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“High” Standards: How the Tide of Marijuana Legalization Sweeping the Country Ignores the Hidden Risks of Edibles

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“High” Standards: The Wave of Marijuana Legalization Sweeping America Ignores the Hidden Risks of Edibles

STEVE P. CALANDRILLO* AND KATELYN FULTON**

As a tide of marijuana legalization sweeps across the United States, there is a surprising lack of scrutiny as to whether the benefits of recreational marijuana outweigh the risks. Notably, marijuana edibles present special risks to the population that are not present in smoked marijuana. States that have legalized recreational marijuana are seeing an increase in edible-related calls to poison control centers and visits to emergency rooms. These negative reactions are especially prevalent in vulnerable populations such as children, persons with underlying preexisting conditions, and out-of-state marijuana novices.

Unfortunately, research on edible marijuana is scant and state regulatory regimes are not adequately accounting for the special risks that edibles pose. Edibles are metabolized differently than smoked marijuana, resulting in late-onset, longer-lasting, and unpredictable intoxication. Novices are particularly vulnerable because of inaccurate dosing and delayed highs. Children are also at risk because edibles are often packaged as chocolate and other forms of candy to which unsuspecting kids are attracted. To minimize these risks and maximize the social utility received from marijuana edibles, further study of their effects is required and potentially tighter regulations may be necessary. These measures will take time to accomplish, and in the interim state-implemented restrictions on marijuana edibles may be necessary to halt the increase of edible-related harms and hospitalizations.

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I. INTRODUCTION

Over the past few decades, the popularity of marijuana as a recreational and medicinal drug has grown rapidly as its reputation has evolved. In the 1960s, it was associated with the free love and peace movements, and often scorned by the establishment.¹ Later, it was adopted by American pop culture, amassing celebrity advocates such as Snoop Dogg, Willie Nelson, Whoopi Goldberg, and Woody Harrelson.² As pop culture and social movements brought marijuana into the limelight, popular opinion shifted towards supporting marijuana legalization.³ Many marijuana advocates cited the drug's potential medicinal properties as a reason that it should be legalized.⁴ In 1996, California became the first state to pass legislation legalizing medical marijuana,⁵ and over the next few decades thirty-two other states and the District of Columbia followed suit.⁶ Now, a wave of recreational marijuana legalization has hit the country. Ten states and the District of Columbia have all legalized marijuana for recreational use, and other states are currently considering similar legislation.⁷

¹ Jamie Doward & Tom Templeton, *Hippie Dream, Modern Nightmare*, THE GUARDIAN (May 3, 2008), <https://www.theguardian.com/lifeandstyle/2008/may/04/healthandwellbeing.culture> [<https://perma.cc/E57K-DZ3Z>].

² See Ryan Bort, *A Brief History of Snoop Dogg and Willie Nelson's Marijuana Romance*, NEWSWEEK (Jan. 5, 2017), <http://www.newsweek.com/snoop-dogg-willie-nelson-marijuana-romance-history-538636> [<https://perma.cc/8EMN-25CL>]; Denver Nicks, *Whoopi Pens Column About How Much She Loves Weed*, TIME (Apr. 18, 2014), <http://time.com/68871/whoopi-goldberg-marijuana-column-denver-post/> [<https://perma.cc/WF6K-DJ5A>]; Jeremiah Wilhelm, *A Salute to Woody Harrelson, Long-Time Cannabis Advocate*, LEAFLY (July 23, 2016), <https://www.leafly.com/news/pop-culture/a-salute-to-woody-harrelson-long-time-cannabis-advocate> [on file with *Ohio State Law Journal*].

³ Julian Zelizer, *Why Marijuana's Moment Has Arrived*, CNN (Aug. 11, 2014), <http://www.cnn.com/2014/08/11/opinion/zelizer-marijuana-moment-arrives/index.html> [<https://perma.cc/LC9E-7J8P>].

⁴ *Id.*

⁵ *State Medical Marijuana Laws*, NAT'L CONFERENCE OF STATE LEGISLATURES (Nov. 8, 2018), <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx> [<https://perma.cc/SJ4N-WYXP>] [hereinafter NCSL].

⁶ *Id.*

⁷ Jeremy Berke & Skye Gould, *This Map Shows Every U.S. State Where Pot Is Legal*, BUS. INSIDER (Jan. 4, 2019), <https://www.businessinsider.com/legal-marijuana-states-20181> [<https://perma.cc/W4SY-Z6YT>].

The tide of legalization is unsurprising, given the joy and utility that the drug brings to many users. It allows recreational users to relax and experience a euphoric “high,” and affords medical users relief from chronic pain and nausea.⁸ According to a recent Gallup Poll, 45% of Americans have now tried marijuana at least once in their lives, and 12% of Americans currently use it.⁹ There is also a generational divide in perceptions of whether marijuana should be legal.¹⁰ Millennials (ages twenty to thirty-seven in 2018) were over twice as likely to support legalization of marijuana in 2016 than they were a decade prior (71% in 2016 versus just 34% in 2006).¹¹ Millennials are also more likely to support it than other generations, although support for the legalization of marijuana is rising in other generations as well.¹² In 2016, 57% of Generation X (ages thirty-eight to fifty-three in 2018) and 56% of Baby Boomers (ages fifty-four to seventy-two in 2018) supported legalization.¹³ These numbers are up dramatically from just 21% and 17% in 1990, respectively.¹⁴

Despite a majority of Americans now supporting decriminalization, the legal and regulatory regime surrounding marijuana continues to create inconsistent expectations. State and federal marijuana laws conflict to an extreme. While a majority of states have legalized medical marijuana and a growing number have legalized recreational marijuana,¹⁵ federal law still

⁸Barney Warf, *High Points: An Historical Geography of Cannabis*, 104 GEOGRAPHICAL REV. 414, 416 (2014); THE NAT’L ACADS. OF SCI., ENG’G, & MED., THE HEALTH EFFECTS OF CANNABIS AND CANNABINOIDS: THE CURRENT STATE OF EVIDENCE AND RECOMMENDATIONS FOR RESEARCH 85 (The National Academies Press ed., 2017) [hereinafter NASEM].

⁹Art Swift, *In U.S., 45% Say They Have Tried Marijuana*, GALLUP NEWS (July 19, 2017), http://news.gallup.com/poll/214250/say-tried-marijuana.aspx?g_source=position1&g_medium=related&g_campaign=tiles [<https://perma.cc/N9EY-5ZBE>].

¹⁰Abigail Geiger, *Support for Marijuana Legalization Continues to Rise*, PEW RESEARCH CTR. (Oct. 12, 2016), <http://www.pewresearch.org/fact-tank/2016/10/12/support-for-marijuana-legalization-continues-to-rise/> [<https://perma.cc/NC5B-775R>].

¹¹*Id.*

¹²*In Debate Over Legalizing Marijuana, Disagreement Over Drug’s Dangers*, PEW RESEARCH CTR. (Apr. 14, 2015), <http://www.people-press.org/2015/04/14/in-debate-over-legalizing-marijuana-disagreement-over-drugs-dangers/> [<https://perma.cc/M3Q5-23Q3>].

¹³Geiger, *supra* note 10.

¹⁴*Id.*

¹⁵See NCSL, *supra* note 5 (listing the jurisdictions that have legalized medical marijuana as Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, the District of Columbia, Florida, Hawaii, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Washington, and West Virginia); see also Berke & Gould, *supra* note 7 (listing the jurisdictions that have legalized recreational marijuana as Alaska, California, Colorado, the District of Columbia, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont, and Washington).

classifies marijuana as a Schedule I substance under the Controlled Substances Act, placing it firmly in the category of an illegal substance.¹⁶

The current tide of recreational marijuana legalization has brought about huge opinion and social change, and most commentators now simply assume that the benefits outweigh the risks. Although this may be true, the very recent legalization of marijuana means that well-conducted, scientifically rigorous studies on the drug are scant and there are large gaps in research. More specifically, advocates have almost entirely ignored the special risks that marijuana edibles present. The way in which edibles are metabolized (as opposed to smoked marijuana) results in a late-onset, longer-lasting, and unpredictable intoxication.¹⁷ Novices are particularly vulnerable to edibles because of inaccurate dosing and delayed highs. Children are also at risk because edibles are often packaged as candy to which children are attracted.¹⁸ Assuming that the future of marijuana is increased social acceptance and legalization, state actors must be vigilant to maximize the benefits while minimizing the risks of increased usage and access. Particularly in the case of edibles, guarding against their unique risks is critical to ensuring that the net utility of marijuana legalization to society is a positive one.

Part II of this Article gives a brief background and history of marijuana and details the underlying laws and regulations that currently govern the drug. Part III lays out the pros and cons of marijuana legalization, both recreational and medical. Part IV examines the special case of edibles by detailing the unique risks associated with this form of marijuana consumption. Part IV also summarizes the current regulations governing edibles in states that have now legalized recreational marijuana. Finally, Part V argues that the risks of edibles require further study and proposes common-sense regulatory responses that states should immediately adopt to minimize the risks associated with edible use.

¹⁶ Controlled Substances Act, 21 U.S.C. §§ 801–904 (2012); see also Melanie Reid, *The Quagmire That Nobody in the Federal Government Wants to Talk About: Marijuana*, 44 N.M. L. REV. 169, 170–73 (2014) (describing the Controlled Substances Act and explaining the categorization process of drugs).

¹⁷ Alice G. Walton, *Is Eating Marijuana Really Riskier than Smoking It?*, FORBES (June 4, 2014), <https://www.forbes.com/sites/alicegwalton/2014/06/04/is-eating-marijuana-really-riskier-than-smoking-it/#5b8495697234> [<https://perma.cc/DCB4-AGXS>].

¹⁸ Jeff Rossen & Jovanna Billington, *Rossen Reports Update: Edible Marijuana That Looks Like Candy Is Sending Kids to the ER*, TODAY (Sept. 16, 2017), <https://www.today.com/parents/edible-marijuana-looks-candy-sending-kids-er-t94486> [<https://perma.cc/KEA8-2EFB>].

II. THE LAWS AND REGULATIONS THAT GOVERN MARIJUANA

A. Brief Overview of Cannabis and Its History

Cannabis has been popular among humankind since the advent of agriculture more than 10,000 years ago.¹⁹ It is native to the steppes of Central Asia and believed to be indigenous to present-day Mongolia and southern Siberia.²⁰ The genus cannabis is made up of a group of closely related species.²¹ The two subspecies that are most prevalent are *cannabis sativa* L. and *cannabis sativa*.²² *Cannabis sativa* L. is known as hemp and is not psychoactive.²³ *Cannabis sativa* is psychoactive and is most widely known as marijuana.²⁴ As human migration spread marijuana across Europe, Asia, and Africa, *Cannabis sativa* L. became widely cultivated in historical civilizations that were located in cooler climates.²⁵ *Cannabis sativa* (i.e., marijuana), among other psychoactive species of cannabis, was historically widely used for its psychoactive properties in areas of the world closer to the equator.²⁶ *Cannabis sativa* was used in China and Japan, and became heavily used for psychoactive purposes once it was carried into South Asia, sometime between 2000 and 1000 BC.²⁷ In India, cannabis became interwoven into traditions and cultures, and had an influence on religion and medicine.²⁸ Over the centuries, migratory and conquest patterns brought *Cannabis sativa*, as well as the historical practice of using the plant for its psychoactive properties, to the rest of the globe.²⁹

The psychoactive effects of marijuana are the result of a resin produced by the female marijuana plant.³⁰ This resin contains cannabinoids, including delta-9-tetrahydrocannabinol (THC).³¹ THC is responsible for the “high” that marijuana produces, which includes symptoms such as euphoria, increased sensory cognizance, distortions in perceptions of time and space, and increased appetite.³² The effects of THC vary from person to person based on differences such as dose, age, and strain of marijuana.³³ In order to be absorbed into the

¹⁹ MARTIN A. LEE, SMOKE SIGNALS: A SOCIAL HISTORY OF MARIJUANA—MEDICAL, RECREATIONAL, AND SCIENTIFIC 3–4 (2012).

²⁰ Warf, *supra* note 8, at 418 (“[O]thers have variously suggested the Huang He River valley, the Hindu Kush mountains, South Asia, or Afghanistan as possible source areas.”).

²¹ *Id.* at 416.

²² *Id.*

²³ *Id.*

²⁴ *Id.*

²⁵ See LEE, *supra* note 19, at 4.

²⁶ See *id.*

²⁷ Warf, *supra* note 8, at 420.

²⁸ *Id.* at 420–21.

²⁹ *Id.* at 418–33.

³⁰ *Id.* at 416.

