What We Don't Know: Studies have suggested that students who use cannabis have poorer educational outcomes, like difficulty graduating from high school or completing a college degree—things that require higher-level executive functioning. How much of an influence cannabis use has on these results is arguable, though, as other factors could predispose people to both marijuana use and unfavorable academic outcomes.

The Hippocampus

What We Do Know: The hippocampus, where many CB1 receptors live, plays a major role in learning and memory. Research has shown that humans are affected by something called state-dependent learning, which means that memory or information recall is most efficient when a person is in the same mental state as she was when the information was learned or a memory was formed. Learning something while intoxicated means a person may not be able to remember what he learned later on when he's no longer under the influence.

What We Don't Know: Although some research suggests that heavy THC use has long-term effects on cognition, even on those who stop using, other studies have shown that the hippocampus can recover after prolonged abstinence.

The ECS

What We Do Know: The body's endocannabinoid system (ECS), a cell-signaling arrangement, is so named because chemicals in our bodies called endocannabinoids are a lot like THC. Anandamide, for example, is responsible for easing pain and depression, controlling appetite and sleep cycles, and manipulating memory. Anandamide binds to CB1 and CB2 receptors throughout the body—high concentrations of CB1 are located in the brain—to signal that the ECS needs to take action to, say, adjust mood. Because THC is so similar to anandamide, it attaches to the same receptors, tells the body to stop the production of anandamide, and throws the ECS off-balance, affecting things like concentration, ability to learn, impulse control, memory, and mental health.

What We Don't Know: Although several studies suggest marijuana exposure during development can cause long-term or possibly permanent adverse changes in the brain, research is mixed on whether IQ is affected.

Behind the Research

Photo by Blaine Harrington III/Getty Images

Break out the highlighter—here's what the available science says about young people and cannabis.

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Because the federal government classifies cannabis as a Schedule I drug, studying marijuana in the United States is a difficult—and frustrating—endeavor. Universities that rely on federal funding are loath to risk losing that cash to research marijuana on campus. Furthermore, any institution that does want to study cannabis must go through the feds to procure product; however, the cannabis grown at federally designated facilities rarely has THC concentrations higher than five or 10 percent. "There is a large

body of research about what lower THC concentrations do and don't impact," says Dr. Sam Wang, a pediatric emergency medicine doctor at Children's Hospital Colorado who is also board certified in medical toxicology. "But there is a paucity of literature about the impacts of high-THC doses on health." Still, many health professionals say the results from the research that does exist with regard to addiction as well as high concentrations of THC are disturbing enough to merit red-flag warnings for youngsters. Local experts pointed us to several studies for a bit of light reading.

In March 2021, *JAMA Pediatrics* published the results of an addiction study executed by National Institute on Drug Abuse [https://www.nih.gov/news-events/news-releases/younger-age-first-cannabis-use-or-prescription-drug-misuse-associated-faster-development-substance-use-disorders] scientists. The research examined the proportion of adolescents and young adults who had developed substance use disorders (SUDs) in the previous year at various intervals since they first used certain drugs, including cannabis. The findings? Marijuana users between 12 and 17 had nearly double the prevalence (10.7 percent) of SUDs one year after first using cannabis compared with adolescents who first used alcohol (5.6 percent) or nicotine (6.6 percent). After three years, the addiction rate for cannabis among adolescents was 20.1 percent; it was 10.9 percent for those ages 18 to 25. The data, says the National Institutes of Health, emphasize the vulnerability of young teenagers to developing SUDs.

A mostly Europe-based study that aimed to identify patterns of cannabis use with the strongest effect on developing psychotic disorders received a lot of attention when it was published in the *Lancet* [https://www.thelancet.com/article/S2215-0366(19)30048-3/fulltext] in March 2019. The conclusions were disturbing. Daily cannabis use was associated with higher likelihoods of psychotic disorders compared with people who had never used marijuana, but those numbers rose to nearly five times increased odds for daily use of high-THC types of cannabis. Another disconcerting finding: Those who had started using high-concentration cannabis by age 15 showed a doubling of risk of psychotic disorders compared with those who had never used.

