

SAM Educational Briefs & Data on Marijuana Policy

September 2017

WHO WE ARE

SAM is the leading non-partisan, non-profit policy group supporting a science-based, common-sense approach to marijuana. We bring the brightest scientific minds to the table on this issue, including top decision-makers and researchers from the most prestigious universities in the world. Based on their advice, we:

- Support a marijuana policy based on science, not slogans
- Educate citizens on the science of marijuana
- Fight and stop marijuana legalization
- Advocate for alternatives to incarceration for marijuana users, and support research on marijuana
- Orchestrate non-partisan campaigns to stop Big Marijuana through our lobbying arm, SAM Action (a 501(c)(4) organization)

SAM also works with noted policy leaders, including the heads of U.S. federal agencies, federal and state representatives, and ambassadors.

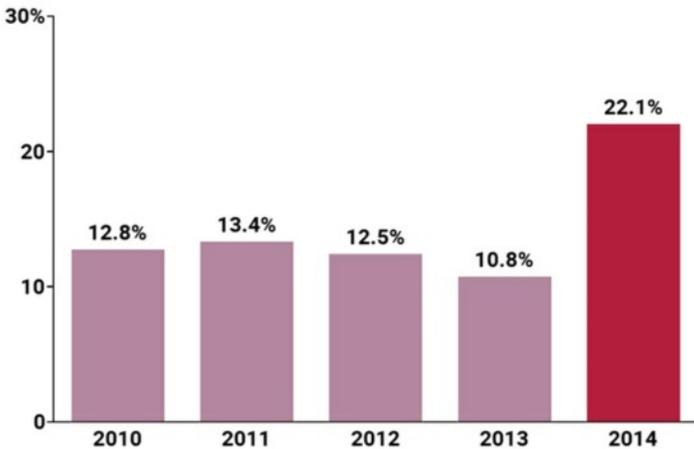
OUR ADVISORS

SAM benefits from an all-star list of advisors from public service and the scientific community, whose perspectives on public health and safety guide our work.

HONORARY ADVISORS
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<ul style="list-style-type: none"> • Dr. Christine Miller, Mental health researcher

WA traffic fatalities where driver tested positive for marijuana



Source: AAA Foundation (2016).

HEALTH RISKS

According to virtually every scientific review, including a 2016 World Health Organization report and a 2017 National Academy of Sciences study, **marijuana is addictive and harmful**—despite rhetoric from the marijuana industry.

The chances of becoming dependent on marijuana can be **up to 50% for some users**, and regular use is indisputably dangerous to the adolescent brain, in some cases linked to permanent reductions in IQ.

Unlike cigarettes, marijuana also intoxicates, sometimes with tragic results. **The percentage of traffic deaths related to marijuana more than doubled in Washington State the year retail marijuana sales were allowed**, and Colorado has seen similar increases in pot-related accidents.

MARIJUANA EDIBLES

Marijuana legalization has spurred a boom in pot “edibles.” THC concentrate is mixed into almost any type of food or drink, including gummy candy, soda, and lollipops. Today, **these edibles comprise at least half of Colorado’s marijuana market.**

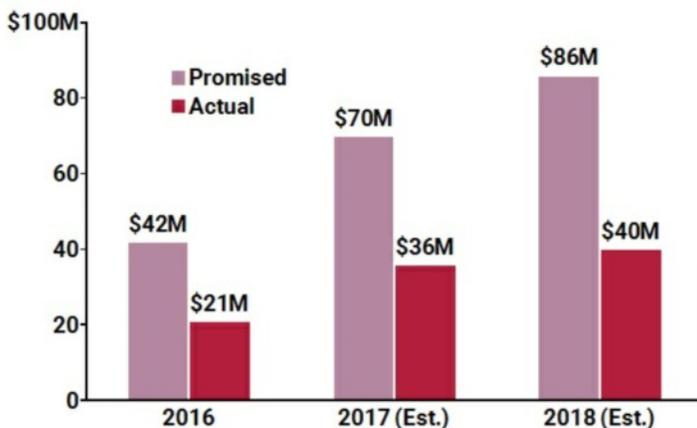
Edibles’ potency (several times that of an average joint) and their attractiveness to kids have led to **serious problems in legalized states like Colorado:**

- A 19-year-old jumped to his death from a fourth-floor balcony after eating a highly potent pot candy.
- Emergency poison control calls for children aged 0 to 8 more than tripled in Colorado after legalization.
- More high school seniors are using pot now than a decade ago, even as use of cigarettes, alcohol, and all other drugs combined has declined.



THC-infused sodas currently on the market as of February 2017.

Marijuana tax money for prevention & education, WA



Source: Initiative 502; Washington State Economic and Revenue Forecast Council (as reported by The Seattle Times)

COSTS OUTWEIGH TAX REVENUE

Although it is still early for comprehensive cost studies on the costs of marijuana legalization, unsettling trends have already surfaced in Colorado & Washington state, suggesting that, like tobacco and alcohol, costs outweigh revenues :

- Over half the pot money promised for drug prevention, education & treatment in WA **never materialized.**
- **Bureaucracy consumes a significant portion of Colorado marijuana tax revenue.**
- **More CO youth - especially black & Latino kids - are being arrested for pot-related offenses post-legalization.**
- Adolescent suicide victims in Colorado are **increasingly found with marijuana in their systems.**
- Marijuana offenses in Colorado elementary and high schools have **increased 34 percent since legalization.**

MARIJUANA & OTHER DRUGS: A LINK WE CAN'T IGNORE

A 2017 STUDY OF over 30,000 American adults demonstrated that **marijuana users were more than twice as likely to move on to abuse prescription opioids** – even when controlling for age, sex, race/ethnicity, other substance use disorders, any mood or anxiety disorder, prior nonmedical opioid use, and family history of drug use disorder, alcohol use disorder, depression, and antisocial personality disorder. (1) Similarly, the CDC also says that marijuana users are three times more likely to become addicted to heroin.(2)

And according to the seminal 2017 National Academy of Sciences report, "There is moderate evidence of a statistical association between cannabis use and the development of substance dependence and/or a substance abuse disorder for substances including alcohol, tobacco, and other illicit drugs."(3)

RECENT STUDIES WITH animals also indicate that marijuana use is connected to use and abuse of other drugs. A 2007 *Journal of Neuropsychopharmacology* study found that rats given THC later self-administered heroin as adults, and increased their heroin usage, while those rats that had not been treated with THC maintained a steady level of heroin intake.(4)

Another 2014 study found that adolescent THC exposure in rats seemed to change the rodents' brains, as they subsequently displayed "heroin-seeking" behavior. Youth marijuana use could thus lead to "increased vulnerability to drug relapse in adulthood."(5)

The National Institutes of Health says that research in this area is "consistent with animal experiments showing THC's ability to 'prime' the brain for enhanced responses to other

drugs. For example, rats previously administered THC show heightened behavioral response not only when further exposed to THC, but also when exposed to other drugs such as morphine—a phenomenon called cross-sensitization."(6)

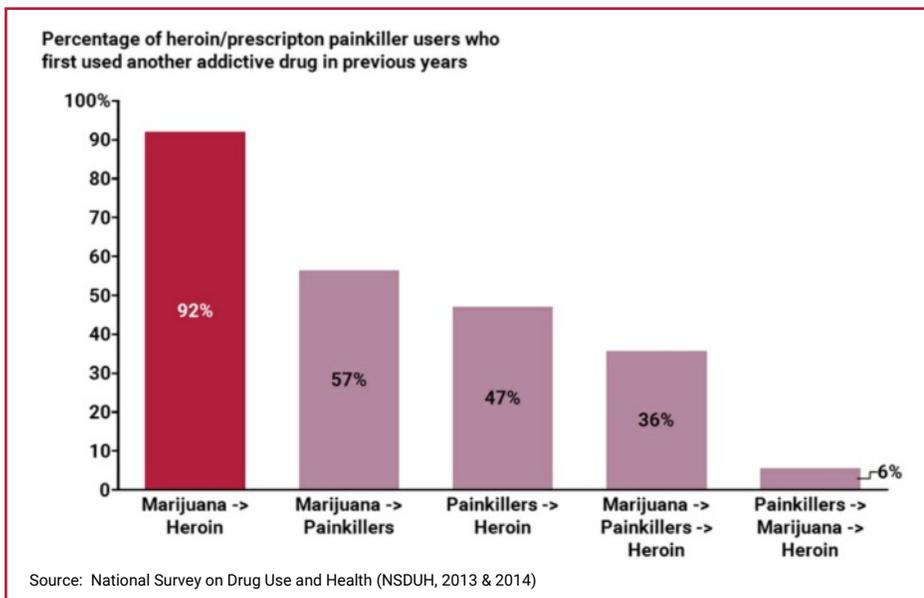
ADDITIONALLY, THE MAJORITY of studies find that marijuana users are often polysubstance users, despite a few studies finding limited evidence that some people substitute marijuana for opiate medication. That is, people generally do not substitute marijuana for other drugs. Indeed, the National Academy of Sciences report found that

"[C]annabis use, even among adults with moderate to severe pain, was associated with a substantially increased risk of non-medical prescription opioid use..."