³¹ *Id.*

³² *Id.*

³³ Warf, *supra* note 8, at 416.

bloodstream, THC must reach a temperature of over 100 degrees Celsius, which is why marijuana has historically been prepared with methods involving heat (i.e., smoking or cooking).³⁴

B. *The Rise of Anti-Marijuana Laws in the United States*

American history has been fraught with the ebb and flow of marijuana popularity and stigmatization. From the mid-1800s to the early 1900s, American physicians explored the medical use of marijuana.³⁵ However, anti-marijuana sentiments were on the rise during this time because the opium addiction gripping America brought about the desire to control drug addiction.³⁶ Anti-immigration sentiments also created a desire in many Americans to criminalize marijuana because they believed that Mexican immigrants who entered the United States after the Mexican Revolution in 1910 had introduced the drug.³⁷ States began passing laws restricting marijuana use beginning in 1911,³⁸ and the first local ordinance that banned citizens from selling or possessing marijuana was issued by El Paso, Texas in 1914.³⁹

The 1920s and '30s witnessed an increase in both medicinal and recreational marijuana use.⁴⁰ Immigrants and sailors arriving by ship brought marijuana to coastal cities.⁴¹ In New Orleans marijuana soared in popularity, thanks to its use by jazz musicians who wrote songs that sang the plant's praises.⁴² From New Orleans, traveling jazz musicians brought marijuana to other prominent jazz cities such as Chicago, Harlem, Kansas City, and St. Louis.⁴³ Meanwhile, pharmaceutical companies were manufacturing marijuana extracts and cigarettes for medical purposes, including for use as painkillers and asthma treatments.⁴⁴

But the 1920s also brought Prohibition, and with it a slew of anti-drug sentiment.⁴⁵ American anti-marijuana laws not only sought to restrict the growing and selling of marijuana, but the mere possession of it as well.⁴⁶

³⁴ *Id.*

³⁵ 86 THE REFERENCE SHELF, MARIJUANA REFORM ix (2014) [hereinafter MARIJUANA REFORM].

³⁶ *Id.*

³⁷ *Id.* at ix–x.

³⁸ *Id.* at x.

³⁹ Warf, *supra* note 8, at 429.

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

⁴⁴ Reid, *supra* note 16, at 170 (listing Parke-Davis, Eli Lilly, and Grimault & Company among the pharmaceutical companies that manufactured medicinal marijuana).

⁴⁵ Prohibition was a time period in American history in which, pursuant to the ratification of the 18th Amendment, the manufacture, sale, and transportation of alcohol was banned. U.S. CONST. amend. XVIII (repealed 1933); Warf, *supra* note 8, at 429.

⁴⁶ Warf, *supra* note 8, at 429.

Furthermore, cotton-growers who feared hemp as a competitor opined that the drug must be criminalized.⁴⁷ Because American laws did not differentiate between *Cannabis sativa* L. and *Cannabis sativa*, the industrial war against hemp by cotton-growers and producers of synthetic fiber resulted in the complete outlawing of the cannabis plant.⁴⁸

Additionally, perhaps the most influential fuel in the fight against marijuana was racial prejudice.⁴⁹ Anti-immigration and racist sentiments, particularly aimed at African-American and Mexican-American populations, ran rampant in the criminalization movement.⁵⁰ Many prohibitionists contended that marijuana drove racial minorities “crazy”⁵¹ and “scapegoated [marijuana] as prompting murder, rape, and mayhem among blacks in the South, Mexican Americans in the Southwest, and disfavored white immigrants from laboring classes with marijuana blamed for the seduction of white girls by black men and for violent crimes committed by these groups.”⁵² By 1931, twenty-nine states had outlawed its production or use.⁵³

During the 1930s and beyond, the federal government’s battle against marijuana reached a new level of vitality. The Federal Bureau of Narcotics (FBN) was established on June 14, 1930,⁵⁴ and its first commissioner, Harry Anslinger, waged a three-decade war on the drug.⁵⁵ Journalists dispersed Anslinger’s anti-marijuana messages to the public, releasing racist stories that claimed marijuana contributed to the “evils” of jazz music, as well as World War II and the Cold War.⁵⁶ Propaganda about the dangers of marijuana reached a new height in the 1936 film *Reefer Madness*, in which the “evil” drug marijuana corrupted a group of teens and adults and caused them to spiral into a haze of rape, murder, suicide, and insanity.⁵⁷ In 1932, the Uniform Law Commission passed the Uniform Narcotic Drug Act, which encouraged states

⁴⁷ *Id.*

⁴⁸ *See id.*

⁴⁹ Steven W. Bender, *The Colors of Cannabis: Race and Marijuana*, 50 U.C. DAVIS L. REV. 689, 690 (2016).

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² *Id.* at 690–91.

⁵³ Warf, *supra* note 8, at 429.

⁵⁴ *Records of the Drug Enforcement Administration [DEA]*, NATIONAL ARCHIVES, <https://www.archives.gov/research/guide-fed-records/groups/170.html#170.3> [<https://perma.cc/VHT6-SBKT>] (citing Act of June 14, 1930, ch. 488, 46 Stat. 585 (repealed 1970)).

⁵⁵ DRUG ENF’T ADMIN., HISTORY: THE EARLY YEARS 16, <https://www.dea.gov/sites/default/files/2018-05/Early%20Years%20p%2012-29.pdf> [<https://perma.cc/ZPB6-8W9F>]; Warf, *supra* note 8, at 429–30.

⁵⁶ Warf, *supra* note 8, at 430 (Anslinger argued that the Japanese (in WWII) and Communists (in the Cold War) were using cannabis to dull the will of Americans).

⁵⁷ REEFER MADNESS (George A. Hirshman Productions 1936); *see* Warf, *supra* note 8, at 430.

to criminalize the use of marijuana.⁵⁸ By 1937, all fifty states had passed laws restricting the use of marijuana, and thirty-five states had criminalized the drug.⁵⁹

In addition, Congress passed the Marijuana Tax Act in 1937.⁶⁰ The Act put the regulation of cannabis under the control of the Drug Enforcement Agency (DEA)⁶¹ and made marijuana sales illegal to anyone without a prescription for its use, effectively criminalizing the drug.⁶² The DEA further promoted anti-hemp programs following World War II, and in 1948 it was again criminalized.⁶³ Three years later Congress made the penalties for marijuana possession equal to heroin when it passed the Boggs Act.⁶⁴

Despite the political push to prohibit marijuana use, the 1960s saw pervasive use of marijuana among all classes and races in the United States.⁶⁵ This upswing in popularity was the result of the social revolution of the hippies, civil rights movements, environmentalism, antiwar sentiments, and other countercultural movements and activists.⁶⁶ As a result, many states' legal penalties for the use of marijuana were reduced in the 1960s.⁶⁷

Anti-marijuana factions met the increasing popularity of marijuana with strong opposition. In 1970, Congress passed the Controlled Substances Act (CSA), prohibiting the distribution and importation of drugs that Congress deemed to have a "high potential for abuse, and little-to-no medicinal value."⁶⁸ The CSA created a five-schedule classification system for drugs that was based on factors such as the potential for abuse, the physical and mental ramifications of the drug's abuse, and its medical utility.⁶⁹ The FDA or the DEA places all drugs in one of the five schedules, and that schedule classification determines what level of regulation and severity of penalty the drug carries.⁷⁰ At the time

⁵⁸ UNIFORM NARCOTIC DRUG ACT § 1 (UNIF. LAW COMM'N 1932); Richard J. Bonnie & Charles H. Whitebread, II, *The Forbidden Fruit and the Tree of Knowledge: An Inquiry into the Legal History of American Marijuana Prohibition*, 56 Va. L. Rev. 971, 1026–47 (1970).

⁵⁹ Reid, *supra* note 16, at 170.

⁶⁰ MARIJUANA REFORM, *supra* note 35, at x; Marijuana Tax Act of 1937, 26 U.S.C. § 4741 (1964) (repealed 1969).

⁶¹ Warf, *supra* note 8, at 430.

⁶² Reid, *supra* note 16, at 170; Warf, *supra* note 8, at 430.

⁶³ Warf, *supra* note 8, at 430.

⁶⁴ *Id.*; Boggs Act, Pub. L. No. 82-255, 65 Stat. 767 (1951) (codified as amended at 21 U.S.C. § 174).

⁶⁵ Warf, *supra* note 8, at 430.

⁶⁶ *Id.* at 430–31.

⁶⁷ MARIJUANA REFORM, *supra* note 35, at x.

⁶⁸ Reid, *supra* note 16, at 170; Controlled Substances Act (CSA), Pub. L. No. 91-513, Title II, 84 Stat. 1242 (1970) (codified at 21 U.S.C. §§ 801–904 (2012)).

⁶⁹ Controlled Substances Act § 812; Reid, *supra* note 16, at 170.

⁷⁰ John Hudak & Grace Wallack, *How to Reschedule Marijuana, and Why It's Unlikely Anytime Soon*, BROOKINGS (Feb. 13, 2015), <https://www.brookings.edu/blog/fixgov/2015/02/13/how-to-reschedule-marijuana-and-why-its-unlikely-anytime-soon/> [<https://perma.cc/N7Y5-AZKS>].

of the CSA's passing, Congress created the initial listing of drugs and classified marijuana as a Schedule I substance, "a category designated for substances that have a high potential for abuse, no current or accepted medical use, and no accepted standards for safe use."⁷¹ Throughout the 1970s and 1980s, the American "War on Drugs" resulted in ever-stricter penalties for marijuana production and use.⁷²

C. States Break the Mold: A Modern-Day Wave of Marijuana Legalization

During the 1990s, evidence began to surface that demonstrated marijuana's medical potential for chronic pain and nausea relief,⁷³ resulting in better footing for medical marijuana advocates. States began to legalize medical marijuana starting in the late 1990s; California was the first state to do so in 1996 via Proposition 215.⁷⁴ Alaska, Arizona, Colorado, Nevada, Oregon, and Washington soon followed suit.⁷⁵ States continued to legalize medical marijuana over the next two decades. By 2018, thirty-three states and the District of Columbia had legalized the use of medical marijuana.⁷⁶ A 2016 Quinnipiac poll found that nearly nine out of ten respondents now favor the use of medical cannabis.⁷⁷

In 2012, states also began to legalize *recreational* marijuana.⁷⁸ Washington and Colorado were the first states to do so, and Alaska, California, the District of Columbia, Maine, Massachusetts, Michigan, Nevada, and Oregon, have since passed laws to legalize its recreational use.⁷⁹ Recreational marijuana laws vary by state in terms of the level of restrictions on the growing, packaging, sale, and purchase of marijuana.⁸⁰

⁷¹ MARIJUANA REFORM, *supra* note 35, at x; Reid, *supra* note 16, at 170 (LSD and heroin are also placed in Schedule I).

⁷² MARIJUANA REFORM, *supra* note 35, at x.

⁷³ *Id.* ("[E]vidence suggested that marijuana was effective in treating a number of serious medical issues, including the side effects from HIV and cancer treatment, glaucoma, multiple sclerosis, and chronic pain.").

⁷⁴ INST. OF MED., MARIJUANA AND MEDICINE: ASSESSING THE SCIENCE BASE vii (Janet E. Joy et al. eds., 1999) [hereinafter MARIJUANA AND MEDICINE]; *State Marijuana Laws in 2018 Map*, NAT'L INFORMATION CONSORTIUM <http://www.governing.com/gov-data/state-marijuana-laws-map-medical-recreational.html> [<https://perma.cc/WYX4-8W9V>] (last updated Jan. 8, 2018).

⁷⁵ MARIJUANA AND MEDICINE, *supra* note 74.

⁷⁶ NCSL, *supra* note 5.

⁷⁷ NASEM, *supra* note 8, at 79.

⁷⁸ Berke & Gould, *supra* note 7.

⁷⁹ *State Marijuana Laws in 2018 Map*, *supra* note 74; see Berke & Gould, *supra* note 7.

⁸⁰ See Berke & Gould, *supra* note 7.

The current state of marijuana laws is summarized below.⁸¹

Table 1: *Current State of Marijuana Laws in the United States (2019)*

State	Medical Marijuana		Recreational Marijuana	
	Legalized?	Legislation (date passed)	Legalized?	Legislation (date passed)
Alabama	No	—	No	—
Alaska	Yes	Ballot Measure 8 (1998)	Yes	Ballot Measure 2 (2014)
Arizona	Yes	Ballot Proposition 203 (2010)	No	—
Arkansas	Yes	Ballot Measure Issue 6 (2016)	No	—
California	Yes	Proposition 215 (1996)	Yes	Proposition 64 (2016)
Colorado	Yes	Ballot Amendment 20 (2000)	Yes	Amendment 64 (2012)
Connecticut	Yes	HB 5389 (2012)	No	—
Delaware	Yes	SB 17 (2011)	No	—
Florida	Yes	Ballot Amendment 2 (2016)	No	—
Georgia	No	—	No	—
Hawaii	Yes	SB 862 (2000)	No	—
Idaho	No	—	No	—
Illinois	Yes	HB 1 (2013)	No	—
Indiana	No	—	No	—
Iowa	No	—	No	—
Kansas	No	—	No	—
Kentucky	No	—	No	—
Louisiana	Yes	SB 271 (2017)	No	—
Maine	Yes	Ballot Question 2 (1999)	Yes	Ballot Question 1 (2016)

⁸¹ *Id.*; NCSL, *supra* note 5.

