CENTER FOR ARIZONA POLICY

POLICY PAGES

Harms of Recreational Marijuana

Nov. 20, 2019

Overview

On August 29, 2019, U.S. Surgeon General Jerome Adams issued an advisory on the health risks of marijuana: "[m]arijuana's increasingly widespread availability in multiple and highly potent forms, coupled with a false and dangerous perception of safety among youth, merits a nationwide call to action."[1] The advisory, aptly called "Marijuana Use and the Developing Brain," cites study after study showing the negative health impact of marijuana use, including cognitive impairment in developing brains (through mid-20s), addiction, physical dependence, anxiety, paranoia, psychosis, overdoses with edibles, and for chronic users, cannabinoid hyperemesis syndrome, "marked by severe cycles of nausea and vomiting."[2]

Even though marijuana's health risks are widely known and it remains an illegal drug under federal law,[3] eleven states and the District of Columbia have legalized recreational marijuana since 2012.[4] Of the five states that had a ballot measure to legalize marijuana in 2016, Arizona was the only state to defeat the measure.

The troubling data coming from states with recreational marijuana, in conjunction with studies showing marijuana's health risks, clearly demonstrate that legalizing recreational marijuana is bad public policy. The rise of marijuana use in these states, including among youth and pregnant women, coupled with today's more potent marijuana— often disguised in dangerous edibles— has and will lead to disastrous health and societal harms, especially for the most vulnerable among us.

Analysis

Today's highly potent marijuana— available in a variety of edible forms like chocolate, beverages, gummies, and cookies[5]— exacerbate the negative outcomes associated with marijuana use. Marijuana, or cannabis, and its related products can be smoked, drunk, eaten, vaped or applied topically. The drug "acts by binding to cannabinoid receptors in the brain to produce a variety of effects, including euphoria, intoxication, and memory and motor impairments."[6] Marijuana

contains delta-9-tetrahydrocannabinol (THC), responsible for euphoria and intoxication, and cannabidiol (CBD), which is not intoxicating and not addictive, but "its long-term effects are largely unknown, and most CBD products are untested and of uncertain purity."[7]

The concentration of THC in marijuana plants and related products has increased drastically in recent years. THC concentration in cultivated marijuana plants has increased from 4% to 12% between 1995 and 2014 respectively.[8] Marijuana sold in dispensaries, in Washington state for example, have average THC concentrations from 17.7% and 23.2%,[9] while concentrated products such as "oil, shatter, dab, and edibles" can have THC concentration levels up to 95%.[10] To put it in perspective, the marijuana of the 1960s to the 1980s had THC concentration of less than 2%.[11]

HARMS TO HEALTH

Marijuana use is associated with significant health risks, especially with increased frequency of use and potency of the marijuana.

Hospitalization. Legalization of recreational marijuana will drastically increase the rate of hospitalizations related to marijuana use. A 2019 study reviewed emergency department visits to UCHealth University Colorado Hospital from 2012 (when recreational marijuana was legalized in Colorado) to 2016, and found the number of marijuana related ER visits more than *tripled*.[12]

The data showed edible marijuana products were more likely to send a person to the emergency room— usually with "[a]cute psychiatric visits like acute panic attacks, acute psychosis, and acute-on chronic conditions such as acute exacerbations of schizophrenia"— perhaps because people are ingesting unsafe levels and not feeling the effects until 2 or 3 hours after ingestion.[13] However, the data showed inhaled marijuana led to longer hospital visits, mostly caused by cannabinoid hyperemesis syndrome,[14] characterized by abdominal pain, nausea, and frequent bouts of vomiting.

Effects on Brain Development. Human brain development begins before birth and continues into the mid-20s, making it "vulnerable to the effects of addictive substances," like marijuana.[15] The prefrontal motor cortex, known as the "seat of judgment," may take 25 to even 30 years to fully develop.[16] As would be expected, frequent marijuana use while the brain is still developing is associated with "[c]hanges in the areas of the brain involved in attention, memory, decision-making, and motivation,"[17] and is associated with permanent IQ loss if frequent marijuana use begins in young adolescence and continues into adulthood.[18] Therefore, even adult marijuana users— 21 to 30 year olds— may be unknowingly harming their brains and thus jeopardizing their educational and professional achievements.