–The American Journal of Psychiatry (2017)

"with regard to opioids, cannabis use predicted **continued** opioid prescriptions 1 year after injury... Finally, cannabis use was associated with reduced odds of achieving abstinence from alcohol, cocaine, or polysubstance use after inpatient hospitalization and treatment for substance use disorders" [emphasis added].(7)

Moreover, a three-year 2016 study of adults also found that marijuana compounds problems with alcohol. Those who reported marijuana use during the first wave of the survey were more likely than adults who did not use marijuana to develop an alcohol use disorder within three years.(8) Similarly, alcohol consumption in Colorado has increased slightly since legalization.(9)



1. Olfson M., et al. Cannabis Use and Risk of Prescription Opioid Use Disorder in the United States. *Am J Psychiatry* 2017. <https://doi.org/10.1176/appi.ajp.2017.17040413>.
2. Centers for Disease Control. *Today's heroin epidemic: Infographics more people at risk, multiple drugs abused*. CDC, 7 July 2015.
3. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on the Health Effects of Marijuana: An Evidence Review and Research Agenda ("2017 NAS Report").
4. Ellgren, Maria et al. "Adolescent Cannabis Exposure Alters Opiate Intake and Opioid Limbic Neuronal Populations in Adult Rats." *Neuropsychopharmacology* 32.3 (2006): 607–615.
5. Stropponi, Serena et al. Chronic THC during adolescence increases the vulnerability to stress-induced relapse to heroin seeking in adult rats. *European Neuropsychopharmacology* Volume 24, Issue 7 (2014), 1037 - 1045.
6. "Is marijuana a gateway drug?" National Institute on Drug Abuse. Jan. 2017. See also Panlilio LV, Zanettini C, Barnes C, Solinas M, Goldberg SR. Prior exposure to THC increases the addictive effects of nicotine in rats. *Neuropsychopharmacol Off Publ Am Coll Neuropsychopharmacol.* 2013;38(7):1198-1208; Cadoni C, Pisanu A, Solinas M, Acquas E, Di Chiara G. Behavioural sensitization after repeated exposure to Delta 9-tetrahydrocannabinol and cross-sensitization with morphine. *Psychopharmacology (Berl)*. 2001;158(3):259-266.
7. 2017 NAS report.
8. Weinberger AH, Platt J, Goodwin RD. Is cannabis use associated with an increased risk of onset and persistence of alcohol use disorders? A three-year prospective study among adults in the United States. *Drug Alcohol Depend.* February 2016.
9. Rocky Mountain HIDTA Investigative Support Center Strategic Intelligence Unit. *The Legalization of Marijuana in Colorado: The Impact*, Volume 4. Sept. 2016 (citing CO Department of Revenue).

WHILE STATES CAN decriminalize marijuana, federal law is clear that a state cannot issue licenses or otherwise sell marijuana.

Today's marijuana industry encompasses industrial-scale growing and THC extraction, and advertising to both in-state and out-of-state markets--it has little to do with individual growing and use, or "mom-and-pop" businesses.

The Colorado experience has demonstrated how commercialized, legal marijuana in one state directly affects its neighbors. Since legalization, marijuana from Colorado has flooded into neighboring states. (See graphic.) In Nebraska and Oklahoma, the inflow has been so dramatic that the states have sued Colorado. These states contend that pot smuggled from Colorado is "undermining [their] own marijuana bans, draining their treasuries, and placing stress on their criminal justice systems," including increased law enforcement and judicial spending.

ORGANIZED CRIME, INCLUDING crime involving Mexican and other international drug cartels, has

surged. The past President of the Colorado Association of Chiefs of Police stated last year that "Organized crime filings have skyrocketed in Colorado since marijuana legalization. We had 1 filing in 2007 and by 2015, we had 40."

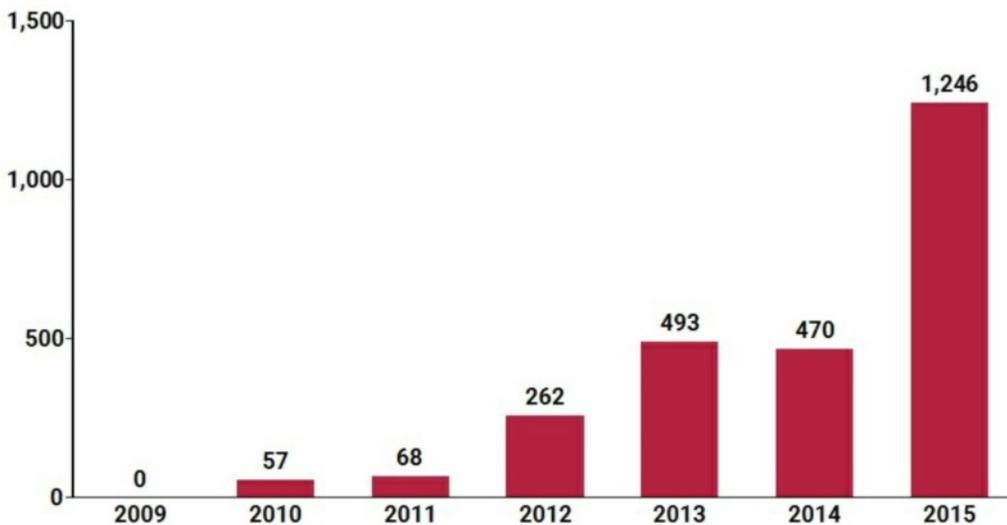


HIGHWAY ADVERTISING targets in-state and out-of-state residents alike

AS POT HAS illegally flowed out of legalized states, people have flooded in for "marijuana tourism." The marijuana industry has launched a nationwide marketing campaign to draw out-of-state residents. It sells packages including travel, lodging, and easy access to the drug. It buys advertising visible from highways.

These developments are not without consequences: Marijuana-related hospital visits have surged in Colorado among out-of-state visitors. In 2014, for example, a 19-year-old international student living in Wyoming killed himself after eating a potent marijuana edible an older friend bought for him at a Colorado pot shop. The Denver coroner's office listed Colorado marijuana intoxication as a significant factor in his death.

Pounds of marijuana shipped from CO to other states seized by U.S. Postal service



Source: Rocky Mountain HIDTA report (Fall 2016), citing data from the U.S. Postal Service

GROWING MARIJUANA REQUIRES prodigious amounts of water, regardless of whether it is grown inside or outdoors. In California, where growers have decades of experience cultivating, plants still require about six gallons of water per plant each day. That adds up to almost 300 million gallons of water per square mile of marijuana each growing season. (1)

This amounts to twice the amount of water wine grapes use, and the same amount of water consumed by almond orchards -- a relatively thirsty agricultural product. (2)

Recent peer-reviewed research from fish and wildlife experts also indicates that marijuana "is likely to have lethal or sub-lethal effects on state-and-federally [protected] salmon and steelhead trout and to cause further decline of sensitive amphibian species," due to the amount of water it diverts from rivers. (3)

PROPONENTS OF MARIJUANA legalization claim that legalization will deter and limit illegal grows that damage public lands. However, the black market for marijuana in legalized states like Colorado has not abated, and abuse and degradation of public lands from illegal grows has continued. (4) For example, in 2015, the Department of Justice announced a wave of prosecutions on federal land resulting in seizure of 20,000 marijuana plants and over 300 kilograms of dried marijuana in Colorado. Suspects included Mexican nationals with ties to transnational criminal groups. (5) In 2017, four years after Colorado legalized pot, officials found more

than 7,000 illegal plants on federal land in the state's San Isabel National Forest. It was the fifth illegal grow found in that area alone since the year legalization passed. (6)