Researchers in the United Kingdom published a study about the impacts of high-THC cannabis [https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2765973]

in *JAMA Psychiatry* in May 2020. The question they posed: Does high-THC cannabis increase risks for problems resulting from cannabis use, common mental disorders, and psychotic experiences, after controlling for early-life mental health symptoms and frequency of use? The short answer is yes. Of the 1,087 participants who reported cannabis use in the previous year, use of high-THC cannabis was associated with a significant increase in the frequency of cannabis use, likelihood of cannabis-related problems, and rates of anxiety disorder.

This Wasn't In The Parenting Manual

Although it's impossible to know how many Colorado families have been negatively impacted by the rising rates of youth dabbing, *5280* spoke with a number of parents who shared their experiences—four of which are included below. In some cases, names have been omitted to protect families' privacies; in all cases, the stories are told in their own words.

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Photo illustration by Eleanor Shakespeare

He Came Unraveled

Robin Noble, Boulder

"The first time my son got suspended from school, I remember his coach said to me, 'Don't be too hard on him; it's just pot.' He said that because my son was an athlete and a good kid. He was just 14. But within two months, my son exited his life. He became a different human being. His joie de vivre was impacted. One day I got in a fight with him about not showing up to school, and I said, 'I think this is the pot. You have to stop.' He said, 'If I have to stop smoking pot, I'm going to kill myself. In fact, I'm going to kill myself right now.' He went to his room and locked the door. I called the police for help, and it was a cop who told me I needed to be very concerned about his marijuana use. He said, 'It's not like what you smoked when you were younger.' That's

how I learned about dabbing. My son was a fun, sweet, supersensitive kid. Then he wanted to be in his room all the time. He was buying shatter and wax through a senior with a medical card. They did it over Snapchat. One night after he came home from work—he got a job at 15—he was looking for *something* in the backyard shed. He was crying. He told me he used to have fun before drugs, but now he only had fun when he was doing drugs. I was like, *Oh, my God, this is an after-school fucking special*. We sent him to a wilderness program, then to a therapeutic boarding school. When he got home, he immediately started dabbing. But then he developed cannabinoid hyperemesis syndrome; he was just vomiting all the time. I took him to the ER 11 times in nine months. Eventually we found a doctor who said, 'This is the pot.' He looked at her and said, 'This is medicine!' He stopped because of the hyperemesis, but his executive functioning has been impacted and there are cognitive issues. I wonder why an 18-year-old can get a medical card and buy two ounces a day but can't buy tobacco or a Coors Light."

Rewired

A mother in Longmont

"I was a stay-at-home mom. I mean, I made organic baby food. My son had a good childhood. He was introduced to marijuana at Boy Scouts in middle school. His freshman year of high school, we found his stash of flower. We sought out counseling, and the counselor said if the marijuana helped with his social anxiety and wasn't hurting his school performance, maybe there wasn't anything terribly wrong with a little pot. We never told him it was OK, but he had a job, he was doing well in school, and during his sophomore and junior years we didn't see his use. Before his senior year, though, he turned 18 and his anxiety got severe. We didn't know it, but he got a medical card. It took him 10 minutes online and a 10-minute appointment to get a card for migraines he didn't have. His usage escalated. In December, a friend introduced him to dabbing. A month later we were in the ER because he had a psychotic break. He thought he was being followed by the cops. He spent several nights in the behavioral unit. We worked with a psychiatrist to get him balanced enough to go back to school. He graduated, deferred enrollment to college, and decided to work until he could take a Birthright trip to Israel. A year after his first psychotic break, he was overseas and had another one. He

hadn't used marijuana for a year. The drugs had rewired his brain. He was in the hospital in Israel for two months while they tried to get him on the right psychiatric drugs to seal the break. He's doing well now. He's going to have a full life, but this may follow him forever."