Effects on Mental Health. Experts are acknowledging the link between marijuana use and psychosis, paranoia, and schizophrenia, especially with higher doses of THC.[19] In 2017, the National Academy of Medicine, a nonprofit group that advises the government on health and medical issues, released a landmark 468-page report, "The Health Effects of Cannabis and

Cannabinoids." After reviewing thirty years of research, a 16-member committee convened by the academy found that "cannabis use is likely to increase the risk of developing schizophrenia and other psychoses; the higher the use, the greater risk."[20]

Similarly, in May 2019 a study compared over 900 patients with first-episode psychosis across locations in Europe and Brazil with over 1,200 people in the same locations who had not.[21] The study concluded "[d]aily cannabis use was associated with increased odds of psychotic disorder compared with never users . . . , increasing to nearly five-times increased odds for daily use of high-potency types of cannabis."[22] For more studies linking marijuana and mental illness see, Alex Berenson, TELL YOUR CHILDREN: THE TRUTH ABOUT MARIJUANA, MENTAL ILLNESS, AND VIOLENCE (2019).

In addition to psychosis, marijuana has been linked to anxiety, depression, and suicide.[23] The data from Colorado bears this out: the number of suicides in Colorado where marijuana was present increased from 86 in 2012 (11.8% of suicides) to 201 in 2017 (22.7% of suicides).[24]

Vaping Lung Injuries and Deaths. Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), state and local health departments, and other clinical and public health partners are investigating a multistate outbreak of lung injury associated with use of e-cigarette, or vaping, products.[25] Although as of November 2019, the CDC and FDA do not know the exact cause of the reported 2,172 injuries[26] and 42 deaths, "[t]he latest national and state findings suggest products containing THC, particularly those obtained off the street or from other informal sources (e.g. friends, family members, illicit dealers), are linked to most of the cases and play a major role in the outbreak."[27] Consequently, the CDC recommends that people not use e-cigarettes, or vaping, products that contain THC.[28]

HARMS TO SOCIETY

DUI and Traffic Deaths. Studies have shown that marijuana "affects psychomotor skills and cognitive functions critical to driving including vigilance, drowsiness, time and distance perception, reaction time, divided attention, lane tracking, coordination, and balance."[29] As marijuana use increases with legalization, marijuana-related DUIs and traffic deaths will increase as well. For example, Colorado State Patrol DUI citations involving marijuana increased from 674 in 2014 to 1,066 in 2018.[30] More tragically, since legalizing recreational marijuana in 2012, Colorado traffic deaths involving *drivers* who tested positive for marijuana more than *doubled* from 2013 to 2018 (other traffic deaths only increased 31 percent).[31] Equating to "one person killed every 3 days in 2018 compared to one person killed every 61/2 days in 2013."[32]

Workforce Affected. Where recreational marijuana is legal, more employees go to work with marijuana in their system, putting those on the road and at work more at risk. For example, employees in Colorado and Washington State testing positive for marijuana rose almost 75% in the three years after legalization.[33] With more potential employees testing positive for marijuana,

employers should find it more difficult to find employees, thereby negatively affecting the economy. However, because companies are having trouble finding people who can pass drug tests, many of them are simply choosing not to drug test anymore,[34] thereby undermining the purpose of the drug tests in the first place.

Crime and Violence. As shown above, studies have concluded "cannabis use is likely to increase the risk of developing schizophrenia and other psychoses; the higher the use, the greater risk."[35] Other studies have shown the link between psychotic disorders and violence.[36] For example, "Schizophrenia and Violence: Systematic Review and Analysis"— an article published in PLOS Medicine in 2009— examined twenty studies on people with schizophrenia and other forms of psychosis.[37] The study found that men with schizophrenia were four to five times more likely to commit a violent act than men without schizophrenia, and the risk was tenfold when the men were also substance abusers (including marijuana).[38] In sum, legalizing recreational marijuana increases its use, thereby increasing the risk of schizophrenia, which inevitably will increase the risk of violent acts being committed.