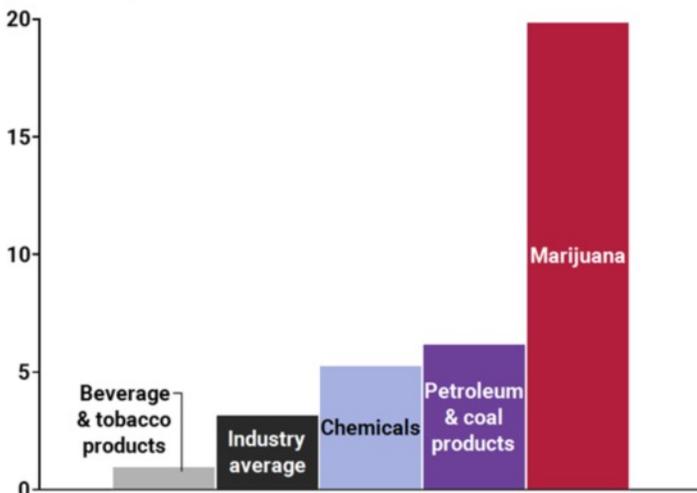
POWER CONSUMPTION IS a similar story. In 2012--since which time, marijuana cultivation has expanded significantly--marijuana growing was responsible for one percent of the nation's entire electricity use. That is six times the amount of power the entire U.S. pharmaceutical industry uses, and can be expected to rise if cultivation and consumption continues to esca-

Marijuana cultivation already accounts for one percent of the United States' total electricity consumption, and is almost four times more energy-intensive than the oil and coal industries.

late due to legalization. The energy to produce a single joint emits three pounds of carbon dioxide. (7) That's the same as leaving the TV on for over 15 hours. (8)

THIS ENORMOUS ENERGY use derives from both the quantity of marijuana grown and the large amount of energy it demands. Pot is almost four times more energy-intensive than oil or coal. (9) It uses so much power that indoor pot production in Colorado is responsible for two percent of the state's electrical load and 45 percent of all new electricity demand coming online. (10) In fact, *Mother Jones* magazine indicated that the pot market "has placed a huge burden on the grid that distributes electricity throughout the state." (11) Thus, the environmental damage the marijuana industry causes will escalate unless the industry is curbed.

Energy intensity (MJ/\$1,000 in shipment value)

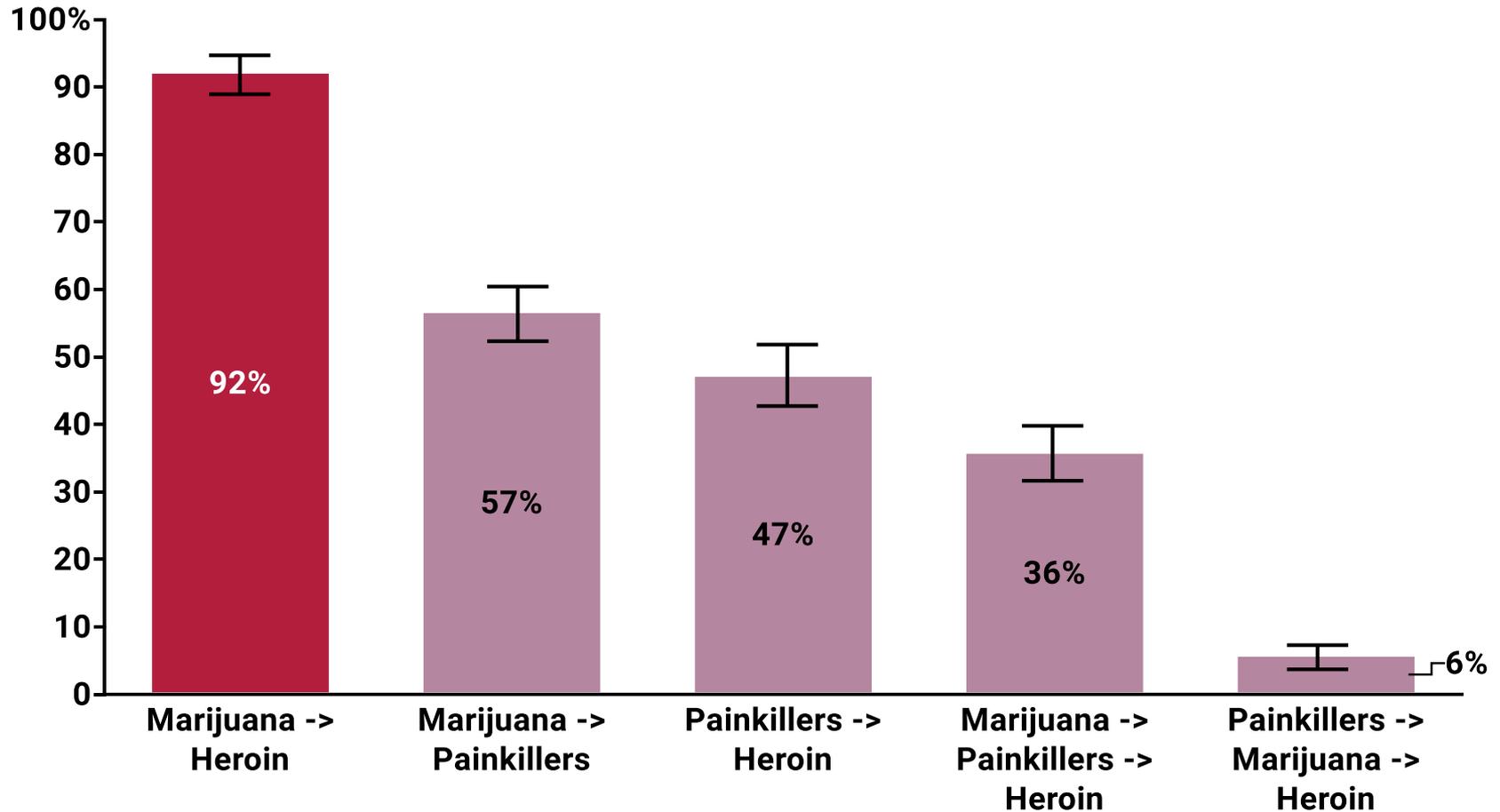


Source: Mills, Evan. "The Carbon Footprint of Indoor Cannabis Production." *Energy Policy*, 46. (2012): 58-67.

1. Carah et al.; High Time for Conservation: Adding the Environment to the Debate on Marijuana Liberalization. *BioScience* 2015; 65 (8): 822-829. doi: 10.1093/biosci/biv083.
2. *Id.*; Ingraham, C. "Forget Almonds: Look at How Much Water California's Pot Growers Use." *Washington Post*. 26 June 2015; Hamblin, James. "The Dark Side of Almond Use." *The Atlantic*, 12 Aug. 2015.
3. Bauer et al. (2015) Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. *PLoS ONE* 10(3):e0120016. doi:10.1371/journal.pone.0120016.
4. "Special report, 'Clearing the haze:' Black market is thriving in Colorado." *Colorado Springs Gazette*, 20 Mar. 2015.
5. Department of Justice, U.S. Attorney's Office, State of Colorado. "Confronting wave of illicit marijuana cultivation, federal, state and local authorities discover and destroy major marijuana grows in locations across Colorado." 8 Oct. 2015.
6. Citation: Kieran, N.. "Hiker finds illegal marijuana grow worth \$7 million in San Isabel National Forest." *The Denver Post*. 30 June 2017
7. Mills, E. "The Carbon Footprint of Indoor Cannabis Production." *Energy Policy*, 46. (2012): 58-67.
8. "Everyday actions that contribute to carbon dioxide emissions." *ABS-CBN*. 27 Nov. 2015.
9. Mills, E. "The Carbon Footprint of Indoor Cannabis Production." *Energy Policy*, 46. (2012): 58-67.
10. Crombie, Noelle. "Task force looks at energy, water use related to marijuana production." *The Oregonian/OregonLive*. 27 June 2016.
11. Mock, B. "This is How Much Energy It Takes to Legalize Weed." *Mother Jones*. 8 Jul. 2015.