Out Of Control

Lindsay Neil, Denver

"I got a call from the high school. It was 7:30 a.m. and my son, a sophomore, reeked of marijuana. As a parent, you wonder what you missed. We talked with my son's therapist—he was in therapy for family dynamics and some depression—to try to find out if he was experimenting or using. A few months later we learned what dabbing was. We found wax in a small container, a vape pen, and a butane torch in his closet. He was *using*. By spring, he was in his room all the time. When he pushed his younger sibling into traffic, that changed things. On his 16th birthday, he started outpatient treatment. After two weeks, the center's staff told me we needed to have a meeting because my son was overage for them to give me information without his consent. At 16? School was ending, and the center wanted him to do full-day treatment once school was out. I agreed. Two days later, he ran away. He was on the streets for two days, and then I found him with a friend. The friend's mom said he could stay. But then he violated her rules; I called the police, and they picked him up. We lived on lockdown while desperately researching treatment options, which is when I learned he would have to consent to treatment in Colorado. I found a place in Utah. You essentially sign over custody of your child. I had to hire a transport company because I knew he wouldn't go willingly. At 4 a.m., they pulled up, went into my child's room, and told him he was going to a residential program. We said, 'We love you,' and they took him. He wasn't ready after 90 days, so we sent him to another program in Arizona. He was there for 14 months. He relapsed. He then went to a transitional program and relapsed again. On his 18th birthday, he signed himself out. He's still using. We don't financially support him now. We had to move out of the parental role. I think my son was struggling with some things before he started dabbing, but the marijuana activated it and worsened it."

Troubled Path

A mother in Boulder County

"My kids are biracial, and my son was in middle school when some bullying started. At that age, in eighth grade, maybe you're a normal kid exploring or maybe he was seeking some relief from anxiety. I don't know, but he told me he tried pot. I voted for Amendment 64. I had no idea the stuff out there was anything different than what I was exposed to when I was a kid. To me, it was OK that he tried it. I mean, we talked about drug use and addiction and those things. But very quickly he got access to high-concentration THC at school from those with medical marijuana cards. Within eight or nine months, he was traveling down a troubled path. He started with the flavored products, but then was using dab pens and glass pipes with a blowtorch. He wasn't going to school. He was high all day. He had been a mostly A student, a sensitive kid. Then he became belligerent and aggressive. We had to do an intervention. We sent him to various Colorado rehabs, then to inpatient treatment. Because the laws in Colorado say teens older than a certain age—15, I think—must give consent for therapy, we sent him to a rehab out of state. He's experienced cannabis-induced psychosis. He hears voices. He stopped using a year ago, but the voices continue. He knows they're not real, but still. It's so heartbreaking. He had so much potential. I think he still does, of course, but he just took such a life-affecting nosedive. I live in fear of a major psychotic break, that I could lose my kid to suicide or a complete mental break like so many other Colorado parents have."

Pot Politics

In May, state Representative Yadira Caraveo introduced a bill she says was meant to protect kids from high-THC cannabis. Not everyone agreed.

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Yadira Caraveo says she's seen a thing or two in her pediatrics practice over the years. But until recently, she hadn't seen what's often called "scromiting." "The medical term is cannabinoid hyperemesis syndrome," the pediatrician-cum-state representative from Adams County says, "but that terminology doesn't illustrate how bad it is." Caraveo

says the uncontrollable vomiting—which is sometimes paired with screaming, hence scromiting—was disturbing.

The calls she's received from Colorado parents in her role as a legislator were equally distressing. Until those conversations, Caraveo says she didn't fully understand what products were out there, much less that THC concentrations in flower in Colorado routinely test higher than 20 percent, technically making most bud high-concentration as well. With that information, Caraveo says she began a discovery process in summer 2020 that resulted in an early draft of the Safe & Healthy Marijuana Use bill in January. Her bill wouldn't be the first attempt at regulating concentrations in Colorado: Legislative efforts in 2016 failed, as did a ballot initiative in the same year.

Caraveo's bill called for a 15 percent concentration cap, changes to how medical marijuana is prescribed, the forbiddance of certain products, adjustments that would require coroners to screen for marijuana in some instances, and the creation of a new state database to monitor and enforce limits on daily dispensary purchases, among other things. Then the draft leaked—and everyone panicked.