Maryland	Yes	SB 293 (2014)	No	—
Massachusetts	Yes	Ballot Question 3 (2012)	Yes	Ballot Question 4 (2016)
Michigan	Yes	Proposal 1 (2008)	Yes	Proposal 18-1 (2018)
Minnesota	Yes	SB 2471 (2014)	No	—
Mississippi	No	—	No	—
Missouri	Yes	Amendment 2 (2018)	No	—
Montana	Yes	Initiative 148 (2004)	No	—
Nebraska	No	—	No	—
Nevada	Yes	Ballot Question 9 (2000)	Yes	Ballot Question 2 (2016)
New Hampshire	Yes	HB 573 (2013)	No	—
New Jersey	Yes	SB 119 (2009)	No	—
New Mexico	Yes	SB 523 (2007)	No	—
New York	Yes	Assembly Bill 6357 (2014)	No	—
North Carolina	No	—	No	—
North Dakota	Yes	Ballot Measure 5 (2016)	No	—
Ohio	Yes	HB 523 (2016)	No	—
Oklahoma	Yes	SQ 788 (2018)	No	—
Oregon	Yes	Oregon Medical Marijuana Act (1998)	Yes	Initiative 91 (2014)
Pennsylvania	Yes	SB 3 (2016)	No	—
Rhode Island	Yes	SB 791 (2007)	No	—
South Carolina	No	—	No	—

South Dakota	No	—	No	—
Tennessee	No	—	No	—
Texas	No	—	No	—
Utah	Yes	Prop 2 (2018)	No	—
Vermont	Yes	SB 76 (2004)	Yes	H.511 (2018)
Virginia	No	—	No	—
Washington	Yes	Initiative 692 (1998)	Yes	Initiative 502 (2012)
Washington, D.C.	Yes	Amendment Act B18-622 (2010)	Yes	Initiative 71 (2014)
West Virginia	Yes	SB 386 (2017)	No	—
Wisconsin	No	—	No	—
Wyoming	No	—	No	—

D. The Current Federal Legal Regime

1. Department of Justice Guidance—Four (Conflicting) Memoranda

Notwithstanding the fact that many states have legalized medical and then recreational marijuana, it remains a Schedule I drug under the CSA. In the past few years, the federal government has released guidance on how it will treat marijuana in states in which the drug has been legalized.⁸² In particular, the United States Deputy Attorney General has issued four memoranda. First, in 2009, the Ogden Memorandum was released, which stated that the enforcement of federal marijuana law “should not focus federal resources . . . on individuals whose actions are in clear and unambiguous compliance with existing state laws providing for the medical use of marijuana.”⁸³ Many states and citizens interpreted this memorandum to say that the federal government would not prosecute people for federal marijuana crimes so long as their actions complied with applicable state law, at least in terms of medical marijuana.⁸⁴ The Ogden Memo also stated, however, that:

⁸² See, e.g., Memorandum from David W. Ogden, Deputy Attorney Gen., to Selected U.S. Attorneys (Oct. 19, 2009) [hereinafter Ogden Memo]; Memorandum from James M. Cole, Deputy Attorney Gen., to U.S. Attorneys (June 29, 2011) [hereinafter Cole 2011 Memo]; Memorandum from James M. Cole, Deputy Attorney Gen., to All U.S. Attorneys (Aug. 29, 2013) [hereinafter Cole 2013 Memo]; Memorandum from Jefferson B. Sessions, III, Attorney Gen., to All U.S. Attorneys (Jan. 4, 2018) [hereinafter Sessions Memo].

⁸³ Ogden Memo, *supra* note 82, at 1–2.

⁸⁴ David Stout & Solomon Moore, *U.S. Won't Prosecute in States That Allow Medical Marijuana*, N.Y. TIMES (Oct. 19, 2009), <http://www.nytimes.com/2009/10/20/us/20cannabis.html> [on file with *Ohio State Law Journal*].

The Department of Justice is committed to the enforcement of the Controlled Substances Act in all States. . . . This guidance regarding resource allocation does not ‘legalize’ marijuana or provide a legal defense to a violation of federal law. . . . Nor does clear and unambiguous compliance with state law . . . create a legal defense to a violation of the Controlled Substances Act.⁸⁵

Subsequent to this memo, the federal government has indeed prosecuted several manufacturers complying with their state’s medical marijuana laws, charging them with CSA violations.⁸⁶

In 2011, a second memorandum (the Cole Memo) was released.⁸⁷ The Cole Memorandum’s subject line proclaimed, “Guidance Regarding the Ogden Memo in Jurisdictions Seeking to Authorize Marijuana for Medical Use.”⁸⁸ The Cole Memo stated that it is not an efficient use of federal government resources to pursue enforcement actions against seriously ill individuals who use marijuana for medical treatment, or against their caregivers.⁸⁹ However, the Cole Memo went on to say that:

There has [] been an increase in the scope of commercial cultivation, sale, distribution and use of marijuana for purported medical purposes . . . several jurisdictions have considered or enacted legislation to authorize multiple large-scale, privately-operated industrial marijuana cultivation centers. Some of these planned facilities have revenue projections of millions of dollars based on the planned cultivation of tens of thousands of cannabis plants.

The Ogden Memorandum was never intended to shield such activities from federal enforcement action and prosecution, even where those activities purport to comply with state law.⁹⁰

The 2011 Cole Memo language was somewhat in conflict with the Ogden Memo, and took a harder stance against medical marijuana production in states in which the drug had been legalized. The result of these two memoranda was further confusion for federal prosecutors as well as potential producers and users.

In an effort to assuage that confusion, the DOJ released yet another memo in 2013 (the 2013 Memo).⁹¹ This memo laid out a list of enforcement priorities and directed DOJ attorneys and law enforcement to focus their resources and

⁸⁵ Ogden Memo, *supra* note 82, at 1–2.

⁸⁶ See, e.g., *United States v. Washington*, 887 F. Supp. 2d 1077, 1083 (D. Mont. 2012) (describing a federal prosecution of defendants in compliance with the Montana Medical Marijuana Act and the later Montana Marijuana Act). See generally Tim Dickinson, *Obama’s War on Pot*, ROLLING STONE (Feb. 16, 2012), <http://www.rollingstone.com/politics/news/obamas-war-on-pot-20120216> [<https://perma.cc/NW8Y-CG6L>] (describing the Obama administration’s prosecution of medical marijuana dispensaries).

⁸⁷ Cole 2011 Memo, *supra* note 82, at 1.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ *Id.* at 1–2.

⁹¹ Cole 2013 Memo, *supra* note 82, at 1.

enforcement efforts on “persons or organizations whose conduct interferes with any one or more of these priorities, regardless of state law.”⁹² The priorities listed in the 2013 Memo were:

- Preventing the distribution of marijuana to minors;
- Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels;
- Preventing the diversion of marijuana from states where it is legal under state law in some form to other states;
- Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;
- Preventing violence and the use of firearms in the cultivation and distribution of marijuana;
- Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use;
- Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands; and
- Preventing marijuana possession or use on federal property.⁹³

The 2013 Memo went on to state that, despite what the DOJ had directed in previous memoranda, proper state regulation of large-scale, for-profit marijuana commercial enterprises might alleviate any threat to federal interests that the operation’s size may have posed.⁹⁴ Therefore, the Department directed that “prosecutors should not consider the size or commercial nature of a marijuana operation alone as a proxy for assessing whether marijuana trafficking implicates the Department’s enforcement priorities listed above. Rather, prosecutors should continue to review marijuana cases on a case-by-case basis.”⁹⁵ Understandably, this 2013 revision was viewed with favor by marijuana advocates and producers, but certainly does not resolve all the questions and concerns that the industry and users might have.

Finally, in January of 2018 Attorney General Sessions released a memorandum with a subject line titled “Marijuana Enforcement.”⁹⁶ This memorandum states that in exercising discretion to prosecute a marijuana activity or not, prosecutors should follow the same principles governing all federal prosecutions.⁹⁷ Furthermore, the memorandum went on to state that “previous [i.e., Obama era] nationwide guidance specific to marijuana

⁹² *Id.* at 1–2.

⁹³ *Id.* at 1–2.

⁹⁴ *Id.* at 3.

⁹⁵ *Id.*

⁹⁶ Sessions Memo, *supra* note 82, at 1.

⁹⁷ *Id.*

enforcement is unnecessary and is rescinded, effective immediately” and specifically listed the Ogden and Cole Memoranda among the rescinded.⁹⁸ This new decision has created even more confusion among the marijuana states, industries, and users as to the risks posed by participating in the marijuana market.⁹⁹

2. Financial Regulations and Implications

Besides the CSA, other federal laws affect the use and distribution of marijuana. Businesses that deal in marijuana are prevented from certain aspects of interstate commerce because the drug is still federally prohibited.¹⁰⁰ In particular, laws that govern banking¹⁰¹ and finance¹⁰² prevent businesses that deal in marijuana from gaining access to lines of credit or banking.¹⁰³ Laws that govern money laundering also prevent banks from dealing with marijuana businesses.¹⁰⁴ The U.S. Treasury Department has attempted to assuage this tension by stating that financial establishments may deal with businesses within the marijuana industry, so long as they comply with state law.¹⁰⁵

Congress also passed Section 538 of the Consolidated Appropriations Act of 2015, which provided that, beginning in December 2014, DOJ funds may not be used to prevent states from implementing laws that authorize the use, distribution, possession or cultivation of medical marijuana.¹⁰⁶ Congress again passed this law in Section 542 of the Consolidated Appropriations Act of 2016.¹⁰⁷ As of 2017, Congress’s latest Consolidated Appropriations Act includes the same protections for state medical marijuana laws under Section 537.¹⁰⁸

⁹⁸ *Id.*

⁹⁹ Josh Gerstein & Cristiano Lima, *Sessions Announces End to Policy That Allowed Legal Pot to Flourish*, POLITICO (Jan. 4, 2018), <https://www.politico.com/story/2018/01/04/jeff-sessions-marijuana-policy-us-attorney-enforcement-324020> [https://perma.cc/3ZEU-NFWL].

¹⁰⁰ See *Gonzales v. Raich*, 545 U.S. 1, 22 (2005) (holding that Congress did not exceed its Commerce Clause powers by regulating marijuana).

¹⁰¹ E.g. Bank Secrecy Act, 12 U.S.C. §§ 1951–1259 (2012); DEP’T OF THE TREASURY, FIN-2014-G001, BSA EXPECTATIONS REGARDING MARIJUANA-RELATED BUSINESSES (2014).

¹⁰² E.g. Money Laundering Control Act, 18 U.S.C. §§ 1956–57 (2012).

¹⁰³ NASEM, *supra* note 8, at 77.

¹⁰⁴ *Id.*; see Money Laundering Control Act, 18 U.S.C. §§ 1956–57 (2012); Julie Andersen Hill, *Banks, Marijuana, and Federalism*, 65 CASE W. RES. L. REV. 597, 610–17 (2015).

¹⁰⁵ DEP’T OF THE TREASURY, *supra* note 101; NASEM, *supra* note 8, at 77.

¹⁰⁶ Consolidated Appropriations Act of 2015, Pub. L. No. 113–235, § 538, 128 Stat. 2130, 2217 (2014).

¹⁰⁷ Consolidated Appropriations Act of 2016, Pub. L. No. 114–113, § 542, 129 Stat. 2242, 2332–33 (2015).

¹⁰⁸ The Consolidated Appropriations Act of 2017 states:

Several pieces of legislation were proposed in the 114th Congress that would lessen federal marijuana restrictions.¹⁰⁹ These proposals range from making cannabis more accessible to researchers to removing marijuana completely from the CSA and treating it like alcohol.¹¹⁰ For example, Senator Cory Booker of New Jersey proposed a bill that would completely remove marijuana as a scheduled drug under the CSA.¹¹¹ Under this proposal, states would be free to choose their own marijuana laws without fear of federal government interference.¹¹² The bill also proposes to withhold criminal justice funding from states in which marijuana remains illegal if rates of arrest and incarceration for marijuana offenses are racially disproportionate.¹¹³ Furthermore, the bill would create an avenue for individuals with federal marijuana convictions to have their records expunged, and for those still serving time to be resentenced.¹¹⁴ Part of the bill's aim is to reduce the harm caused disproportionately to low-income and minority communities so that past¹¹⁵ and current¹¹⁶ harm caused by federal marijuana laws can be reduced.¹¹⁷

None of the funds made available in this Act to the Department of Justice may be used, with respect to any of the States of Alabama, Alaska, Arkansas, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming, or with respect to the District of Columbia, Guam, or Puerto Rico, to prevent any of them from implementing their own laws that authorize the use, distribution, possession, or cultivation of medical marijuana.

Pub. L. No. 115–31, § 537, 131 Stat. 135, 228 (2017).

¹⁰⁹ NASEM, *supra* note 8, at 78.

¹¹⁰ Medical Marijuana Research Act, H.R. 5549, 114th Cong. (2016); NASEM, *supra* note 8, at 78.

¹¹¹ Marijuana Justice Act, S. 1689, 115th Cong. (2017); Christopher Ingraham, *Sen. Cory Booker Puts Marijuana Legalization at the Center of His New Racial Justice Bill*, WASH. POST: WONKBLOG (Aug. 1, 2017), https://www.washingtonpost.com/news/wonk/wp/2017/08/01/cory-booker-puts-marijuana-legalization-at-the-center-of-his-new-racial-justice-bil/?utm_term=.3afd79cec999 [<https://perma.cc/J3JM-EGDN>].

¹¹² S. 1689 § 2; Ingraham, *supra* note 111.

¹¹³ S. 1689 § 3(b); Ingraham, *supra* note 111.

¹¹⁴ S. 1689 § 3(c); Ingraham, *supra* note 111.

¹¹⁵ See *supra* Part II.B; Bender, *supra* note 49, at 690–92.