HARMS TO CHILDREN AND YOUTH

U.S. Surgeon General Jerome Adams warns in his 2019 "Marijuana Use and the Developing Brain" advisory, "No amount of marijuana use during pregnancy or adolescence is known to be safe."[39] And yet, legalizing recreational marijuana increases the use of marijuana among these populations.

Increased Use Among Pregnant Women. Many dispensaries recommend marijuana to pregnant women to help with morning sickness,[40] even though health risks to them and their babies are very real. Citing a variety of studies, the U.S. Surgeon General warns that marijuana use during pregnancy can affect the developing baby: 1) THC can enter the baby's brain from the mother's bloodstream 2) THC may disrupt the endocannabinoid system, which is important for a healthy pregnancy and for the baby's brain development; and 3) Marijuana use is associated with low birth weight.[41] The danger to the baby continues even after birth as THC has been found in breast milk days after the last recorded use of marijuana.[42] In spite of these health risks, a 2017 study found that 70% out of 400 dispensaries contacted in Colorado recommended treating nausea in the first trimester with marijuana.[43]

A national survey recently found marijuana use among pregnant women doubled (3.4% to 7%) between 2002 and 2017, and a study done in a large health system in California found marijuana use among pregnant women rose 69% (4.2% to 7.1%) between 2009 and 2016.[44] Legalizing recreational marijuana exacerbates this problem and puts even more pregnant women and their babies in harm's way.

Increased Use Among Youth. Where recreational marijuana is legal, teens are more likely to use it. According to the data from the National Survey on Drug Use and Health for 2016-2017, among the eleven states and District of Columbia where recreational marijuana is legal, 15.45% of

minors aged 12 to 17 used marijuana in the prior year, with the highest rates in Vermont (17.9%), Colorado (17%), and Oregon (17%).[45] In contrast, the average for the remaining thirty-nine states was only 11.89%, with the lowest rates being Utah (9.2%), Texas (9.6%), and Alabama (9.7%).[46] These numbers make sense because 1) legalization itself "may be impacting youth perception of harm from marijuana,"[47] making them think it is safer than it actually is and 2) legalization makes marijuana more accessible to youth— critical because they usually get their marijuana free from friends and relatives.[48]

The health risks of marijuana, as outlined above, affect the young even worse. As the U.S. Surgeon General has warned, the developing brain of a teenager is more vulnerable to the addictive effects of marijuana, and frequent marijuana use during teenage years is associated with impairment of attention, memory, decision-making, and motivation, as well as loss of IQ, increased rates of school absence and drop-out rates, suicide attempts, early onset of psychotic disorders, and greater likelihood of misusing opioids.[49]

Accidental Ingestion by Children and Youth. Where recreational marijuana is legalized, the rate of accidental ingestion by children and youth increases. Edibles with concentrated doses of THC in the form of candy, snacks, and beverages are often indistinguishable for small children and attractive for teens. Also, because edibles take time to absorb and to produce its effects, the potential for overdose is much greater when "an entire product containing multiple dose-units"[50] is consumed.

A study analyzed "single substance, human exposure calls coded to marijuana brownies, candies, cookies, beverages, or other foods" reported to the National Poison Data system from January 2013 to December 2015; it found the highest number of calls came from Colorado and Washington, with 91% of all calls occurring from states with decriminalized medical or recreational marijuana.[51] This study matches the data coming out of Colorado, where the Rocky Mountain Poison and Drug Center reported marijuana-related exposures in children and teens increasing from 50 in 2012 (year before recreational marijuana was legalized) to 147 in 2018.[52]

Although downplayed by some, "[u]nintentional cannabis ingestion by children is a serious public health concern and is well-documented in numerous studies and case reports."[53]

CONCLUSION

Legalizing recreational marijuana is bad public policy. Legalization results in an array of health and societal harms. Legalization increases use, including among youth and pregnant women, and is made worse by the highly potent forms of marijuana products now available. The rate of marijuana-related health problems, psychosis, suicides, traffic deaths, hospitalizations, and accidental ingestions by children and youth only increase with legalization.