Yadira Caraveo. Photo by Sarah Banks

Dispensary owners said the bill would crater their businesses. Marijuana industry lobbyists complained they weren't appropriately consulted. Medical marijuana patients—particularly parents of children with intractable seizure disorders and veterans with PTSD—worried the bill would take away life-saving treatments. When Caraveo and three other sponsors actually introduced House Bill 21-1317 [http://leg.colorado.gov/sites/default/files/2021a_1317_signed.pdf] on May 14, though, the text was less inflammatory—and did not include a provision to cap THC concentration. "The thing we kept hearing from the industry was there wasn't enough data to make a science-backed decision on potency," Caraveo says. As such, Caraveo and company settled on language that would remedy that problem.

The bill, which lawmakers approved and Governor Jared Polis signed in June, will require the Colorado School of Public Health at the University of Colorado Anschutz Medical Campus to do a review of the available research related to the possible health effects of high-THC cannabis and provide a report by July 1, 2022. The bill also will create a review council to analyze that report and make recommendations to the General Assembly.

Other changes that will impact consumers—and specifically target the illegal funneling of medical marijuana to kids—were not insignificant. To get a new medical card, Coloradans ages 18 to 20 will, starting January 1, 2022, have to meet in person with and get consent from two physicians from different practices; they will also have to check in with a doctor every six months instead of annually. Furthermore, 18- to 20-year-old patients will only be able to purchase two grams of medical marijuana concentrate per day as opposed to 40 grams.

Christian Sederberg, co-founder of Denver cannabis law firm Vicente Sederberg, and board president Chuck Smith of Colorado Leads [https://coleads.org/] , a coalition of cannabis business leaders, are both circumspect about HB 1317 but believe there are ways to make changes to ensure safety without upending the industry. Truman Bradley, executive director of the Marijuana Industry Group

[http://marijuanaindustrygroup.org/] (MIG), agrees. "MIG is very supportive of making it more difficult for teenagers to illegally get marijuana," he says. "We also are supportive of research as long as it is objective, broad, and doesn't favor any predetermined outcomes." Others, like Steve Lopez, CEO of the Green Solution dispensary, are less magnanimous: "These people are looking for any cracks in the system to return to prohibition."

The people Lopez references include members of groups like Smart Approaches to Marijuana [https://learnaboutsam.org/] , Smart Colorado [https://onechancetogrowup.org/] , and Blue Rising Together [https://www.bluerisingtogether.com/] , a grassroots political action committee that focuses on high-THC cannabis. Blue Rising has actively supported Caraveo's legislation. Co-founder Dawn Reinfeld believes Colorado owes it to other Americans to let them know that this "freight train" is headed toward them if they don't enact concentration limits when they legalize. "The science we have says 15 percent is where things become problematic, especially for young people," she says. "We need to follow the science."

Finding Solutions

Several countermeasures—some in HB 1317, some not—have been bandied about, but keeping concentrates away from kids is a tricky proposition.
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Enforce Law & Order
According to the Colorado Marijuana Enforcement Division's mid-2020 report [https://sbg.colorado.gov/news-article/colorados-marijuana-enforcement-division-released-2020-mid-year-update] , dispensaries have a 97 percent compliance rate when it comes to nonqualified sales. "The thing is that there's not much a dispensary can do when someone purchases legally and then walks out the door and sells it to a kid," says Colorado Leads' Chuck Smith. "Frankly, that's a felony." Smith is right; it is a felony punishable by eight to 32 years in prison. However, the Denver Police Department says

this type of illicit activity rarely comes to its attention. “We encourage anyone who has information about these types of illegal transactions,” says Douglas Schepman, interim director of communications for the department, “to contact us immediately.”

Increase Taxes

Currently, retail marijuana in Denver is subject to a 26.41 percent tax (including sales, excise, and special taxes), while medical marijuana in Denver is only hit with an 8.81 percent tax (including sales and special taxes). Several marijuana industry insiders—including the Marijuana Industry Group’s Truman Bradley—say increasing the sales tax on high-THC medical products is a possible avenue for deterring younger buyers or those looking to illegally sell to younger buyers without limiting access for others. “This could impact low-income people,” he says, referencing veterans and the elderly specifically, “but it could accomplish some goals.” The extra tax dollars could fund mental health care or youth education programs.