¹¹⁶ See generally ACLU, THE WAR ON MARIJUANA IN BLACK AND WHITE 47 (2013), https://www.aclu.org/sites/default/files/field_document/1114413-mj-report-rfs-rel1.pdf [<https://perma.cc/4X6Q-7NGG>] [hereinafter ACLU] (finding that African Americans are 3.73 times more likely than white people to be arrested for marijuana possession).

¹¹⁷ S. 1689 §§ 3–4; see Ingraham, *supra* note 111.

3. Court Cases

Recent cases in the federal court system have demonstrated that the courts err on the side of refusing to entertain challenges to state marijuana legalization regimes.¹¹⁸ For instance, in *United States v. McIntosh*, the Ninth Circuit held that Section 542 of the Consolidated Appropriations Act of 2016 prevents the federal government from prosecuting individuals whose conduct is in compliance with state medical marijuana laws.¹¹⁹ The court held that Section 542 proscribes the DOJ from expending funds on actions that are meant to prevent states with laws legalizing medical marijuana from giving effect to those laws.¹²⁰

In March of 2016, the Supreme Court declined to hear a case in which Oklahoma and Nebraska challenged Colorado's marijuana legalization regime.¹²¹ Oklahoma and Nebraska argued that Colorado's legalization of marijuana had created issues with enforcement of their own marijuana laws because it had resulted in more marijuana crossing the border from Colorado into their states.¹²² The Supreme Court refused to hear the case without comment and by a 6-2 majority.¹²³

4. Effect of Conflicting Federal and State Laws on Marijuana Research

The conflicting federal and state marijuana regimes create numerous complications for users and the marijuana industry, but perhaps one of the most deleterious impacts is the chilling effect that it has had on conducting scientific research.¹²⁴ Because federal law still criminalizes marijuana, obtaining federal funding for research of the drug is extremely difficult.¹²⁵ The DEA has

¹¹⁸ See generally David S. Schwartz, *High Federalism: Marijuana Legalization and the Limits of Federal Power to Regulate States*, 35 CARDOZO L. REV. 567 (2013).

¹¹⁹ *United States v. McIntosh*, 833 F.3d 1163, 1177 (9th Cir. 2016).

¹²⁰ *Id.* at 1176–77.

¹²¹ *Nebraska v. Colorado*, 136 S. Ct. 1034, 1034 (2016); Christopher Ingraham, *What Today's Supreme Court Decision Means for the Future of Legal Weed*, WASH. POST: WONKBLOG (Mar. 21, 2016), https://www.washingtonpost.com/news/wonk/wp/2016/03/21/what-todays-supreme-court-decision-means-for-the-future-of-legal-weed/?utm_term=.e38c268791ce [<https://perma.cc/SZ86-JQWQ>].

¹²² Ingraham, *supra* note 121.

¹²³ *Id.*

¹²⁴ See generally Christopher Ingraham, *Why the DEA Just Said 'No' to Loosening Marijuana Restrictions*, WASH. POST: WONKBLOG (Aug. 11, 2016), <https://www.washingtonpost.com/news/wonk/wp/2016/08/11/the-deas-latest-stance-on-marijuana-explained/> [<https://perma.cc/K7G2-NPEJ>] (discussing DEA's decision refusing to reduce federal restrictions on marijuana use).

¹²⁵ *Id.*; see also NASEM, *supra* note 8, at 384–85.

regulatory power over the cultivation of marijuana for research purposes.¹²⁶ The DEA sets forth specific licensing requirements and quotas for yearly aggregate production under the CSA.¹²⁷ So far, the DEA has only issued *one* marijuana research cultivation license to the University of Mississippi.¹²⁸ Therefore, the sole source of marijuana for the entire nation's research originates from one plot of land.¹²⁹ This limited source presents practical problems—most notably, it creates a lack of competitive research because of the isolation to only Mississippi strains, which have been described as “low-quality.”¹³⁰ The National Institute on Drug Abuse (NIDA), part of the National Institutes of Health (NIH) and Department of Health and Human Services (DHHS), contracts with the University of Mississippi for the marijuana that it cultivates and is the sole source of this material for marijuana research.¹³¹ Before researchers may obtain NIDA funding and marijuana materials for their projects they must meet strict requirements.¹³² In particular, they must: (1) “[d]emonstrate scientific validity and ethical soundness through NIH review,” (2) hold a “DEA registration for marijuana, a Schedule I controlled substance,” and (3) have “[a]n active-status Investigational New Drug (IND) application on file with the FDA (for human research only), which has been evaluated by FDA and found safe to proceed.”¹³³

NIDA's tight hold on funding and materials for marijuana research is more significant in light of the fact that the federal government owns the sole patent on cannabis plant compounds.¹³⁴ U.S. Patent 6,630,507 was issued to DHHS, and was a result of NIH research, of which NIDA is a subset.¹³⁵ The patent describes cannabinoid chemical compounds that are similar to THC structurally but are devoid of psychoactive effects, and lays out their therapeutic possibilities for certain medical conditions.¹³⁶ Research companies must apply for licenses

¹²⁶ *NIDA's Role in Providing Marijuana for Research*, NAT. INST. ON DRUG ABUSE, <https://www.drugabuse.gov/drugs-abuse/marijuana/nidas-role-in-providing-marijuana-research> [<https://perma.cc/UNL9-F9TG>] (last updated Apr. 2018) [hereinafter NIDA].

¹²⁷ *Id.*

¹²⁸ *Id.*

¹²⁹ Christopher Ingraham & Tauhid Chappell, *Government Marijuana Looks Nothing Like the Real Stuff. See for Yourself.*, WASH. POST: WONKBLOG (Mar. 13, 2017), https://www.washingtonpost.com/news/wonk/wp/2017/03/13/government-marijuana-looks-nothing-like-the-real-stuff-see-for-yourself/?utm_term=.1f8f18478532 [<https://perma.cc/5GU9-RY4A>]; see also NIDA, *supra* note 126.

¹³⁰ Ingraham & Chappell, *supra* note 129.

¹³¹ NASEM, *supra* note 8, at 384; NIDA, *supra* note 126.

¹³² See NIDA, *supra* note 126.

¹³³ *Id.*

¹³⁴ See Alicia Wallace, *Patent No. 6,630,507: Why the U.S. Government Holds a Patent on Cannabis Plant Compounds*, THE CANNABIST (Aug. 22, 2016), <https://www.thecannabist.co/2016/08/22/marijuana-patents-6630507-research-dea-nih-fda-kannalife/61255/> [<https://perma.cc/4JG5-VCVR>].

¹³⁵ *Id.*; NASEM, *supra* note 8, at 384.

¹³⁶ *Id.*

in order to use the technology covered in the patent.¹³⁷ On the positive side, much of this will change on April 21, 2019, when the patent is due to expire.¹³⁸ After that date, researchers will be free to use the cannabinoids covered in the patent and competitive research should bloom.¹³⁹

The net result of the above-described marijuana research regulatory regime is a glaring lack of reputable scientific studies on the health risks and benefits of cannabis.¹⁴⁰ States are legalizing marijuana (or deciding to keep it criminal) based on extremely limited research on the effect that marijuana has on the human body and the broader human population.¹⁴¹ As noted by one drug policy journalist, “[t]he gap between permissive state laws and a restrictive federal policy has become increasingly untenable in the minds of many doctors, patients, researchers, business owners and legislators.”¹⁴² The DEA’s regime and continued refusal to reschedule marijuana results in a circular catch-22 problem for marijuana research: “[b]y ruling that there is not enough evidence of ‘currently accepted medical use’—a key distinction between the highly restrictive Schedule I classification and the less restrictive Schedule II—the administration essentially makes it harder to gather such evidence.”¹⁴³

III. PROS AND RISKS OF MARIJUANA LEGALIZATION

A. *The Pros of Marijuana Legalization*

1. *Economic Benefits*

Marijuana legalization provides substantial economic benefits, as the marijuana industry has become a booming business in states in which it has been legalized. Colorado has accrued tax revenue over \$905 million since marijuana legalization went into effect in 2014 until the end of 2018.¹⁴⁴ Washington State reports its revenue at over \$686 million since its legalization of marijuana in 2014.¹⁴⁵ In Oregon, almost \$21 million was made in tax revenue in the 2016 fiscal year in which marijuana was legalized, over \$70 million in the 2017 fiscal

¹³⁷ *Id.*

¹³⁸ *Id.*

¹³⁹ *See id.*

¹⁴⁰ *See* NASEM, *supra* note 8, at 377–78.

¹⁴¹ *See id.*

¹⁴² Ingraham, *supra* note 124.

¹⁴³ Greg Miller, *DEA Verdict on Marijuana Research Draws Mixed Reaction*, SCIENCE (Aug. 11, 2016), <https://www.sciencemag.org/news/2016/08/dea-verdict-marijuana-research-draws-mixed-reaction> [<https://perma.cc/8MGW-XNJM>].

¹⁴⁴ *Marijuana Tax Data*, COLO. DEP’T OF REVENUE, <https://www.colorado.gov/pacific/revenue/colorado-marijuana-tax-data> [<https://perma.cc/ZBZ8-QRVL>] (last updated Jan. 2019).

¹⁴⁵ *See Marijuana Dashboard*, WASH. STATE LIQUOR & CANNABIS BD., <https://data.lcb.wa.gov/stories/s/WSLCB-Marijuana-Dashboard/hbnp-ia6v/> [<https://perma.cc/KX83-TZF2>].

year, and over \$82 million in the 2018 fiscal year.¹⁴⁶ In less than two full years, Oregon collected \$108.6 million in taxes on the state and local levels.¹⁴⁷ Based off of the tax revenues of the earliest states to have legalized marijuana, a May 2016 study found that the new industry could create \$28 billion in tax revenues for governments on the local, state, and federal levels.¹⁴⁸ Market valuation estimates put the 2016 legal marijuana market at approximately \$7.2 billion, with a projected compound annual growth rate of 17%.¹⁴⁹ Medical marijuana alone is estimated to increase in sales from \$4.7 billion in 2016 to \$13.3 billion in 2020.¹⁵⁰ Recreational marijuana is projected to grow in sales from \$2.6 billion in 2016 to \$11.2 billion by 2020.¹⁵¹ And these numbers do not include any additional markets from other states that are likely to pass legalization initiatives by 2020.¹⁵²

States that legalize marijuana also experience the economic benefit of reduced expenditures on law enforcement—police, judicial, legal, and corrections.¹⁵³ Police resource expenditures would be reduced because there would be fewer drug arrests.¹⁵⁴ Legal and judicial expenses would also be reduced because there would be fewer drug prosecutions.¹⁵⁵ Finally, correctional resource expenditures would be reduced because fewer people would be incarcerated for drug offenses.¹⁵⁶ These reductions create a substantial monetary savings for states. For instance, a recent report has estimated that Washington State spent over \$211 million on marijuana law enforcement

¹⁴⁶ *Oregon Marijuana Tax Statistics: Accounting Information*, OR. DEP'T OF REVENUE <https://www.oregon.gov/DOR/programs/gov-research/Documents/Financial-reporting-receipts-public.pdf> [<https://perma.cc/4NDP-YWAK>] (last updated Dec. 27, 2018).

¹⁴⁷ Noelle Crombie, *Oregon Pays out \$85 Million in Pot Taxes to School Fund, Cops, Other Services*, OREGONIAN (Oct. 6, 2017), http://www.oregonlive.com/marijuana/index.ssf/2017/10/oregon_pays_out_85_million_in_1.html [<https://perma.cc/YSU7-S4FW>].

¹⁴⁸ GAVIN EKINS & JOSEPH HENCHMAN, TAX FOUND., MARIJUANA LEGALIZATION AND TAXES: FEDERAL REVENUE IMPACT 1 (Fiscal Fact No. 509, 2016), https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF509.pdf [<https://perma.cc/4QSF-AASA>].

¹⁴⁹ Debra Borchardt, *Marijuana Industry Projected to Create More Jobs than Manufacturing by 2020*, FORBES (Feb. 22, 2017), <https://www.forbes.com/sites/debraborchardt/2017/02/22/marijuana-industry-projected-to-create-more-jobs-than-manufacturing-by-2020/#6407fcb13fa9> [<https://perma.cc/X5VD-BRQE>].

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ See ACLU, *supra* note 116, at 10–11, 22–23, 76.

¹⁵⁴ JEFFREY A. MIRON & KATHERINE WALDOCK, CATO INST., THE BUDGETARY IMPACT OF ENDING DRUG PROHIBITION 1–2 (2010), <https://object.cato.org/sites/cato.org/files/pubs/pdf/DrugProhibitionWP.pdf> [<https://perma.cc/3DTV-NY3H>].

¹⁵⁵ *Id.* at 2.

¹⁵⁶ *Id.*

between the years of 2000 and 2010.¹⁵⁷ In 2010, Colorado spent almost \$38 million on marijuana possession enforcement.¹⁵⁸ In the same year, Oregon spent over \$50 million and Washington spent over \$34 million.¹⁵⁹ California, one of the most recent states to legalize recreational marijuana, spent a massive \$491 million.¹⁶⁰ The vast majority of those costs can now be eliminated from cash-strapped budgets and allocated to other pressing concerns like education and transportation.¹⁶¹

When combined, the tax revenues raised by states in which marijuana is legal and the saved enforcement costs amount to a large net economic benefit.¹⁶² Economists have been predicting this benefit for quite some time.¹⁶³ Over 500 economists have referenced a 2005 study by Jeffrey Miron which found that marijuana legalization would generate significant tax revenue and fiscal savings for federal, state, and local governments.¹⁶⁴ This study, when adjusted for inflation to 2011 dollars, would result in a total net benefit of over \$1.6 billion for the California government alone and over \$20 billion for the federal government.¹⁶⁵ These numbers would be even larger if adjusted for inflation in 2019.