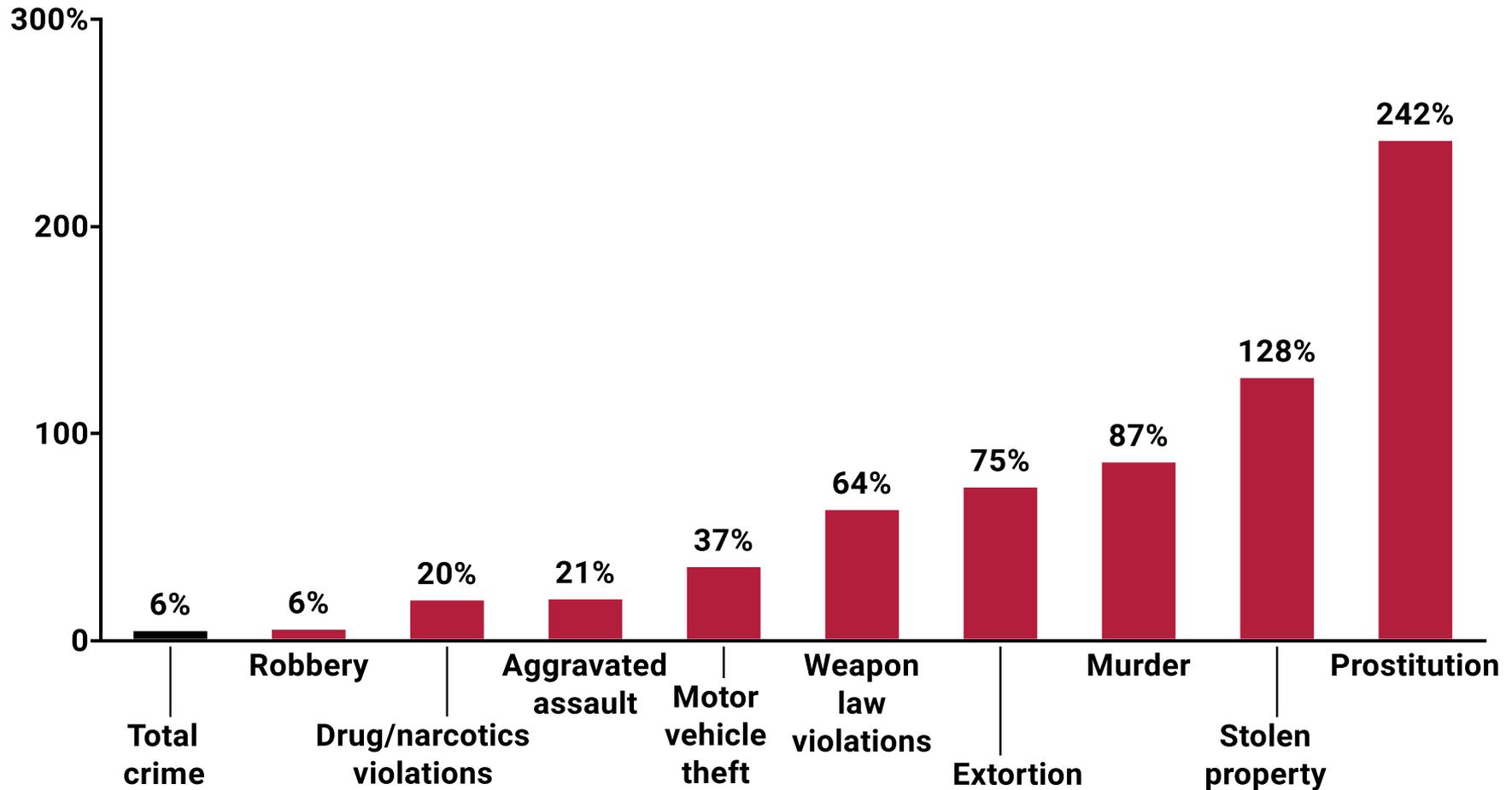
Marijuana use is linked to subsequent opiate and heroin use

Percentage of heroin/prescription painkiller users who first used another addictive drug in previous years



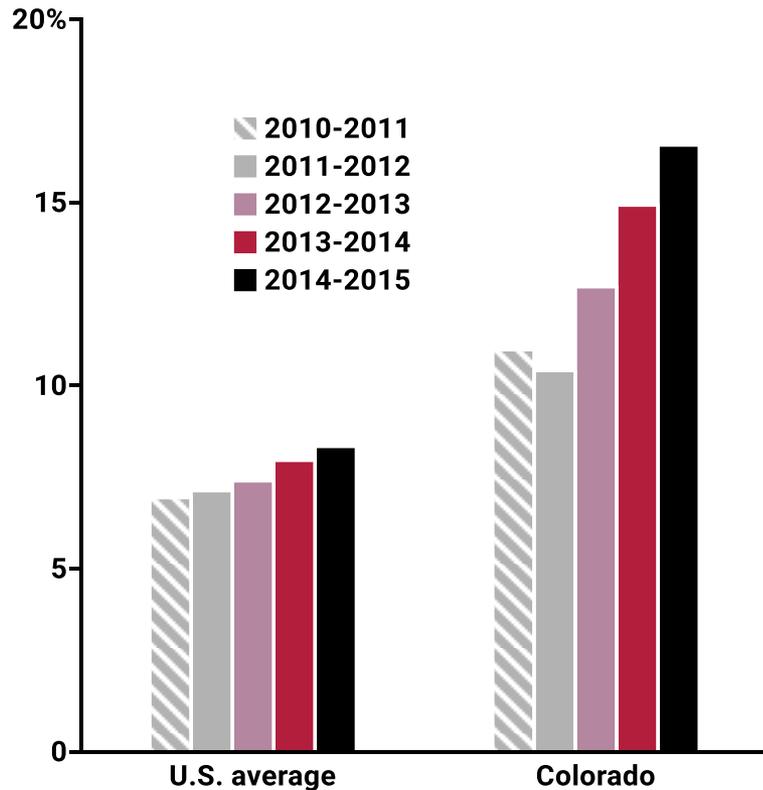
Crime in Denver has surged since non-medical marijuana stores opened there

Increase in crime, 2014-2016
(Denver, CO)



Since legalization, pot use in Colorado has steadily climbed, well outpacing the national average