TALKING POINTS

- Today's marijuana is 10 to 50 times more potent than it was in the 1970s, depending on the form. This newer, high potency marijuana is linked to schizophrenia and other psychosis, as well as several significant health risks— including the majority of thousands of recent lung illnesses and deaths due to THC-related vaping.
- Where recreational marijuana is legal, more people use it; more people drive under the influence, work under the influence, and end up in the hospital. And regardless of age restrictions, more teens use it where it is legal, and more children are hospitalized after accidentally eating marijuana-laced candy and snacks.
- Self-serving marijuana insiders downplay the risks of marijuana, much like the tobacco industry ignored the lung cancer risks of cigarettes years ago.

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[1]Surgeon General Jerome Adams, "U.S. Surgeon General's Advisory: Marijuana Use and the Developing Brain," August 29, 2019, https://www.hhs.gov/surgeongeneral/reports-and-publications/addiction-and-substance-misuse/advisory-on-marijuana-use-and-developing-brain/index.html (last visited November 6, 2019).

[2]*Id.*

[3]21 U.S.C. § 812 Schedules of controlled substances.

[4]As of 2019, eleven states and the District of Columbia have legalized recreational marijuana: Colorado (2012), Washington (2012), Alaska (2014), Oregon (2014), District of Columbia (2014), California (2016), Maine (2016), Massachusetts (2016), Nevada (2016), Michigan (2018), Vermont (2018), and Illinois (2019). National Conference of State Legislatures, "Marijuana Overview," October 17, 2019, http://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx (last visited October 31, 2019).

[5]"In Colorado, you can find fine truffles, high-end chocolates, suckers, gummies, drinks, candy and even cannabis-infused butters and oils if you want to try to bake your own loaded dessert. . . . Basically, if you can bake it, you can get baked by it." Aimee Heckel, "The 11 Best Edibles in Colorado," tripsavvy, June 26, 2019, https://www.tripsavvy.com/best-edibles-in-colorado-4137624 (last visited November 5, 2019).

[6]Surgeon General Jerome Adams, *supra* note 1.

[7]*Id.* (citing M.O. Bonn-Miller, et al. *Labeling Accuracy of Cannabidiol Extracts Sold Online*, 318 JAMA 1708, 1708-09 (2017)).

[8]*Id.* (citing M.A. Elsohly, et al. *Changes in Cannabis Potency Over the Last 2 Decades (1995-2014): Analysis of Current Data in the United States*, 79 Biological Psychiatry, 613-619 (2016)).

[9]*Id.* (citing Nick Jikomes and Michael Zoorob, *The Cannabinoid Content of Legal Cannabis in Washington State Varies Systematically Across Testing Facilities and Popular Consumer Products*, 8 Scientific Reports, 4519 (2018)).

[10]Elizabeth Stuyt, *The Problem with the Current High Potency Marijuana from the Perspective of an Addiction Psychiatrist*, 115 Missouri Medicine, 482-486 (2018).

[11]*Id.*

[12]Nora D. Volkow and Ruben Baler, "Emergency Department Visits From Edible Versus Inhalable Cannabis," Annals of Internal Medicine, April 16, 2019, https://annals.org/aim/article-abstract/2729210/emergency-department-visits-from-edible-versus-inhalable-cannabis (last visited October 31, 2019). These numbers match Colorado's "hospitalizations related to Marijuana" since legalization: 6,720 (2012), 8,279 (2013), 11,454 (2014), and 14,852 (2015). Rocky Mountain High Intensity Drug Trafficking Area (HIDTA), "The legalization of Marijuana in

Colorado: The Impact," vol. 6, Sept. 2019, 35, https://rmhidta.org/files/D2DF/FINAL-Volume6.pdf (last visited November 6, 2019).