Finally, the legalization of marijuana also brings employment benefits. In fact, a 2017 report projected that by 2020 the marijuana industry will create more than a quarter of a million jobs.¹⁶⁶ According to the Bureau of Labor Statistics, this number represents more new jobs than those created by both the manufacturing and utilities industries, as well as by the government.¹⁶⁷

¹⁵⁷ Mark Cooke, *Interactive Map: What Is Your County Spending on Marijuana Law Enforcement?*, ACLU (Aug. 27, 2012), <https://www.aclu-wa.org/blog/interactive-map-what-your-county-spending-marijuana-law-enforcement> [<https://perma.cc/BC5Q-QMVL>].

¹⁵⁸ ACLU, *supra* note 116, at 140.

¹⁵⁹ *Id.* at 172, 182.

¹⁶⁰ *Id.* at 139.

¹⁶¹ See Crombie, *supra* note 147.

¹⁶² See *supra* note 158–60.

¹⁶³ See Abbas P. Grammy, *Economic Benefits of Marijuana Legalization*, PREMIER THOUGHTS: THE CSUB BUS. BLOG (Mar. 26, 2012), *reprinted in* 86 THE REFERENCE SHELF: MARIJUANA REFORM 204, 204–05 (2014).

¹⁶⁴ JEFFREY A. MIRON, THE BUDGETARY IMPLICATIONS OF MARIJUANA PROHIBITION 2–3 (2005), http://hanfinfo.ch/info/it/IMG/pdf/The_Budgetary_Implications_of_Marijuana_Prohibition_MironReport_2005.pdf [<https://perma.cc/CGA5-T552>] (estimating legalization would generate \$2.4 billion in tax revenue annually and save governments \$7.7 billion annually); Grammy, *supra* note 163, at 204–05.

¹⁶⁵ Grammy, *supra* note 163, at 205.

¹⁶⁶ NEW FRONTIER DATA, THE CANNABIS INDUSTRY ANNUAL REPORT: 2017 LEGAL MARIJUANA OUTLOOK (2017); *see also* Borchardt, *supra* note 149 (citing the report).

¹⁶⁷ BUREAU OF LABOR STATISTICS, EMPLOYMENT BY MAJOR INDUSTRY SECTOR tbl.2.1 (2017), <https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm> [<https://perma.cc/KZM9-XYTZ>].

2. Health Benefits

Though research on the medical and therapeutic impacts of cannabis is scant,¹⁶⁸ in March of 2016, the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine was tasked with convening a group of experts to review the current scientific literature on the health effects of cannabis.¹⁶⁹ The report, released in early 2017, presents both the current consensus on the medical benefits of marijuana and the areas in which more research is required to fill gaps in knowledge.¹⁷⁰ It reached the following conclusions, among others:

- “In adults with chemotherapy-induced nausea and vomiting, oral cannabinoids are effective antiemetics.”¹⁷¹
- “In adults with chronic pain, patients who were treated with cannabis or cannabinoids are more likely to experience a clinically significant reduction in pain symptoms.”¹⁷²
- “In adults with multiple sclerosis (MS)-related spasticity, short-term use of oral cannabinoids improves patient-reported spasticity symptoms.”¹⁷³
- “In individuals with schizophrenia and other psychoses, a history of cannabis use may be linked to better performance on learning and memory tasks.”¹⁷⁴
- “For these [above] conditions the effects of cannabinoids are modest; for all other conditions evaluated there is inadequate information to assess their effects.”¹⁷⁵

The report also found that there is nonexistent or insufficient evidence to conclude that cannabis is an effective treatment for:

- Cancers and associated anorexia;
- Irritable bowel syndrome symptoms;
- Epilepsy;
- Chorea, Huntington’s disease neuropsychiatric symptoms, and motor system symptoms associated with Parkinson’s disease;
- Dystonia; and

¹⁶⁸ See *supra* Part II.D.4.

¹⁶⁹ NASEM, *supra* note 8, at 1–3. This was to be the first comprehensive review of this kind in almost two decades. Cf. MARIJUANA AND MEDICINE, *supra* note 74, at vii (released in 1996).

¹⁷⁰ NASEM, *supra* note 8, at xvii.

¹⁷¹ *Id.* at 85.

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ *Id.* at 289.

¹⁷⁵ *Id.* at 85.

- Achieving abstinence in the use of addictive substances (cannabinoids); and
- Schizophrenia or schizophrenia-form psychosis mental health outcomes.¹⁷⁶

The report suggested that further research is required to determine if there is any merit to claims that marijuana helps with the above, or other, ailments.¹⁷⁷

3. Social Benefits

Marijuana also provides social benefits to users. The legalization of marijuana has lessened the taboo surrounding marijuana use, helping users to feel less stigmatized and offering a corresponding social benefit in that respect.¹⁷⁸ Furthermore, researchers at the University of Illinois at Chicago and the University of Chicago who conducted a study on college students have reported that low doses of THC can reduce stress and anxiety, although they also found that moderate-to-high doses of THC have precisely the opposite effect.¹⁷⁹

The legalization of marijuana is also socially valuable because it coincides with the evolving views of a majority of Americans. According to a Gallup poll released in October of 2017, 64% of Americans now support the legalization of recreational marijuana.¹⁸⁰ The knowledge that state law supports an ideal shared by a majority of state citizens provides those citizens with a social benefit.¹⁸¹ Furthermore, there is a social benefit in allowing individual citizens the autonomy to use marijuana if they choose.¹⁸² Marijuana legalization may also

¹⁷⁶ NASEM, *supra* note 8, at 129.

¹⁷⁷ *Id.* at 127.

¹⁷⁸ Cf. Christopher Ingraham, *Study: Teens Who Smoke Weed Daily Are 60% Less Likely to Complete High School Than Those Who Never Use*, WASH. POST: WONKBLOG (Sept. 9, 2014), https://www.washingtonpost.com/news/wonk/wp/2014/09/09/study-teens-who-smoke-weed-daily-are-60-less-likely-to-complete-high-school-than-those-who-never-use/?utm_term=.d79d0f11e1e6 [<https://perma.cc/GV6S-87Q8>] (finding that negative stereotypes and exposure to the black market could explain negative outcomes related to marijuana use).

¹⁷⁹ Emma Childs et al., *Dose-Related Effects of Delta-9-THC on Emotional Responses to Acute Psychosocial Stress*, 177 DRUG & ALCOHOL DEPENDENCE 136, 142 (2017); see also Sharon Parnet, *Low-Dose THC Can Relieve Stress; More Does Just the Opposite*, UIC TODAY (June 2, 2017), <https://today.uic.edu/low-dose-thc-can-relieve-stress-more-does-just-the-opposite> [<https://perma.cc/L6VN-PAT4>].

¹⁸⁰ Justin McCarthy, *Record-High Support for Legalizing Marijuana Use in U.S.*, GALLUP NEWS (Oct. 25, 2017), <http://news.gallup.com/poll/221018/record-high-support-legalizing-marijuana.aspx> [<https://perma.cc/U5BS-MS9E>].

¹⁸¹ See *id.*

¹⁸² See Andrew J. Boyd, *Medical Marijuana and Personal Autonomy*, 17 J. MARSHALL L. REV. 1253, 1278 (2004); Josh Hamilton, *The Economic and Social Benefits of Taxing Marijuana*, MEDIUM (Sept. 26, 2017), <https://medium.com/the-jist/the-economic-and-social-benefits-of-taxing-marijuana-5e11c7877d4d> [<https://perma.cc/TAC2-ADJ4>].

lessen animosity towards law enforcement due to the reduction of arrests for marijuana possession, use, and sale.¹⁸³ Reducing the stigma surrounding marijuana via legalization also permits schools to take a different approach to marijuana education and adolescent use, rather than employing the overly simplistic and largely ineffective “just say no” campaign popularized by Nancy Reagan in the 1980s.¹⁸⁴ Legalization and taxation also provides funding for that education in some states.¹⁸⁵

Finally, marijuana legalization also helps those who would otherwise have been incarcerated and have a criminal record, a group in which minority youth are overrepresented.¹⁸⁶ Earning a criminal record in adolescence can have large negative effects for the duration of an individual’s life.¹⁸⁷ In youth, criminal records can result in ineligibility for jobs, financial aid, housing, and higher education programs.¹⁸⁸ The legalization of marijuana prevents hundreds of thousands of adolescents from potentially being disqualified from educational institutions and occupations because of a criminal record that may only exist due to marijuana use.¹⁸⁹

B. The Risks of Marijuana Legalization

1. Potential Role as a Gateway Drug

Studies have produced conflicting results as to whether marijuana is a gateway drug.

[T]he term ‘gateway’ has sometimes been misinterpreted to imply that all individuals who use cannabis will directly abuse other drugs, [but the] original hypothesis . . . conducted on cohorts of high school students suggested that cannabis use is a critical illicit drug, intermediate in the transition from legal

¹⁸³ Kristen Gwynne, *Five Reasons Cops Want to Legalize Marijuana*, ROLLING STONE (June 27, 2013), <http://www.rollingstone.com/politics/news/five-reasons-cops-want-to-legalize-marijuana-20130627> [<https://perma.cc/78FQ-J8WL>].

¹⁸⁴ See Sarah Grippa & Molly Lotz, Opinion, *Science Behind Marijuana Empowers Teens*, DENVER POST (Apr. 14, 2017), <http://www.denverpost.com/2017/04/14/marijuana-science-empowers-teens/> [<https://perma.cc/ULB5-BGDQ>]; Scott O. Lilienfeld & Hal Arkowitz, *Why “Just Say No” Doesn’t Work*, SCIENTIFIC AMERICAN: MIND (Jan. 1, 2014), <https://www.scientificamerican.com/article/why-just-say-no-doesnt-work/> [<https://perma.cc/R2L4-SBUZ>].

¹⁸⁵ See Hamilton, *supra* note 182 (noting Colorado’s use of marijuana tax revenue to fund “a number of programs aimed at improving the standards of education and health”).

¹⁸⁶ Committee on Substance Abuse & Committee on Adolescence, *The Impact of Marijuana Policies on Youth: Clinical Research, and Legal Updates*, 135 PEDIATRICS 584, 586 (2015).

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*

¹⁸⁹ See *id.*

substance use (i.e., cigarettes and alcohol) to illicit drug use (i.e., heroin, amphetamines, and LSD).¹⁹⁰

Many studies have found that cannabis use in adolescents increases the risk of addiction to other drugs in the future. According to the original 1975 study examining the gateway drug hypothesis, more than 25% of individuals who used illicit drugs had used marijuana previously.¹⁹¹ Only 2%–3% of individuals who used legal drugs (i.e., alcohol and tobacco) but did not use marijuana continued on to use illicit drugs.¹⁹² In 1986, another longitudinal study found that early-adolescent cannabis use positively predicts across a one-year period the use of cocaine and alcohol.¹⁹³ A 2006 study, which spanned twenty-five years and examined associations between age of first marijuana use and the frequency of use or dependence on other drugs, found that there was a significant association between marijuana use and subsequent drug abuse.¹⁹⁴ The researchers found this association despite “controlling for a number of confounding variables, such as socio-economic background, other illicit substance use, family functioning, child abuse, and personality traits.”¹⁹⁵ Another study found that marijuana use was “2.5 times more likely than no previous marijuana [use] to be associated with subsequent abuse of prescription opioids.”¹⁹⁶ A 2014 study conducting probability estimates showed that 44.7% of lifetime marijuana users continued on to use illicit drugs at some point.¹⁹⁷ In animal studies, which give researchers the ability to test the causal relationship between marijuana use and subsequent drug addiction, exposure of adolescent rats to THC increased the self-administration of heroin.¹⁹⁸

On the other hand, many scholars argue that the gateway theory of marijuana and other illicit drug use, at least as it is commonly understood, is an

¹⁹⁰ Benjamin Chadwick et al., *Cannabis Use During Adolescent Development: Susceptibility to Psychiatric Illness*, 4 FRONTIERS IN PSYCHIATRY 1, 2–3 (2013).

¹⁹¹ *Id.* at 3 (citing Denise Kandel, *Stages in Adolescent Involvement in Drug Use*, 190 SCIENCE 912, 912 (1975)).

¹⁹² *Id.*

¹⁹³ *Id.* (citing Michael D. Newcomb & P.M. Bentler, *Cocaine Use Among Adolescents: Longitudinal Associations with Social Context, Psychopathology, and Use of Other Substances*, 11 ADDICTIVE BEHAV. 263, 263 (1986)).

¹⁹⁴ *Id.* (citing David M. Fergusson et al., *Cannabis Use and Other Illicit Drug Use: Testing the Cannabis Gateway Hypothesis*, 101 ADDICTION 556, 558, 562 (2006)).

¹⁹⁵ *Id.*

¹⁹⁶ Lynn E. Fiellin et al., *Previous Use of Alcohol, Cigarettes, and Marijuana and Subsequent Abuse of Prescription Opioids in Young Adults*, 52 J. ADOLESCENT HEALTH 158, 158 (2013).