Track Pot Purchases

A central provision of HB 1317 is a mandate to create a statewide tracking program for medical marijuana purchases. Although Caraveo initially hoped to create a new system similar to Colorado’s Prescription Drug Monitoring Program [https://dpo.colorado.gov/PDMP] , stakeholder meetings determined it was possible to use the existing seed-to-sale system. With some modifications, this database will be used as a powerful tool for reducing a practice called looping, in which red card holders —some of whom are presumably in the 18- to 20-year-old age range—go from dispensary to dispensary accumulating product to sell on the black market. “An 18-year-old can’t go from King Soopers to Walgreens in the same day and keep getting Adderall from each pharmacy,” says cannabis attorney Christian Sederberg.”It should be like that with cannabis.”

Amend Medical Cards

Parents with kids who’ve been impacted negatively by cannabis have long pointed to a lax system that has encouraged medical cards as a rite of passage for 18-year-olds. When Governor Jared Polis signed House Bill 21-1317, he approved legislation that, starting on January 1, 2022, will require new patients between 18 and 20 to consult—

in person—with two doctors from different practices instead of just one before obtaining a red card. The language in HB 1317 will also limit the amount 18- to 20-year-olds can buy and change how a physician certifies a medical card. "Medical marijuana should be treated like any other physician-prescribed drug," state Representative Yadira Caraveo, one of the bill's sponsors, says. With that in mind, she also wanted certain information to accompany a medical card: date of issue, effective date, recommending physician's name and federal Drug Enforcement Administration number, daily authorized quantity, maximum recommended concentration level, recommended product, directions for use, and the physician's signature. These changes were met with trepidation from patients, but, according to Caraveo, care was taken and language was tweaked to ensure the alterations do not unduly burden them.

Provide An Education

There's evidence that science- and reality-based prevention education—for sex, smoking, violence, and drug use—works. Launched in 2015, Steamboat Springs–based Marijuana Education Initiative [https://marijuana-education.com/] (MEI) has a variety of online-only programs for different grade levels that lay out the risks of cannabis use for the developing brain. MEI lessons are being deployed in several Colorado and out-of-state school districts, often using funds schools receive from a marijuana excise tax. "As the research evolves," says MEI co-founder Molly Lotz, "we update our curriculum to make sure kids understand the brain science so they can feel empowered to make decisions."

Two Years Sober

Photo illustration by Eleanor Shakespeare

A 22-year-old Colorado native details his long journey to abstention.

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Chris Baker* believes THC was a serious problem, but it wasn't his only problem. At 16, he was struggling with attention deficit and executive function disorders. He was having a hard time with some dysfunction at home and experiencing depression, which runs in his family. He says he would drink alcohol as a salve, but then a friend with a medical marijuana card opened the dispensary door to cannabis. "I got high to escape," Baker says, "but also to feel like *I had arrived*. I could be social. I could be me."

Then he got caught up in it. He couldn't control his usage. And why would he? "The sheer amount children can get access to in a day is crazy," he says. "We'd go from one dispensary to the next and get 1,200 milligrams of edibles or a gram of 99 percent isolate and some 30 percent flower. No one needs that dose."

By the time he was 18 and a senior in high school, he knew he was in trouble. He experienced a borderline psychotic break at school, and it scared him enough to ask his parents for help. They sent him to wilderness therapy in Oregon, at a cost of roughly $40,000 out of pocket. "At the end of therapy there, I really thought I'd never smoke again," he says. "I actually remember saying that out loud to a tree." It wasn't to be. Within a month, he was using again.

Things got worse when Baker went off to college. He was smoking all the time and rarely leaving his studio apartment. He says he wouldn't buy anything that was less than 90 percent THC. The resulting psychosis made him believe there was some grand underpinning to the universe, and he was figuring it all out. He taped pieces of paper with incoherent scribbles to the walls. His mirrors were covered in sayings and what he thought were high-level equations. It was a scene straight out of *A Beautiful Mind*. He failed his first quarter of college and ended up back home. His family begged him to get help, but he said he had a plan, that he'd go back to school and be OK. About six weeks later, he called his parents to come get him. "I was doing a gram of dabs and feeling

nothing," he says. "That's when I knew." He went to a residential treatment program in California, started Alcoholics Anonymous, and this time it took.