Percentage of population ages 12 and up who used marijuana in the past month

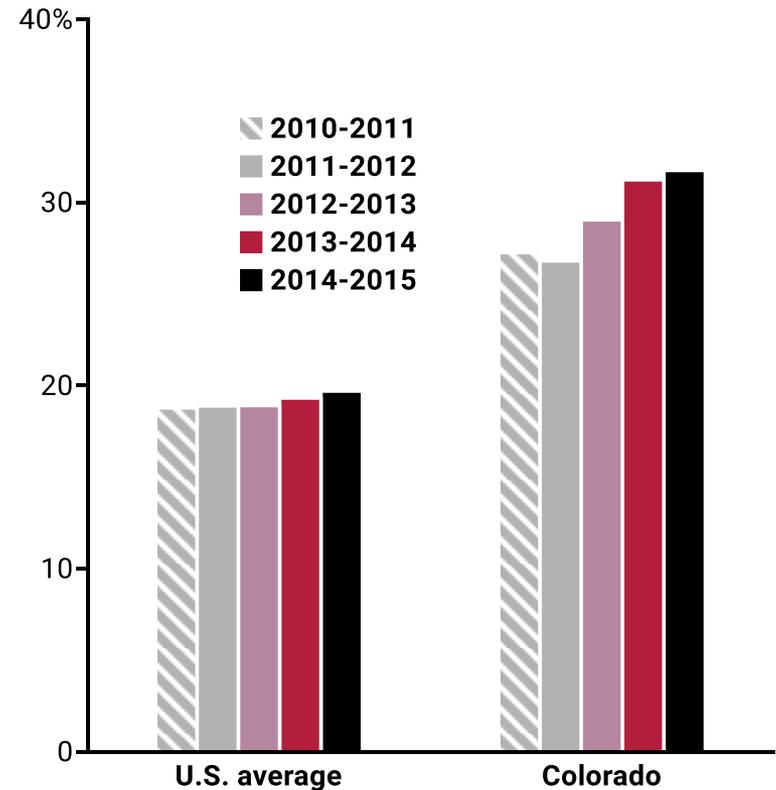


Avg. change per period

4.7%

10.8%

Percentage of population ages 18 to 25 who used marijuana in the past month



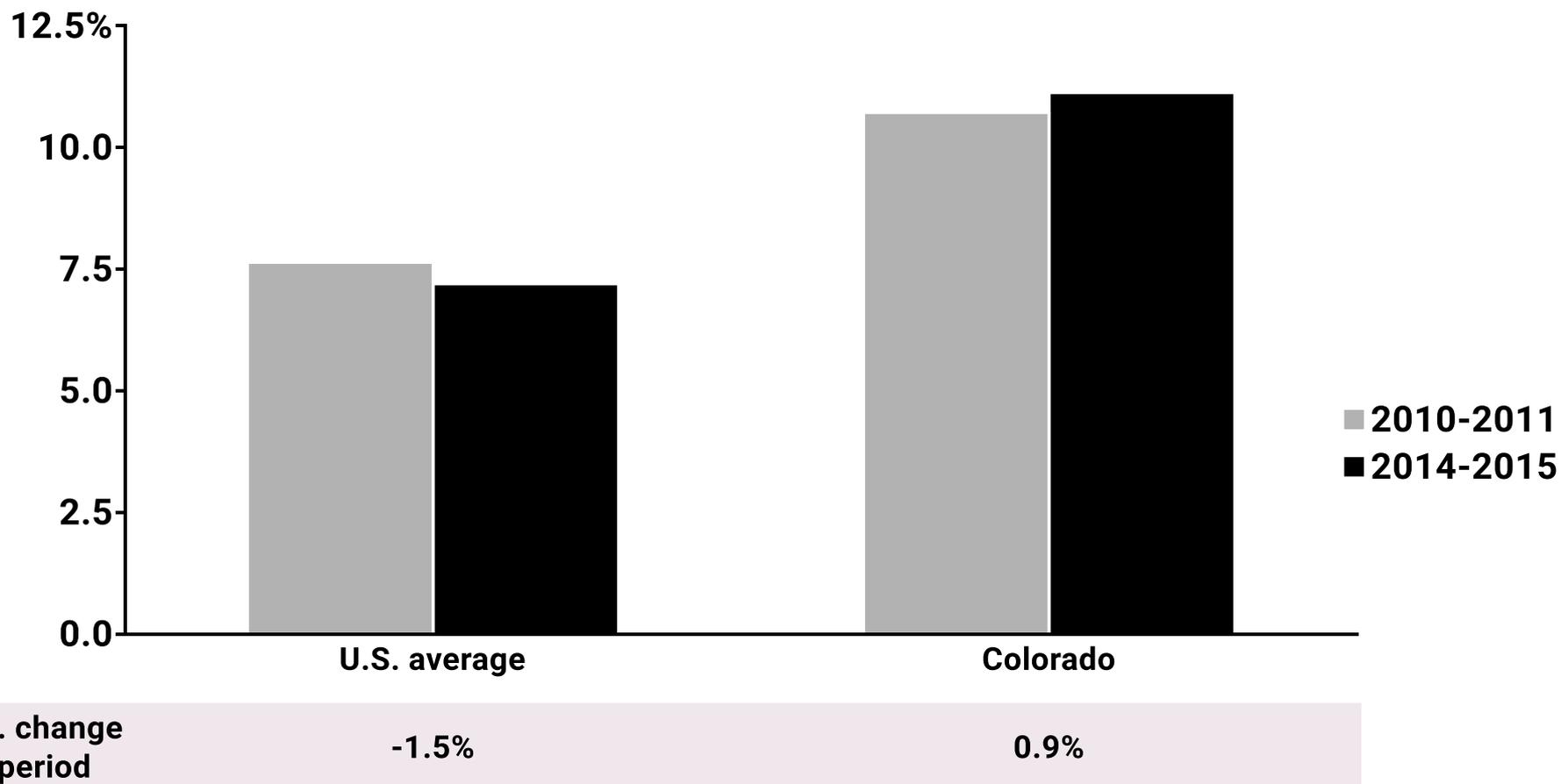
Avg. change per period

1.2%

3.9%

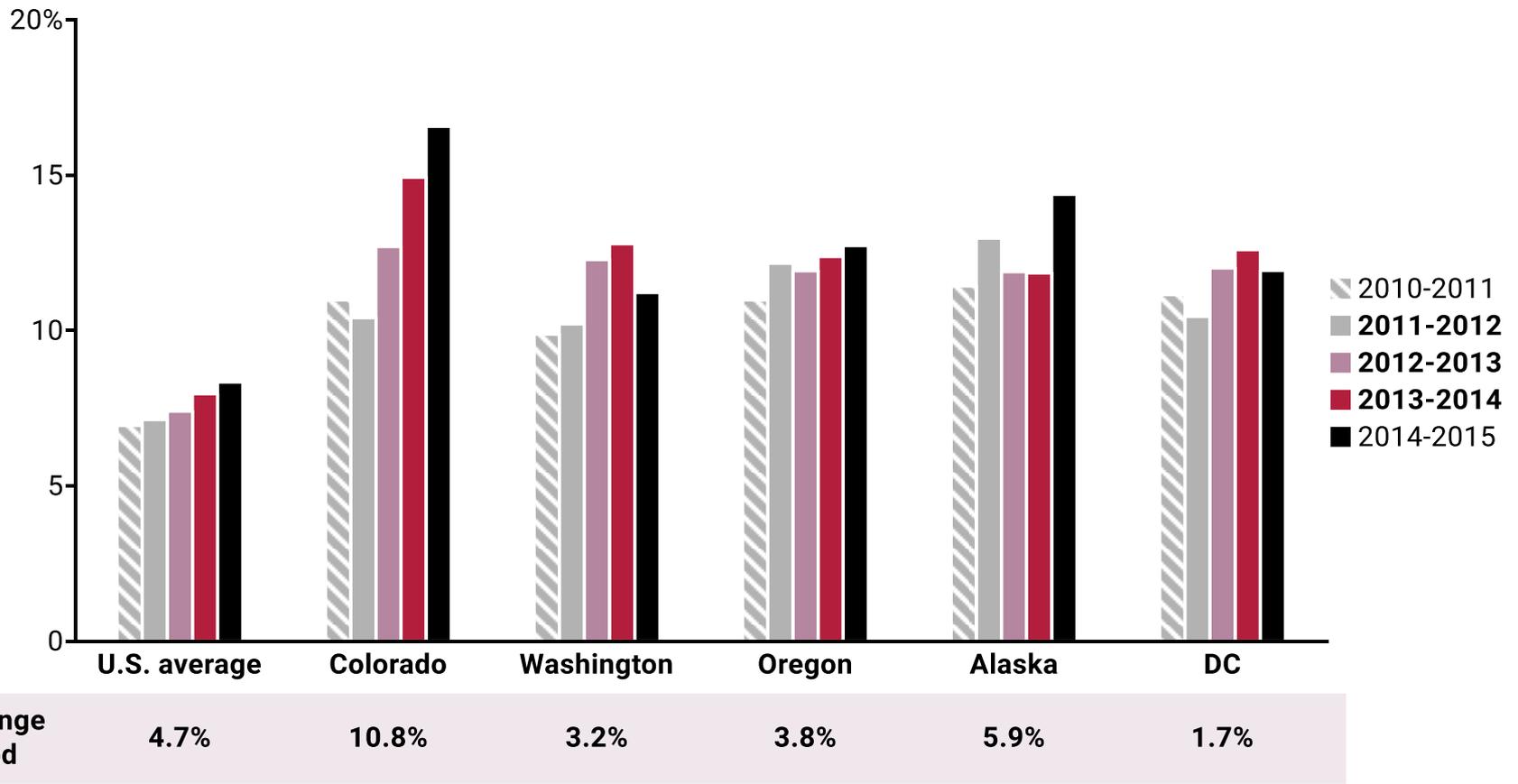
Youth use has also steadily risen in Colorado since legalization, in contrast to the nat'l average