¹⁹⁷ Roberto Secades-Villa et al., *Probability and Predictors of the Cannabis Gateway Effect: A National Study*, 26 INT’L J. DRUG POL’Y 135, 135 (2015).

¹⁹⁸ Chadwick et al., *supra* note 190, at 3 (citing Maria Ellgren et al., *Adolescent Cannabis Exposure Alters Opiate Intake and Opioid Limbic Neuronal Populations in Adult Rats*, 32 NEUROPSYCHOPHARMACOLOGY 607, 607, 610 (2007); Hilarie C. Tomasiewicz et al., *Proenkephalin Mediates the Enduring Effects of Adolescent Cannabis Exposure Associated with Adult Opiate Vulnerability*, 72 BIOLOGICAL PSYCHIATRY 803, 803, 805 (2012)).

overly simplistic, invalid theory and should be retired. As Doctor John Kleinig has posited:

Since . . . [the popularization of] the idea of gateway drugs, there has been a multitude of studies designed to affirm, elaborate, interpret, fine tune, replicate, contextualize, and question the hypothesis. The result, as I perceive it, is that the hypothesis has suffered the death of a thousand qualifications—it becomes an empty peg whose removal is long overdue.¹⁹⁹

According to Kleinig, the scientific community should focus on the interactions of all factors that could potentially provide a drug gateway, rather than one specific factor like marijuana.²⁰⁰ Even studies that present results supporting an association between cannabis use and the use of other illicit drugs caveat that the factors that predict whether an individual will progress from cannabis to illicit drugs are still undetermined.²⁰¹ Some researchers agree, maintaining that the existence of variances in drug use trajectory, prior alcohol and tobacco use, and the fact that marijuana use does not make illicit substance abuse inevitable present problems for the gateway hypothesis.²⁰² Furthermore, many scholars believe that the gateway hypothesis assumes a causal connection between marijuana use and the use of other illicit drugs when in reality there is only a statistical association between “common” and “uncommon” drugs.²⁰³ Whether marijuana is a gateway drug that increases the propensity of a user to become addicted to other illicit drugs remains a grey area, with strong, conflicting opinions on both sides of the debate.

2. *Effect on Crime Rates*

The effect of recreational marijuana legalization on crime is a topic of continuing debate. There has not been sufficient time since the legalization of recreational marijuana for data to reliably support one side of the debate or the other, and crime rates are extremely volatile due to a host of confounding factors that make a direct causation to changes in crime rates difficult to ascertain.²⁰⁴

¹⁹⁹ John Kleinig, *Ready for Retirement: The Gateway Drug Hypothesis*, 50 SUBSTANCE USE & MISUSE 971, 974 (2015).

²⁰⁰ *Id.*

²⁰¹ See Secades-Villa et al., *supra* note 197, at 136, 140.

²⁰² Rashi K. Shukla, *Inside the Gate: Insiders' Perspectives on Marijuana as a Gateway Drug*, 35 HUMBOLDT J. SOC. REL. 5, 6 (2013).

²⁰³ LYNN ZIMMER & JOHN P. MORGAN, MARIJUANA MYTHS MARIJUANA FACTS 33–37 (1997).

²⁰⁴ See COLO. DEP'T OF PUB. SAFETY, MARIJUANA LEGALIZATION IN COLORADO: EARLY FINDINGS, A REPORT PURSUANT TO SENATE BILL 13-283, at 10 (2016), <https://cdpsdocs.state.co.us/ors/docs/reports/2016-SB13-283-Rpt.pdf> [<https://perma.cc/QL3A-BP7E>] [hereinafter LEGALIZATION IN COLORADO]; Keith Coffman & Nicole Neroulis, *Colorado, Washington First States to Legalize Recreational Pot*, REUTERS (Nov. 6, 2012), <https://www.reuters.com>

In Washington, violent crime has decreased by 10% and the overall crime rate has remained at a forty-year low since the passage of I-502 in 2012, suggesting that the legalization of marijuana has not lead to an increase in crime.²⁰⁵ In Portland, Oregon, violent and property crimes have remained steady in the months since legalization.²⁰⁶ Colorado's violent crime rate decreased 6% and its property crime rate decreased 3% from 2009 to 2014.²⁰⁷ However, it is worth noting that in 2016 Colorado saw a rise in auto thefts, rape, murder, and robbery, and its crime rate shot up by 3.4%.²⁰⁸ Although there are many potential causes for the increase in crime rate, some Colorado pundits blame the marijuana industry for luring criminals and transients into the state.²⁰⁹ Without further study, changes in crime rates cannot be causally linked to marijuana legalization.

3. *Increases in Drugged Driving*

Determining the trend in driving-under-the-influence (DUI) arrests in states that have legalized marijuana is difficult. There is no centralized database where this information is reported, officers are now taking different approaches to identifying intoxicated drivers, and only drivers who are pulled over and tested on the road are reported.²¹⁰ Some of the first states to legalize marijuana are beginning to collect information on marijuana DUI citations,²¹¹ but the evidence is inconclusive and requires additional study.²¹² In Washington State, the

/article/us-usa-marijuana-legalization/colorado-washington-first-states-to-legalize-recreational-pot-idUSBRE8A602D20121107 [https://perma.cc/TBX9-8DSN] (reporting that Colorado and Washington were the first states to legalize recreational marijuana in November 2012).

²⁰⁵ DRUG POL'Y ALL., STATUS REPORT: MARIJUANA LEGALIZATION IN WASHINGTON AFTER 1 YEAR OF RETAIL SALES AND 2.5 YEARS OF LEGAL POSSESSION 2 (July 2015), https://www.drugpolicy.org/sites/default/files/Drug_Policy_Alliance_Status_Report_Marijuana_Legalization_in_Washington_July2015.pdf [https://perma.cc/5NYU-BHQR].

²⁰⁶ ANGELA DILLS ET AL., CATO INST., DOSE OF REALITY: THE EFFECT OF STATE MARIJUANA LEGALIZATIONS 16 (2016), <https://object.cato.org/sites/cato.org/files/pubs/pdf/pa799.pdf> [https://perma.cc/LJ3W-5P8Y].

²⁰⁷ LEGALIZATION IN COLORADO, *supra* note 204, at 9.

²⁰⁸ Kirk Mitchell, *Crime Rate in Colorado Increases Much Faster than Rest of the Country*, DENVER POST (July 11, 2017), <http://www.denverpost.com/2017/07/11/colorado-sees-big-increase-crime-10-percent-higher-murder-rate/> [https://perma.cc/D2LN-HRT8].

²⁰⁹ *Id.*

²¹⁰ LEGALIZATION IN COLORADO, *supra* note 204, at 27–28; see also Martin Kaste, *More Washington Drivers Use Pot and Drive; Effect on Safety Disputed*, NPR (Aug. 19, 2015), <https://www.npr.org/2015/08/19/432896393/more-washington-drivers-use-and-drive> [https://perma.cc/V94D-WHCE].

²¹¹ See Patrick McGreevy, *California Lawmakers Want the State to Collect Data on Drivers Under the Influence of Pot*, L.A. TIMES (Aug. 28, 2018), <https://www.latimes.com/politics/la-pol-ca-pot-driver-accident-bill-california-20180828-story.html> [https://perma.cc/JW3V-YMKN].

²¹² LEGALIZATION IN COLORADO, *supra* note 204, at 27.

number of samples containing THC in DUI cases nearly doubled from 19% in 2012 to 33% in 2015.²¹³ In Colorado, summonses for DUIs concerning marijuana or marijuana-in-combination surprisingly *decreased* by about 1% between 2014 and 2015.²¹⁴ However, in Denver, DUIs in which marijuana or marijuana-in-combination was involved predictably increased from 33 cases in 2013 to 73 cases in 2015, and marijuana accounted for 2.5% of 2014 DUI citations and 3% of 2015 DUI citations.²¹⁵ Between July 1 and December 31 of 2015, the Oregon State Police reported 50 drivers driving under the influence of marijuana, as opposed to 19 drivers for the same time period during the previous year in which marijuana was still illegal.²¹⁶ However, due to a lack of systemic study and research controlling for confounding factors, none of these statistics can be used to establish a conclusive trend in DUIs since legalization.²¹⁷

If more drivers actually are driving under the influence of marijuana it likely means that the roads are less safe, although further study on this issue is necessary.²¹⁸ In a 2017 report by the National Academies of Sciences, Engineering, and Medicine (NASEM), a committee analyzed the most recent reviews of fair-to-good quality that analyzed the potential link between motor vehicle crashes and drivers under the influence of marijuana.²¹⁹ NASEM cited to a 2016 study by Ole Rogeberg and Rune Elvik as “both the most comprehensive and most recently published systematic review,” and it also “pooled studies reviewed in three earlier meta-analyses . . . [and] performed a structured search of online databases.”²²⁰ Rogeberg and Elvik’s meta-analysis found that driving under the influence of cannabis was associated with 20% to 30% higher odds of a motor vehicle crash.²²¹ According to the authors, as well

²¹³ Kaste, *supra* note 210.

²¹⁴ LEGALIZATION IN COLORADO, *supra* note 204, at 28.

²¹⁵ *Id.* at 29.

²¹⁶ Noelle Crombie, *Legal Pot in Oregon: One Year Later*, OREGONIAN (June 30, 2016), http://www.oregonlive.com/marijuana/index.ssf/2016/06/oregon_marks_1_year_anniversar.html [<https://perma.cc/Y9ST-YHFB>].

²¹⁷ See LEGALIZATION IN COLORADO, *supra* note 204, at 27.

²¹⁸ NASEM, *supra* note 8, at 228–30.

²¹⁹ NASEM, *supra* note 8, at 228 (citing Mark Asbridge et al., *Acute Cannabis Consumption and Motor Vehicle Collision Risk: Systematic Review of Observational Studies*, 344 BRIT. MED. J. 536, 539 (2012); Bianca Calabria et al., *Does Cannabis Use Increase the Risk of Death? Systematic Review of Epidemiological Evidence on Adverse Effects of Cannabis Use*, 29 DRUG & ALCOHOL REV. 318, 320–21 (2010); Rune Elvik, *Risk of Road Accident Associated with the Use of Drugs: A Systematic Review and Meta-Analysis of Evidence from Epidemiological Studies*, 60 ACCIDENT ANALYSIS & PREVENTION 254, 262, 265 (2013); Rebecca L. Hartman & Marilyn A. Huestis, *Cannabis Effects on Driving Skills*, 59 CLINICAL CHEMISTRY 478, 489–90 (2013); Mu-Chen Li et al., *Marijuana Use and Motor Vehicle Crashes*, 34 EPIDEMIOLOGIC REV. 65, 70 (2012); and Ole Rogeberg & Rune Elvik, *The Effects of Cannabis Intoxication on Motor Vehicle Collision Revisited and Revised*, 111 ADDICTION 1348, 1357 (2016)).

²²⁰ *Id.* (citing Asbridge et al., *supra* note 219; Elvik, *supra* note 219; Li et al., *supra* note 219).

²²¹ Rogeberg & Elvik, *supra* note 219, at 1355; NASEM, *supra* note 8, at 228–29.

as the committee that evaluated the study for the NASEM report, there is a low-to-moderate magnitude of association between driving under the influence of cannabis and motor vehicle crashes.²²² The NASEM committee ultimately concluded, in accordance with the 2016 study, that “[t]here is substantial evidence of a statistical association between cannabis use and increased risk of motor vehicle crashes.”²²³

4. Decreases in Workplace Productivity and Safety

Marijuana is the drug most often detected in workplace drug tests, a more likely prospect now than it was in the past.²²⁴ As detailed earlier in the Article, American perceptions of the risk of marijuana have changed drastically since the beginning of the century.²²⁵ In 2002, 38% of the population saw a great risk in using marijuana once a month, while that number fell to 26.5% by 2014.²²⁶ While the perceived risk of marijuana use shrinks, the potency of cannabis grows. In the 1970s THC content in marijuana hovered around 1%.²²⁷ THC levels in modern-day marijuana are now almost 13%, and some strains have a THC content of 25% or higher.²²⁸ This is a deadly combination in the workplace. Decreased perception of risk is associated with increased use,²²⁹ and the combination of increased use and increased potency of the drug could result, if used in the workplace, in an unsafe work environment.²³⁰

In the workplace, employees who are intoxicated by marijuana present “the risk and associated cost of adverse events and the loss of productivity.”²³¹ Marijuana has been connected with impairment of skills that are necessary for the safe operation of motor vehicles, and these results can be transferred to workplace accidents in which use of machines and motorized equipment is

²²² Røgeberg & Elvik, *supra* note 219, at 1357; NASEM, *supra* note 8, at 229.

²²³ NASEM, *supra* note 8, at 230.

²²⁴ Jennan A. Phillips et al., *Marijuana in the Workplace: Guidance for Occupational Health Professionals and Employers*, 57(4) J. OCCUPATIONAL & ENVTL. MED. 459, 459 (2015).

²²⁵ See *supra* Parts I, II.

²²⁶ Terri L. Dougherty, *Marijuana Use and Its Impact on Workplace Safety and Productivity*, OCCUPATIONAL HEALTH & SAFETY (Feb. 1, 2016), <https://ohsonline.com/Articles/2016/02/01/Marijuana-Use-and-Its-Impact-on-Workplace-Safety-and-Productivity.aspx?Page=1&p=1> [<https://perma.cc/YH3A-JH77>].