Two years later, Baker is 22 and sober. He ably articulates his journey and knows he's lucky. "My primary problem is addiction," he says. "I didn't understand addiction. I was not the person I thought of when I thought of an addict. I was a wealthy white kid from Boulder." Although Baker says he believes cannabis should be legal, he also thinks it's too accessible for kids, and he ponders whether his pre-existing disorders and depression made him more vulnerable to THC-induced mental health problems or if THC was the sole cause of the psychosis. "Either way," he says, "my problems haven't all gone away, but I'm not fighting with them anymore. I have new solutions for them. Life is much easier now."

**Name has been changed to protect privacy*

When It's Time To Intervene

Durango's Open Sky Wilderness Therapy [https://www.openskywilderness.com/] treats young people who face mental health issues, such as depression, anxiety, substance abuse, and addiction. Teens receive clinical treatment while living in nature, sometimes for months at a time. *5280* connected with Open Sky clinical therapist Brian Leidal to ask him about the impacts of cannabis he sees in his cohorts.
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5280: Do you often have clients experiencing addiction to marijuana?
Brian Leidal: Yes. Clients I work with fall on a spectrum, ranging from mild to severe use. In order to determine if a client's use has become an addiction, I ask them about the frequency of their cannabis use, the types and concentrations of the cannabis they use, and the consequences of their use. The difference between dependence and addiction is consequences: For those clients who have become addicted, the consequences really pile up.

Are there fallacies about pot's addictive qualities?

Marijuana is often downplayed for its addictive qualities when compared to other substances of abuse. I often hear from my clients, "I was just smoking pot." THC activates the reward circuitry of our brains in ways that may cause this circuitry to be hijacked. While the effects of marijuana may wear off after just a couple of hours, the half-life of THC is quite long. The half-life of THC for mild users is between one and two days, but THC can still be traced in the system of a mild user for weeks afterward. For those who use cannabis frequently or use higher concentrations of THC, the half-life is between one and two weeks and THC lasts within their systems for much, much longer. This accrual of THC leads to increasing tolerance and the belief that there isn't much to the withdrawal from cannabis. The higher the THC, the higher the addictive potential. Once the body becomes acclimated to the presence of THC, withdrawal symptoms kick in.

Withdrawal isn't the only thing we need to worry about with frequent THC use, right?

Moderate to severe cannabis use is associated with reductions in two measures of intelligence and cognitive ability: working memory and processing speed. More research is needed to definitively state whether these reductions are permanent or temporary in adolescents or young adults. For adolescents who use cannabis, however, there are studies that show that these reductions are permanent and don't recover in adulthood, even if they stop using.

Have you observed mental health disturbances associated with cannabis use?

Yes, unfortunately. The co-occurrence of a cannabis use disorder and other mental health issues is very prevalent. There is a higher likelihood of developing generalized anxiety disorder and first-episode psychosis in cases where clients have used cannabis at an early age and especially when they are using high-concentration THC products. For young people who are using cannabis, I advise they get to know their family histories of mental health and stop or cut back on cannabis if they have close family members who have a history of psychosis.

How does wilderness therapy help with cannabis addiction?

It creates a controlled environment, where clients can detox from cannabis without the

potential of relapse. The treatment places a strong emphasis on developing genuine human connection. Clients learn skills to expand their emotional toolboxes, so that when they encounter adversity, they have more options than to turn back to the one consistent tool they had: cannabis.

Getting Help

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Finding resources when your child is experiencing addiction can be challenging, especially in Colorado where children 15 and older must consent to treatment. Parents also often encounter difficulties getting their insurance carriers to cover therapy for cannabis addiction. The Colorado Department of Human Services [https://cdhs.colorado.gov/] offers crisis services as well as information for finding behavioral health help. The federal Substance Abuse and Mental Health Services Administration [https://www.samhsa.gov/find-help/national-helpline] also provides assistance for finding treatment. The Colorado chapter of Narcotics Anonymous [https://nacolorado.org/] can be a good resource too.