[13]Per Dr. Andrew Monte, lead author of the study and Associate Professor of Emergency Medicine and Emergency Toxicology at the University of Colorado School of Medicine quoted in Shamard Charles, "ER visits linked to marijuana rose at Colorado hospital after legalization, study finds," NBC News, March 25, 2019, https://www.nbcnews.com/health/health-news/er-visits-linked-marijuana-rose-colorado-hospital-after-legalization-study-n987161 (last visited November 7, 2019).

[14]Volkow, *supra* note 12.

[15]Surgeon General Jerome Adams, *supra* note 1 (citing J. Pujol et al., *When does human brain development end? Evidence of corpus callosum growth up to adulthood*, 34 Annals of Neurology 71-75 (1993); A. Levine, et al., *Evidence for the Risks and Consequences of Adolescent Cannabis Exposure*, 56 Journal of the American Academy of Child & Adolescent Psychiatry, 214-225 (2017)).

[16]Stuyt, *supra* note 10.

[17]Surgeon General Jerome Adams, *supra* note 1.

[18]Madeline H. Meier, et al., *Persistent cannabis users show neuropsychological decline from childhood to midlife*, 109 Proceedings of the National Academy of Sciences of the U.S., e2657-e2664 (2012).

[19]Surgeon General Jerome Adams, *supra* note 1 (citing Nora D. Volkow et al., *Adverse Health Effects of Marijuana Use*, 370 N Engl J Med., 2219–2227 (2014); E. Silins, et al., *Young adult sequelae of adolescent cannabis use: An integrative analysis*, 1 The Lancet Psychiatry, 286-293 (2014)).

[20]The National Academies of Science, Engineering, and Medicine, "The Health Effect of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research," 289, https://www.nap.edu/read/24625/chapter/14 (Last visited November 11, 2019).

[21]Marta Di Forti, et al., *The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicenter case-control study*, 6 The Lancet Psychiatry, 427-436 (2019), https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(19)30048-3/fulltext (last visited November 7, 2019).

[22]*Id.* Marijuana proponents might object that these studies only demonstrate correlation, not causation because they did not involve a double blind, randomized, placebo controlled trial. However, there is no ethical (or maybe even legal way) to prove causation because it would require asking half a sample group to experiment with high doses of a drug that more likely than not will harm them and others. Also, as Alex Berenson has noted, all the studies that make us believe that cigarette smoking causes lung cancer are correlated studies too and we don't question them.

[23]Surgeon General Jerome Adams, *supra* note 1 (citing Volkow, *Adverse Health Effects of Marijuana Use*; Silins, *Young adult sequelae of adolescent cannabis use: An integrative analysis*).

[24]Rocky Mountain High Intensity Drug Trafficking Area, *supra* note 12, at 41.

[25]Centers for Disease Control and Prevention, "Outbreak of Lung Injury Associated with the Use of E-Cigarette, or Vaping, Products," https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html#latest-outbreak-information (last visited November 20, 2019). They are calling the outbreak EVALI (e-cigarette, or vaping, associated lung injury). *Id.*

[26]Reported symptoms include cough, shortness of breath, chest pain, nausea, vomiting, abdominal pain, diarrhea, fever, chills, or weight loss. Centers for Disease Control and Prevention, "For the Public: What You Need to Know: Symptoms of Lung Injury Reported by Some Patients in This Outbreak," https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease/need-to-know/index.html#symptoms (last visited November 20, 2019).

[27]Centers for Disease Control and Prevention, *supra* note 25.

[28]*Id.*

[29]Governors Highway Safety Association, "Drug-Impaired Driving: Marijuana and Opioids Raise Critical Issues for States," 13, https://www.ghsa.org/resources/DUID18 (last visited November 8, 2019).