²²⁷ *Id.*

²²⁸ *Id.*; see also Phillips et al., *supra* note 224, at 461 (explaining how previous studies on the effects of marijuana may not apply to “today’s higher potency marijuana”).

²²⁹ U.S. DEP’T OF HEALTH & HUMAN SERVS., RESULTS FROM THE 2013 NATIONAL SURVEY ON DRUG USE AND HEALTH: SUMMARY OF NATIONAL FINDINGS 73 (2014), <https://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.pdf> [<https://perma.cc/YD4T-9BLV>] [hereinafter 2013 NATIONAL SURVEY].

²³⁰ See Dougherty, *supra* note 226; see also Phillips et al., *supra* note 224, at 461.

²³¹ Phillips et al., *supra* note 224, at 459.

present.²³² In evaluating the effect of drug-free workplace programs on the risk of occupational injuries, one study found that they caused a statistically significant decrease in injury rates for construction, manufacturing, and services industry groups.²³³

To reduce the risk of workplace injury, “The Joint Task Force recommends that marijuana use be closely monitored for all employees in safety-sensitive positions, whether or not covered by federal drug-testing regulations.”²³⁴ Furthermore, employers have duties under the Occupational Health and Safety Act (OSHA) to maintain practices and conditions as are reasonably necessary and appropriate to protect workers.²³⁵ Under this duty, it may be necessary for employers to exclude from employment individuals who are or potentially could be intoxicated by marijuana.²³⁶

Notwithstanding the above evidence, further research is required to determine if there is a direct link between marijuana use and injuries in the workplace. The National Academies of Sciences, Engineering, and Medicine suggests that, to get a better picture of this association, it “needs to be explored across a broad range of regions, populations, workplace settings, workplace practices (e.g., drug use prevention programs, safety standards), worker characteristics (e.g., medical history, history of drugs and alcohol use), work patterns, and occupations.”²³⁷

5. Marijuana’s Effect on the Youth

A National Survey on Drug Use and Health found that over the past decade there has been a decrease in the percentage of twelve to seventeen year-olds who consider there to be a “great risk” in using marijuana once per month or even a couple of times per week.²³⁸ This same survey stated that such a decrease in perceived risk often precedes an increase in use.²³⁹ In a recent report from the

²³² *Id.* at 461.

²³³ Thomas M. Wickizer et al., *Do Drug-Free Workplace Programs Prevent Occupational Injuries? Evidence from Washington State*, 39 HEALTH SERVS. RES. 91, 91 (2004).

²³⁴ Phillips et al., *supra* note 224, at 464.

²³⁵ Occupational Safety and Health Act, 29 U.S.C. § 651 (2012).

²³⁶ Phillips et al., *supra* note 224, at 464.

²³⁷ NASEM, *supra* note 8, at 236.

²³⁸ 2013 NATIONAL SURVEY, *supra* note 229, at 73 fig. 6.2.

²³⁹ *Id.* at 73 (“For example, the percentage of youths aged 12 to 17 indicating great risk in smoking marijuana once a month decreased from 34.4 percent in 2007 to 24.2 percent in 2013 (Figure 6.2). The rate of youths perceiving great risk in smoking marijuana once or twice a week also decreased from 54.6 percent in 2007 to 39.5 percent in 2013. Consistent with these decreasing trends in the perceived risk of marijuana use, the prevalence of past month marijuana use among youths increased between 2007 (6.7 percent) and 2011 (7.9 percent). Despite the perceived risk of marijuana use among youths continuing to decline between 2011 and 2013, however, the rate of past month marijuana use declined between

American Academy of Pediatrics, researchers opined that the legalization of marijuana by many states, although not targeting adolescents, has caused adolescents to increasingly perceive marijuana to be more “acceptable, safe, and therapeutic.”²⁴⁰ The report, citing multiple published studies, stated that the negative consequences of recreational marijuana use in adolescents have been well documented and include “impaired short-term memory and decreased concentration, attention span, and problem-solving skills, all of which interfere with learning. Alterations in motor control, coordination, judgment, reaction time, and tracking ability have also been documented.”²⁴¹ Because the prefrontal cortex of the brain, which controls decision-making and judgment, does not fully develop until the early-to-mid-twenties, marijuana abuse may affect the brain of an adolescent differently than the brain of an adult.²⁴² For example,

Studies examining brain functioning in youth who use cannabis regularly or heavily (defined as using 10-19 times/month or 20 or more times/month, respectively) show potential abnormalities that occur across a number of brain regions including those affecting memory (hippocampus) and executive functioning and planning (prefrontal cortex) . . . A major study also has shown that long-term marijuana use initiated in adolescence has negative effects on intellectual function and that the deficits in cognitive areas, such as executive function and processing speed, did not recover by adulthood, even when cannabis use was discontinued.²⁴³

2011 and 2013 (7.1 percent). The rate of past month marijuana use among youths in 2013 was similar to that in 2007.”).

²⁴⁰ Sheryl A. Ryan & Seth D. Ammerman, *Counseling Parents and Teens About Marijuana Use in the Era of Legalization of Marijuana*, 139 PEDIATRICS 1, 1 (2017), <http://pediatrics.aappublications.org/content/early/2017/02/23/peds.2016-4069> [<https://perma.cc/NPC6-M56D>].

²⁴¹ *Id.* at 2.

²⁴² *Id.* (citing Nora D. Volkow et al., *Adverse Health Effects of Marijuana Use*, 370 NEW ENG. J. MED. 2219, 2220 (2014); Ty S. Schepis, Bryon Adinoff, & Uma Rao, *Neurobiological Processes in Adolescent Addictive Disorders*, 17 AM. J. ADDICTION 6, 7 (2008); Alecia D. Schweinsburg, Sandra A. Brown, & Susan F. Tapert, *The Influence of Marijuana Use on Neurocognitive Functioning in Adolescents*, 1 CURRENT DRUG ABUSE REV. 99, 99 (2008); Christopher J. Hammond, Linda C. Mayes, & Mark N. Potenza, *Neurobiology of Adolescent Substance Use and Addictive Behaviors: Treatment Implications*, 25 ADOLESCENT MED.: STATE ART REV. 15, 16 (2014)).

²⁴³ *Id.* (citing Schepis, Adinoff, & Rao, *supra* note 242, at 7–8; Schweinsburg, Brown, & Tapert, *supra* note 242, at 99; Hammond, Mayes, & Potenza, *supra* note 242, at 16; Battistella et al., *Long-Term Effects of Cannabis on Brain Structure*, 39 NEUROPSYCHOPHARMACOLOGY 2041, 2041 (2014); Weiland et al., *Daily Marijuana Use Is Not Associated with Brain Morphometric Measures in Adolescents or Adults*, 35 J. NEUROSCI. 1505, 1505 (2015); Meier et al., *Persistent Cannabis Users Show Neuropsychological Decline from Childhood to Midlife*, 1909 PROC. NAT’L ACAD. SCI. U.S. 15980, 15980 (2012)).

According to the American Academy of Pediatrics, evidence demonstrates that marijuana is an addictive substance, particularly when use begins during youth.²⁴⁴ While 9% of individuals who experiment with marijuana eventually become addicted, when individuals begin marijuana use during adolescence this number increases to 17%.²⁴⁵ Furthermore, if individuals are daily users of marijuana in their youth this number increases to a range of 25% to 50%.²⁴⁶

A recent study also linked marijuana use to a lower probability of completing high school and obtaining a degree.²⁴⁷ According to a study of adolescent use, teenagers who use marijuana daily are over 60% less likely to complete high school than those who never use marijuana.²⁴⁸ Teenagers who use marijuana daily are also 60% less likely to graduate college.²⁴⁹ Finally, and tragically, those teenagers are seven times more likely to attempt suicide.²⁵⁰

6. Negative Health Effects

Marijuana has been associated with certain negative physical health effects, but more research and study is required to truly understand the relationship between marijuana use and these effects.²⁵¹ Negative health impacts on respiratory function, including chronic cough and phlegm production, have been associated with regularly smoking marijuana.²⁵² Published reports have also found “temporal relation[s] between marijuana use and the development of acute myocardial infarction, cardiomyopathy, and sudden cardiac death.”²⁵³ It is difficult to ascertain how direct this cardiac association is, however, because marijuana use is often combined with other drugs, such as alcohol, tobacco, and cocaine, and it is difficult to separate out the effects of each substance on the cardiovascular system.²⁵⁴ Smoking marijuana during pregnancy is linked to lower birth weight in babies,²⁵⁵ and, according to a recent JAMA study, an increasing number of expectant mothers are smoking marijuana (ironically, to

²⁴⁴ *Id.*

²⁴⁵ *Id.*

²⁴⁶ Ryan & Ammerman, *supra* note 240, at 2.

²⁴⁷ Committee on Substance Abuse, Committee on Adolescence, *supra* note 184, at 586 (citing Silins et al., *Young Adult Sequelae of Adolescent Cannabis Use: An Integrative Analysis*, 1 LANCET PSYCHIATRY 286, 286, 288 (2014)).

²⁴⁸ Ingraham, *supra* note 178 (citing Silins, *supra* note 247, at 286, 288).

²⁴⁹ *Id.*

²⁵⁰ *Id.*

²⁵¹ Volkow et al., *supra* note 242, at 2220.

²⁵² NASEM, *supra* note 8, at 181; see also Ryan & Ammerman, *supra* note 240, at 2 (citing to Joshi et al., *Marijuana and Lung Diseases*, 20 CURRENT OPINION PULMONARY MED. 173, 174 (2014)).

²⁵³ Grace Thomas et al., *Adverse Cardiovascular, Cerebrovascular, and Peripheral Vascular Effects of Marijuana Inhalation: What Cardiologists Need to Know*, 113 AM. J. CARDIOLOGY 187, 187 (2014).

²⁵⁴ *Id.*

²⁵⁵ NASEM, *supra* note 8, at 245.

help ease nausea due to morning sickness).²⁵⁶ The study found that the number of expectant mothers who reported using marijuana in the past month jumped from 2.37% in 2002 to 3.85% in 2014.²⁵⁷ Heavy marijuana use is also known to cause cannabinoid hyperemesis syndrome, in which individuals experience extreme nausea and vomiting.²⁵⁸ These symptoms resolve within days of ceasing marijuana use.²⁵⁹

Negative physical health effects are especially prevalent in pediatric populations exposed to marijuana.²⁶⁰ Studies analyzing pediatric populations exposed to marijuana have demonstrated that potentially serious symptoms may result from marijuana exposures.²⁶¹ Secondhand marijuana smoke has been linked to respiratory compromise in children.²⁶² According to a case report released in 2017 by two Colorado physicians, the death of an eleven-month-old baby who died from cardiac arrest following a seizure and myocarditis may have been linked to cannabis exposure.²⁶³ Another report analyzed symptoms in children between eleven and thirty-three months who were admitted to an ICU in Paris.²⁶⁴ These children had central nervous system symptoms such as drowsiness and coma, and some required intubation and mechanical ventilation.²⁶⁵ Another report analyzed calls to an Arizona poison control center concerning children under seven who had accidentally ingested marijuana.²⁶⁶ This report found that “the most commonly reported symptoms were lethargy (48% of cases), an inability to walk (53%), coma (10%), and vomiting (21%).”²⁶⁷ The documented adverse reactions of children who have accidentally

²⁵⁶ Jacqueline Howard, *More Pregnant Women Are Using Pot, Study Finds*, CNN (Dec. 27, 2017), <http://www.cnn.com/2017/12/26/health/marijuana-pregnancy-statistics-study/index.html> [<https://perma.cc/WDM3-CHLF>].

²⁵⁷ *Id.*

²⁵⁸ Pauline Bartolone, *Heavy Marijuana Use Linked to Rare Vomiting Illness*, CNN HEALTH (Dec. 4, 2017), <http://www.cnn.com/2017/12/04/health/vomiting-illness-marijuana-partner/index.html> [<https://perma.cc/Z67F-8K2H>]; Jonathan Lapook, *Mysterious Illness Tied to Marijuana Use on the Rise in States with Legal Weed*, CBS NEWS (Dec. 28, 2016), <https://www.cbsnews.com/news/mysterious-illness-tied-to-marijuana-use-on-the-rise-in-states-with-legal-weed/> [<https://perma.cc/ACY8-S244>].

²⁵⁹ Lapook, *supra* note 258.

²⁶⁰ Ryan & Ammerman, *supra* note 240, at 2.

²⁶¹ *Id.*

²⁶² *Colorado Study Finds One in Six Children Hospitalized for Lung Inflammation Test Positive for Marijuana Exposure*, AM. ACAD. PEDIATRICS (Apr. 30, 2016), <https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/Colorado-Study-Finds-One-in-Six-Children-Hospitalized-for-Lung-Inflammation-Positive-for-Marijuana-Exposure.aspx> [<https://perma.cc/N6FE-UGCG>].

²⁶³ Thomas M. Nappe & Christopher O. Hoyte, *Pediatric Death Due to Myocarditis After Exposure to Cannabis*, 1 CLINICAL PRAC. & CASES EMERGENCY MED. 166, 166 (2017).

²⁶⁴ NASEM, *supra* note 8, at 232.

²⁶⁵ *Id.*

²⁶⁶ *Id.* at 232–33.

²⁶⁷ *Id.* at 233.

been exposed to cannabis demonstrate the special risks to health that are present in pediatric populations.