Percentage of population ages 12 to 17 who used marijuana in the past month



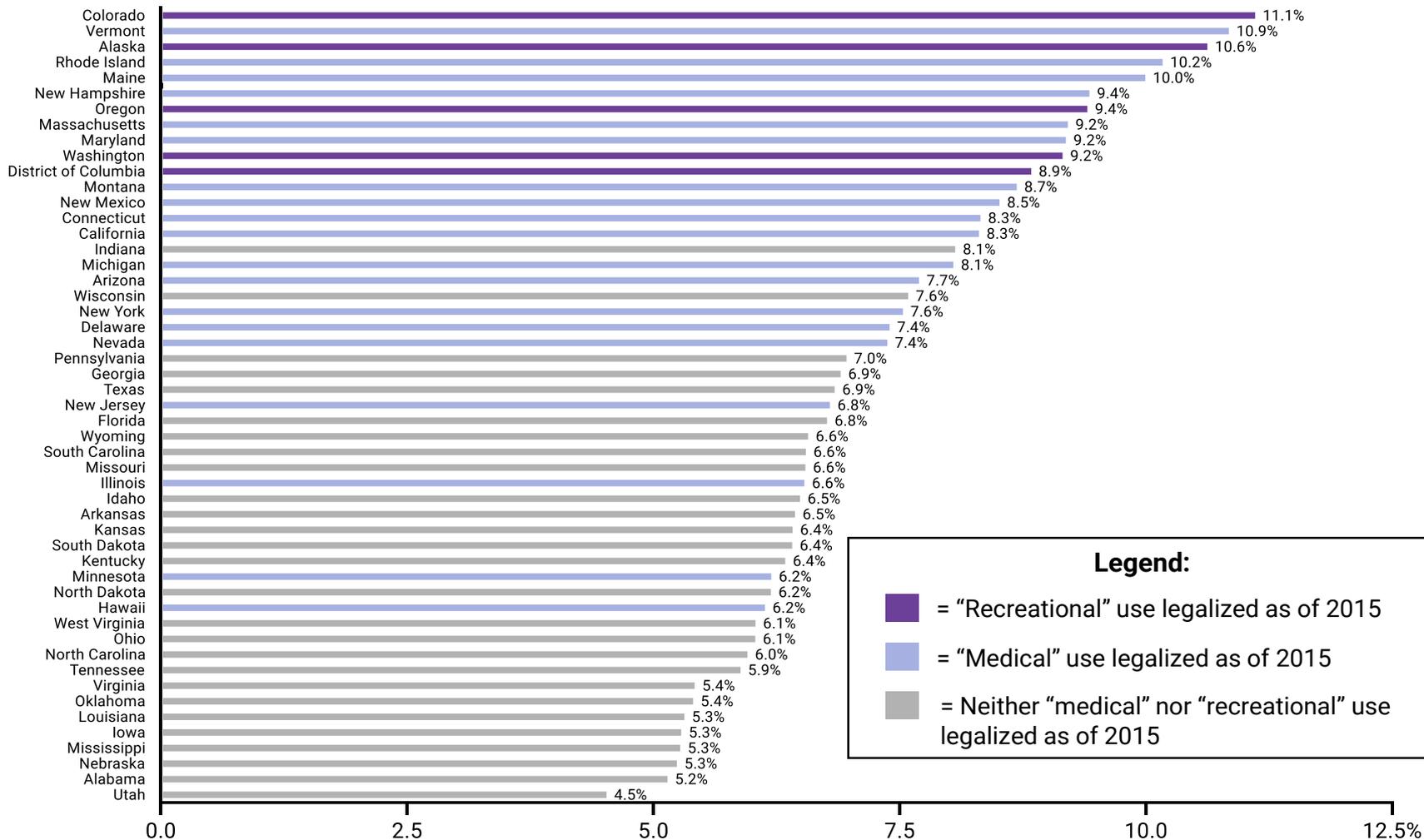
Past-month marijuana use among the overall U.S. population has increased steadily since 2010

Percentage of population ages 12 and up who used marijuana in the past month



Youth use rates in states that have legalized marijuana outstrip those that have not

Last-month use, ages 12-17 (as of 2015)



Pot use among HS seniors rose over 1%/year in last decade, while use of alcohol & other drugs fell

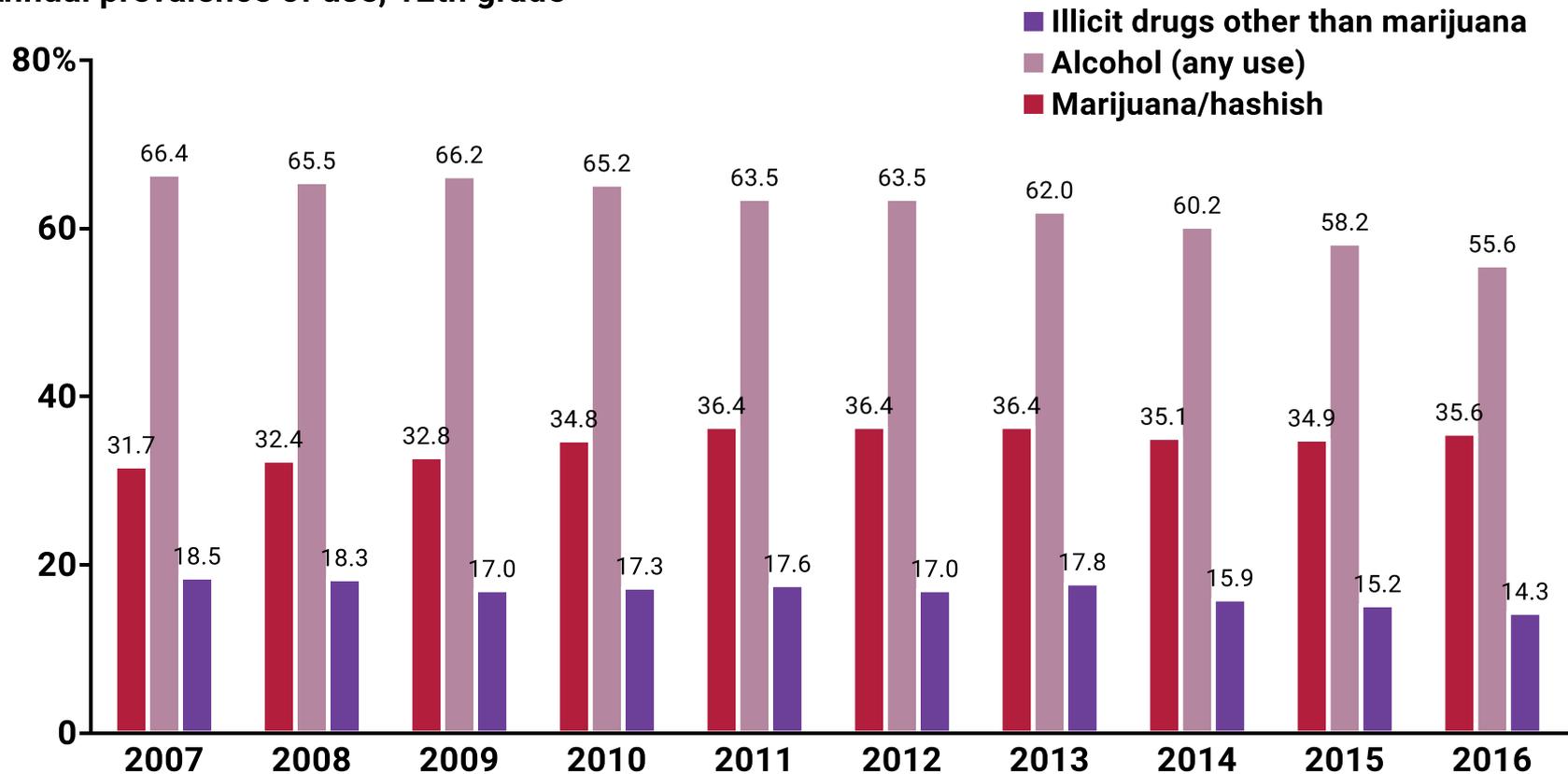
Avg. annual change (2007-2016):