[30]Rocky Mountain High Intensity Drug Trafficking Area, *supra* note 12, at 15.
[31]*Id.* at 1.
[32]*Id.*
[33]Quest Diagnostics, "News Releases: Increases in Illicit Drugs, Including Cocaine, Drive Workforce Drug Positivity Rate in 12 Years, Quest Diagnostics Analysis Finds," May 16, 2017, https://newsroom.questdiagnostics.com/2017-05-16-Increases-in-Illicit-Drugs-Including-Cocaine-Drive-Workforce-Drug-Positivity-to-Highest-Rate-in-12-Years-Quest-Diagnostics-Analysis-Finds (last visited November 8, 2019).
[34]Rebecca Greenfield and Jennifer Kaplan, "How legalized pot is affecting employee drug tests," The Morning Call, March 9, 2018, https://www.mcall.com/business/mc-biz-employment-drug-tests-20180305-story.html (last visited November 11, 2019); Joe Rubino, "Testing positive for marijuana won't get you fired at more than half of Colorado companies, survey says," The Denver Post, March 12, 2019, https://www.denverpost.com/2019/03/12/marijuana-colorado-employers-jobs-positve-drug-tests/ (last visited November 11, 2019); Wayne Heilman, "Survey: Colorado employers relaxing marijuana testing," The Gazette, March 1, 2019, https://gazette.com/business/survey-colorado-employers-relaxing-marijuana-testing/article_a7b21e10-3c64-11e9-ad11-3ff1ec7c5fbb.html (last visited November 11, 2019).
[35]The National Academies of Science, Engineering, and Medicine, *supra* note 20.
[36]For a list of studies linking psychosis and violence see, Alex Berenson, TELL YOUR CHILDREN: THE TRUTH ABOUT MARIJUANA, MENTAL ILLNESS, AND VIOLENCE, 167-178 (2019).
[37]Seena Fazel, et al., *Schizophrenia and Violence: Systematic Review and Meta-Analysis*, PLOS Medicine (August 11, 2009).
[38]*Id.* at 5, 15.
[39]Surgeon General Jerome Adams, *supra* note 1.
[40]*Id.*
[41]*Id.*
[42]*Id.*
[43]Betsy Dickinson, et al. *Recommendations From Cannabis Dispensaries About First-Trimester Cannabis Use*, 131 Obstetrics & Gynecology, 1031-1038 (2018).
[44]Surgeon General Jerome Adams, *supra* note 1 (citing N.D. Volkow, et al., *Self-reported Medical and Non-medical Cannabis Use Among Pregnant Women in the United States*, JAMA (June 18, 2019); KC Young-Wolff, et al. *Trends in Self-reported and Biochemically Tested Marijuana Use Among Pregnant Females in California From 2009-2016*, 318 JAMA, 2490–2491 (2017)).
[45]Substance Abuse and Mental Health Administration, 2016-2017 National Survey on Drug Use and Health: Model-Based Prevalence Estimates (50 States and the District of Columbia), 4-5, https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHsaePercentsExcelCSVs2017/NSDUHsaePercents2017.pdf (last visited November 8, 2019).
[46]*Id.*
[47]Surgeon General Jerome Adams, *supra* note 1.
[48]The National Survey on Drug Use and Health from 2006 to 2010 showed that over 70% of marijuana users from 12 to 14 years of age obtain marijuana free from their friends (55.6%), relatives (10.6%), or acquaintance (3.9%). Substance Abuse and Mental Health Administration, "Data Spotlight: Young Marijuana Users Often Get Marijuana for Free from Friends," September 22, 2011, https://www.samhsa.gov/data/sites/default/files/WEB_SPOT_028/WEB_SPOT_028.pdf (last visited November 11, 2019).
[49]Surgeon General Jerome Adams, *supra* note 1.
[50]D. Cao, et al., *Characterization of edible marijuana product exposures reported to the United States poison centers*, 54 Clinical Toxicology, 840-846 (2016).
[51]*Id.*

[52]Rocky Mountain High Intensity Drug Trafficking Area, *supra* note 12, at 36.
[53]John R. Richards, et al., *Unintentional Cannabis Ingestion in Children: A Systematic Review*, 190 The Journal of Pediatrics 142-152 (2017).