Marijuana/hashish: +1.3%

Alcohol: -2.0%

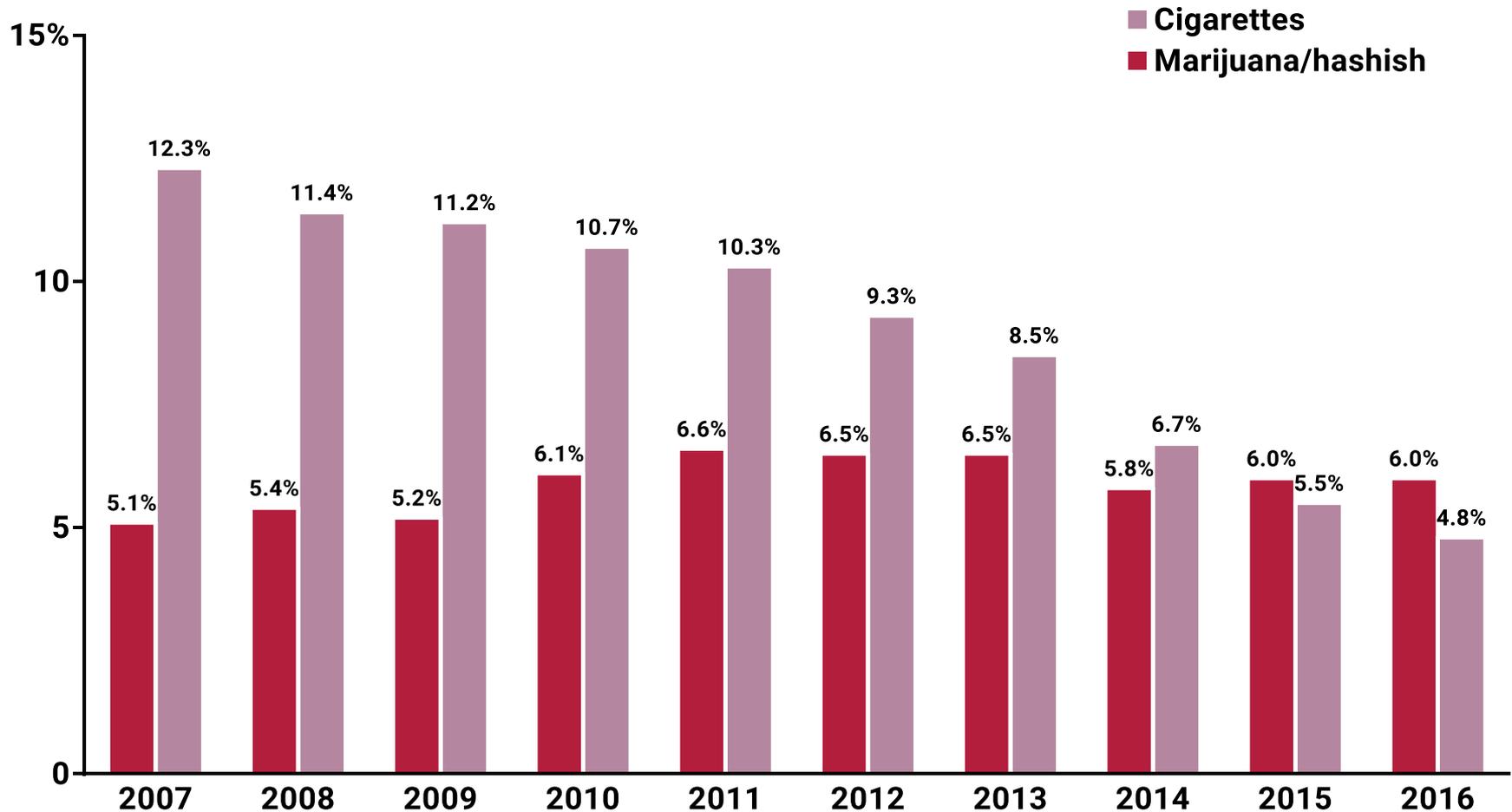
Illicit drugs other than marijuana: -2.2%

Annual prevalence of use, 12th grade



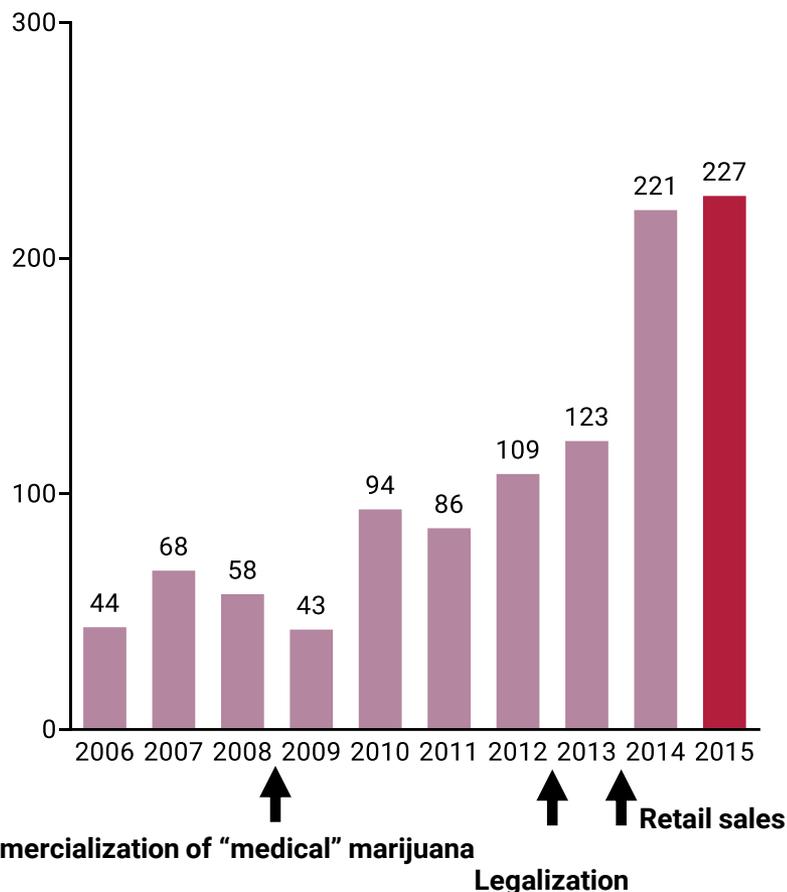
Cigarette use among high schoolers has plunged in the last decade, but pot use has trended upward

Daily prevalence of use, 12th grade

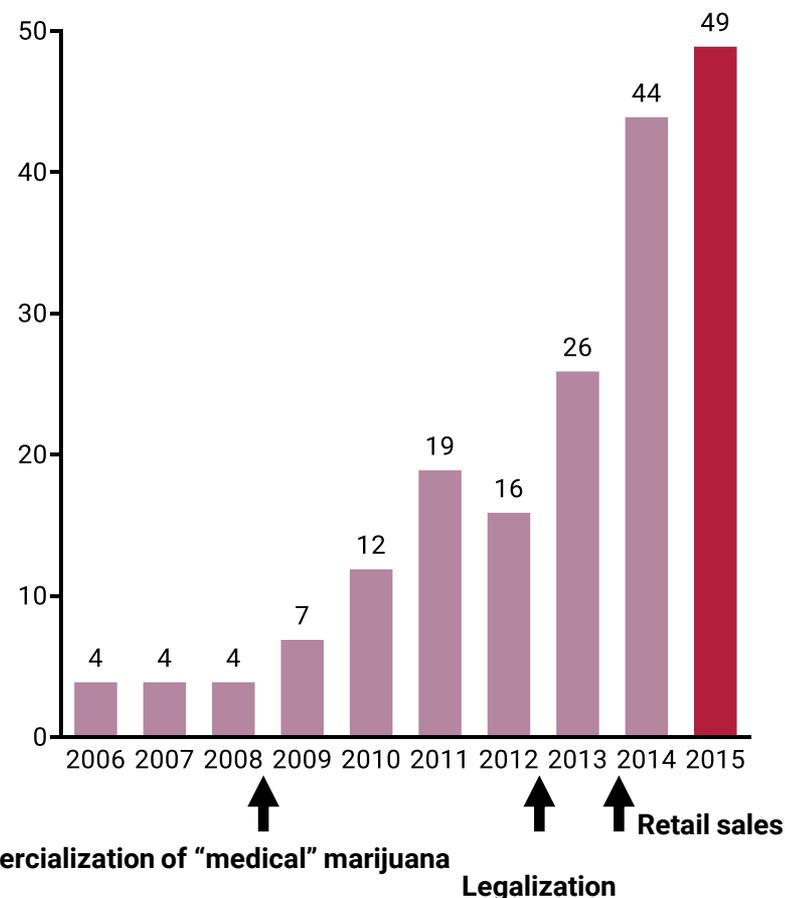


More and more people, including very young children, are going to the hospital due to pot use

EMERGENCY POISON CONTROL CALLS RELATED TO MARIJUANA (GENERAL POPULATION)



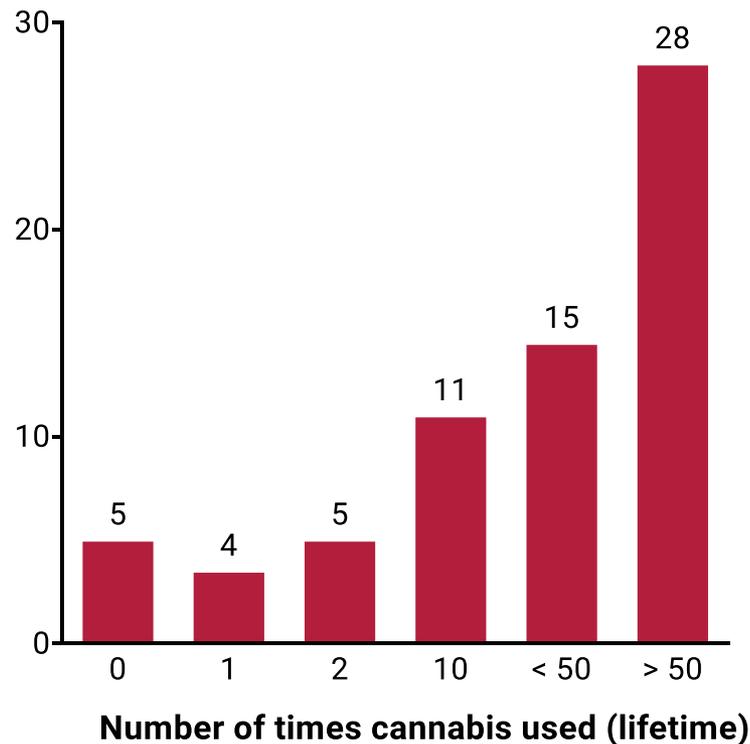
EMERGENCY CALLS RELATED TO CHILDREN AGES 0-8



Pot use is strongly correlated with psychosis

MORE CANNABIS USE CORRELATES WITH HIGHER RATES OF SCHIZOPHRENIA

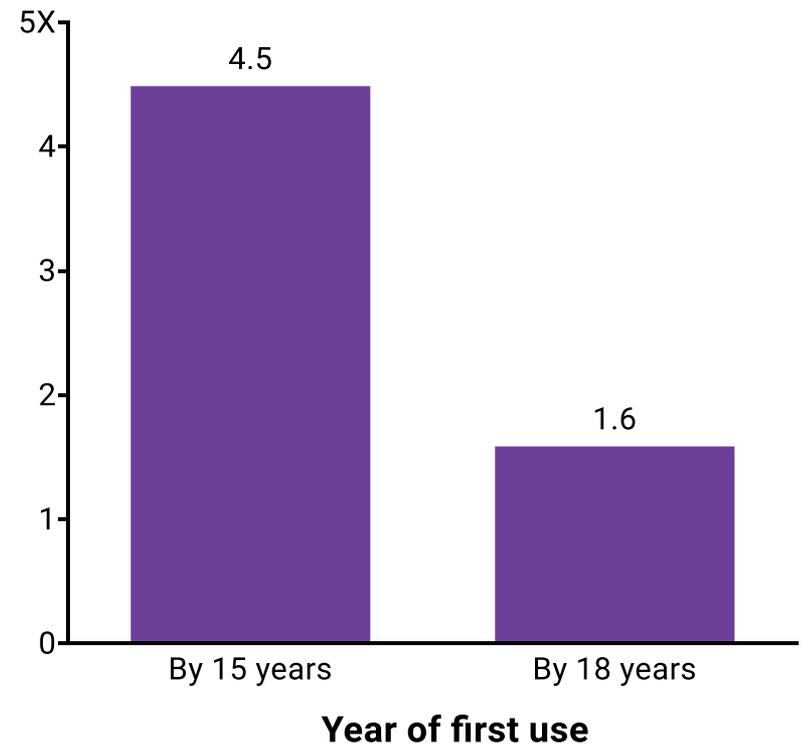
Cases of schizophrenia per 1,000 people



Study of Swedish Conscripts (n=45570)

EARLIER AGE OF USE CORRELATES WITH INCREASED SCHIZOPHRENIA RISK

Risk multiple for schizophrenia-like psychosis at age 26



Longitudinal prospective Dunedin study (n=1037)

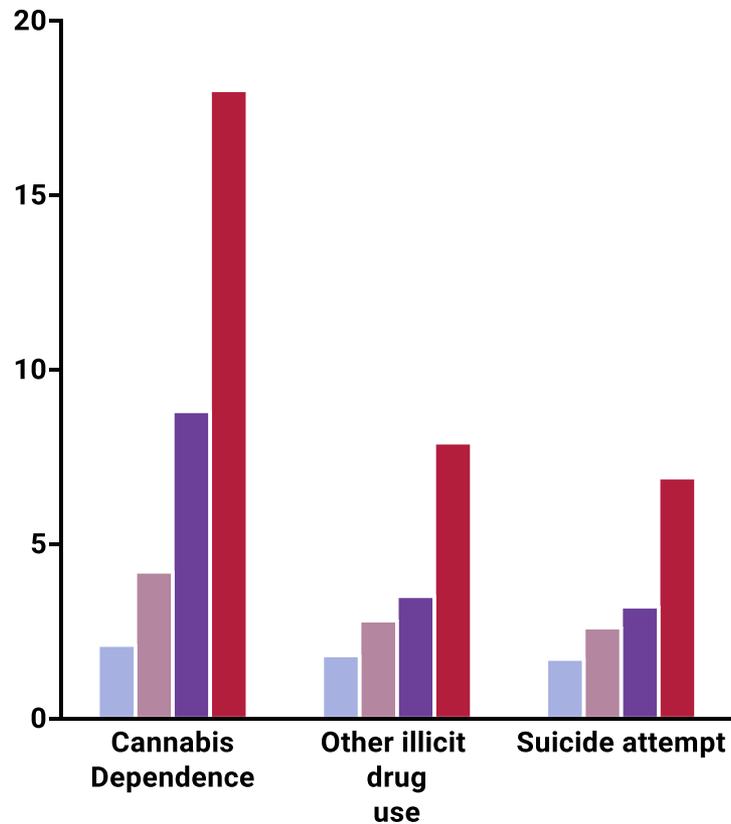
Marijuana use is also associated with other physical and mental health issues

- **Respiratory problems**, including chronic bronchitis
- Injuries & deaths from **car crashes**
- **Overdose injuries** in children
- **Low birth weight** (where pregnant mother uses)
- Impaired learning, memory, and attention (including **permanent loss of IQ** in younger heavy users)
- **Suicide**

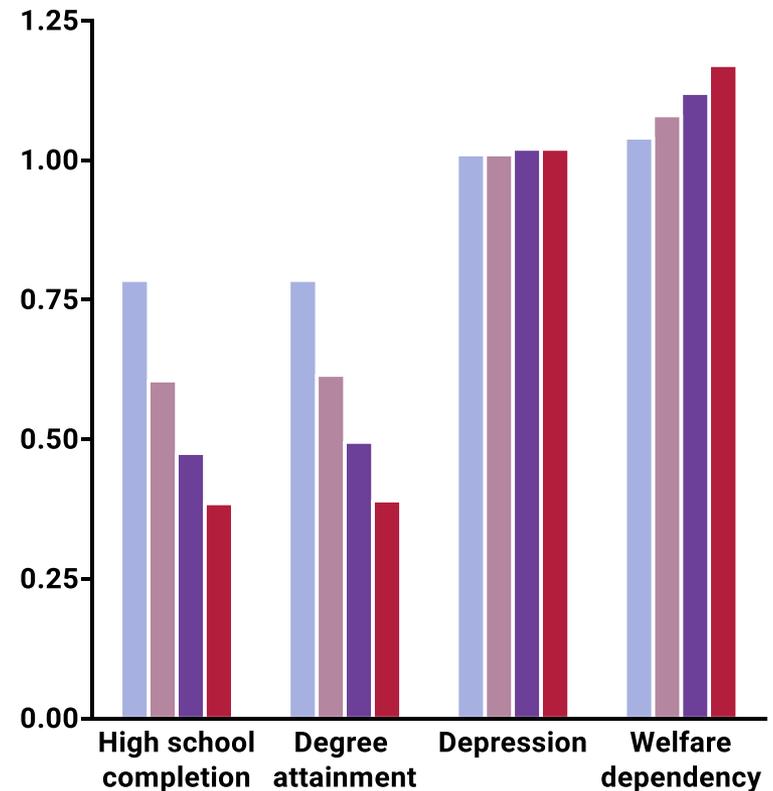
Frequent pot use by kids correlates with social problems like dropouts and welfare dependency



Adjusted odds ratios



Adjusted odds ratios



Accidents, injuries, absenteeism, and disciplinary problems are far more common among pot users

Incidence of problem compared to control group