Marijuana use has also been associated with negative psychiatric health effects. Ryan and Ammerman found that “longitudinal studies linking marijuana use with higher rates of mental health disorders, such as depression and psychosis, recently have been published, raising concerns about longer-term psychiatric effects.”²⁶⁸ The risk of developing schizophrenia and other psychosis is likely increased by marijuana use.²⁶⁹ The higher the use of marijuana by an individual, the greater the risk is increased.²⁷⁰ Heavy users of marijuana are more likely to report suicidal thoughts than those who do not use marijuana.²⁷¹ Regular marijuana use also likely increases the risk of the development of social anxiety disorder.²⁷²

7. Increased Calls to Poison Control Centers and Emergency Room Visits

Calls to poison control centers for marijuana exposure have increased in states that have legalized marijuana.²⁷³ Particularly in Washington and Colorado, where recreational marijuana has been legalized since 2014 (long enough to obtain some data) statistics demonstrate an increase in these reports.²⁷⁴ In 2012, Washington State had 162 calls to its poison center, a number that spiked up to 245 in 2014.²⁷⁵ Colorado’s poison control center reported 127 marijuana-related calls in 2013.²⁷⁶ This number spiked to 233 in 2014.²⁷⁷ Furthermore, poison control centers reasonably speculate that the number of calls they received is under-representative of actual marijuana adverse reactions, as many people are embarrassed and never call about their adverse symptoms.²⁷⁸

There has also been a statistically significant increase in non-residents coming to Colorado emergency rooms because of marijuana since

²⁶⁸ Ryan & Ammerman, *supra* note 240, at 2 (first citing to Volkow et al., *supra* note 242, at 2221; and then citing A. Eden Evins et al., *The Effect of Marijuana Use on the Risk for Schizophrenia*, 73 J. CLINICAL PSYCHIATRY 1463, 1463 (2012)).

²⁶⁹ NASEM, *supra* note 8, at 295.

²⁷⁰ *Id.* at 289.

²⁷¹ *Id.* at 314.

²⁷² *Id.* at 318.

²⁷³ Josiah M. Hesse, *Why Are People Going to the Emergency Room for Weed?*, THE CANNABIST (Jan. 14, 2016), <http://www.thecannabist.co/2016/01/14/pot-emergency-room-marijuana-er/42939/> [<https://perma.cc/M4SD-HXA5>].

²⁷⁴ *Id.*

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ *Id.*

²⁷⁸ *Id.*

legalization.²⁷⁹ The Colorado Hospital Association reported that for every 10,000 hospital visits by non-residents, 78 were due to marijuana in 2012, 112 in 2013, and 163 in 2014.²⁸⁰ For every 10,000 in-state Colorado resident emergency room visits, 70 were due to marijuana in 2012, 86 in 2013, and 101 in 2014.²⁸¹ Marijuana patients in Colorado hospitals typically complain of three types of symptoms: “psychiatric issues, particularly anxiety or agitation or brief psychosis; cardiovascular issues such as high blood pressure and a fast heart rate; and gastrointestinal issues such as nausea or vomiting.”²⁸² According to Dr. Andrew Monte, an emergency room toxicologist at the University of Colorado Denver, three typical types of visitors are seen.²⁸³ The first are patients whose underlying medical conditions were exacerbated by marijuana use.²⁸⁴ The second are patients who were put in dangerous situations (like motor vehicle accidents) when under the influence of marijuana.²⁸⁵ Finally, the third are patients who had smoked or ingested too much marijuana and were overly intoxicated.²⁸⁶

IV. THE SPECIAL RISKS POSED BY MARIJUANA EDIBLES

A. *Why Are Edibles So Popular?*

Many marijuana users choose to consume through the use of edibles—marijuana-infused food that is ingested for a high.²⁸⁷ Marijuana edibles come in

²⁷⁹ Tom McGhee, *Study: Marijuana Sends More Colorado Tourists to Emergency Rooms than Locals*, DENVER POST <https://www.denverpost.com/2016/02/24/study-marijuana-sends-more-colorado-tourists-to-emergency-rooms-than-locals/> (last updated Oct. 2, 2016) [<https://perma.cc/7DAL-4FEN>] (citing Howard S. Kim et al., *Marijuana Tourism and Emergency Department Visits in Colorado*, 374 NEW ENG. J. MED. 797, 797–98 (2016) [hereinafter *Marijuana Tourism*]); see also Angus Chen, *Colorado Pot Tourists Are More Apt to Land in the ER than Locals*, NPR (Feb. 24, 2016), <https://www.npr.org/sections/health-shots/2016/02/24/468009810/for-pot-tourists-the-trip-is-more-likely-to-end-in-the-er> [<https://perma.cc/3G2C-599M>] (also citing *Marijuana Tourism*, *supra*, at 797–98); Colleen Curry, *Pot Tourists in Colorado Are Getting Too High and Ending up in the ER*, VICE NEWS (Feb. 25, 2016), <https://news.vice.com/article/pot-tourists-in-colorado-are-getting-too-high-and-ending-up-in-the-er> [<https://perma.cc/X9NJ-MHTM>] (also citing *Marijuana Tourism*, *supra*, at 797–98).

²⁸⁰ McGhee, *supra* note 279 (citing *Marijuana Tourism*, *supra* note 279, at 797–98).

²⁸¹ *Id.*

²⁸² Curry, *supra* note 279.

²⁸³ Maggie Fox, *Emergency Room Visits Double for Marijuana-Using Colorado Visitors*, NBC NEWS (Feb. 25, 2016), <https://www.nbcnews.com/storyline/legal-pot/emergency-room-visits-double-marijuana-using-colorado-visitors-n525081> [<https://perma.cc/48S3-HD2P>].

²⁸⁴ *Id.*

²⁸⁵ *Id.*

²⁸⁶ *Id.*

²⁸⁷ Robert J. MacCoun & Michelle M. Mello, *Half-Baked—The Retail Promotion of Marijuana Edibles*, 372 NEW ENG. J. MED. 989, 989 (2015); Mike Montgomery, *Edibles Are*

a vast range of forms and potency levels, such as brownies, chocolate bars, lollipops, and candy.²⁸⁸ Edibles have become a highly desirable product within legal marijuana markets.²⁸⁹ “Among Colorado, Washington and Oregon, edibles ranked #3 in terms of market share of dollars sold during 2016, capturing 12 percent (\$269.8 million) of the \$2.33 billion cannabis market. Flower leads with 58 percent of the market, followed by concentrates at 20 percent.”²⁹⁰ In California, consumers purchased more than \$180 million in edibles in 2016, representing 10% of the cannabis market in the state.²⁹¹ Washington State’s edible sales increased 121% in 2016.²⁹² Colorado’s edible sales tripled between the first quarter of 2014 and the third quarter of 2016, increasing from \$17 million to \$53 million.²⁹³ Typically, 25% to 60% of a dispensary’s profits are attributable to edibles.²⁹⁴

According to one study and anecdotal accounts, edibles are appealing to many users due to several common perceptions: “(1) edibles are a discreet and more convenient way to consume cannabis; (2) edibles offer a ‘high’ that is calmer and more relaxing than smoking cannabis; and (3) edibles avoid the harmful toxins and health risks that come with smoking cannabis.”²⁹⁵ But scientific research and evaluation has not yet been completed to determine if these perceptions are legitimate.²⁹⁶

Edibles do carry a level of discretion and ease-of-use that other forms of marijuana consumption do not.²⁹⁷ For instance, in Washington State the most popular edible is “Mr. Moxey’s Mints,” which from an outside perspective simply gives the appearance of a user consuming a mint (a commonplace activity), rather than lighting up a joint.²⁹⁸ More than \$700,000 worth of

the Next Big Thing for Pot Entrepreneurs, FORBES (July 19, 2017), <https://www.forbes.com/sites/mikemontgomery/2017/07/19/edibles-are-the-next-big-thing-for-pot-entrepreneurs/#48d1acee576b> [<https://perma.cc/UA8W-SEFM>].

²⁸⁸ Daniel G. Barrus et al., *Tasty THC: Promises and Challenges of Cannabis Edibles*, RTI PRESS 6 (Nov. 2016), <https://www.rti.org/sites/default/files/resources/rti-publication-file-b5a159b0-ab5a-4042-9e5b-64910759fc29.pdf> [<https://perma.cc/5CBW-CBXY>]; MacCoun & Mello, *supra* note 287, at 989.

²⁸⁹ MacCoun & Mello, *supra* note 287, at 989.

²⁹⁰ *Consumers in CO and OR Go Their Own Way with Edibles*, BDS ANALYTICS (Apr. 6, 2017), <http://www.bdsanalytics.com/edibles-2/> [<https://perma.cc/XGQ3-T24H>].

²⁹¹ Montgomery, *supra* note 287.

²⁹² *Id.*

²⁹³ *Id.*

²⁹⁴ *Id.*

²⁹⁵ Barrus et al., *supra* note 288, at 2.

²⁹⁶ *Id.*

²⁹⁷ Jessie Wardarski, *Edible Marijuana Is Booming, But These Aren't Your Father's Pot Brownies*, NBC NEWS (Aug. 19, 2015), <https://www.nbcnews.com/health/health-news/these-are-not-your-fathers-pot-brownies-n411881> [<https://perma.cc/NX2R-GDNV>].

²⁹⁸ *Edibles Eating Up Marijuana Market Share; Bubble Could Burst*, KINDLAND (Feb. 21, 2017), <https://www.thekindland.com/products/edibles-eating-up-marijuana-market-share-bubble-could-burst-2646> [<https://perma.cc/3W9G-DF9A>] [hereinafter *Edibles Eating*].

Moxey's mints have been sold nationwide.²⁹⁹ In Colorado, the top seller in marijuana shops was Americanna's Sour Leaf Gummies in 2016, another discreet form of edible marijuana.³⁰⁰

B. Anecdotes of Edibles Gone Wrong

Many instances of bad edible reactions have been documented since states legalized marijuana.³⁰¹ Many of these cases have come from Colorado.³⁰² In March of 2014, Levy Thamba, a 19-year-old Wyoming college student, jumped from his hotel room balcony after eating a marijuana-infused cookie that had been purchased from a licensed and legal pot shop in Denver.³⁰³ Thamba's autopsy found that his blood contained 7.2 nanograms (ng) of active THC per milliliter of blood, and that marijuana intoxication was a chief contributing factor to his death.³⁰⁴ The legal limit in Colorado for individuals driving is 5 ng per milliliter.³⁰⁵ Thamba had consumed an entire marijuana cookie before his death, which had a total THC content of 65 mg.³⁰⁶ Originally, Thamba had only consumed a single serving size of the cookie (10 mg) as directed by the sales clerk.³⁰⁷ However, when he did not experience any effects an hour later he consumed what remained of the cookie.³⁰⁸ Still, the amount of marijuana that Thamba had consumed was by no means a lethal amount.³⁰⁹ According to one doctor, Thamba likely had a predisposition or underlying mental illness that the ingestion of so much marijuana triggered.³¹⁰ According to the police report, Thamba had no known history of mental illness.³¹¹

In the summer of 2014, Jordan Coombs inadvertently consumed THC-infused chocolates at a county fair's pot pavilion, despite the food being labeled as THC-free.³¹² Within twenty minutes, Coombs began to lose touch with

²⁹⁹ *Id.*

³⁰⁰ *Id.*

³⁰¹ See Andrew Blake, *CDC Warns of Dangers of Marijuana Edibles*, WASH. TIMES (July 26, 2015), <https://www.washingtontimes.com/news/2015/jul/26/cdc-warns-of-dangers-of-marijuana-edibles/> [<https://perma.cc/NUK6-REQK>].

³⁰² See, e.g., *id.*

³⁰³ *Id.*

³⁰⁴ *Id.*; Jessica B. Hancock-Allen et al., *Notes from the Field: Death Following Ingestion of an Edible Marijuana Product—Colorado, March 2014*, 64 CDC MORBIDITY & MORTALITY WEEKLY REPORT 771, 771–72 (July 2015), https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6428a6.htm?s_cid=mm6428a6_w [<https://perma.cc/23C7-Y2AD>].

³⁰⁵ Blake, *supra* note 301.

³⁰⁶ Hancock-Allen et al., *supra* note 304.

³⁰⁷ *Id.*

³⁰⁸ *Id.*

³⁰⁹ Blake, *supra* note 301.

³¹⁰ *Id.*

³¹¹ Hancock-Allen et al., *supra* note 304.

³¹² Lori Jane Gliha, *Potent Snacks: How Big Is Colorado's Marijuana Edibles Overdose Problem?*, ALJAZEERA AM. (Jan. 8, 2015), <http://america.aljazeera.com/watch/shows/america>

reality and thought that he was having a heart attack and dying.³¹³ His family drove him to the hospital, where he was admitted for a marijuana overdose.³¹⁴

In April of 2014, a Denver man shot and killed his wife after eating a marijuana-infused Karma Kandy, which contained 100 mg of THC, ten times the amount that Colorado defines as one serving of THC.³¹⁵ Richard Kirk shot and killed his wife, Kris Kirk, while she was on the phone with a 911 operator.³¹⁶ Before being shot, Kris Kirk told the operator that her husband had eaten marijuana candy, was behaving as though he was drunk, was hallucinating, and was retrieving his gun.³¹⁷ Richard Kirk's toxicology results found that he had 2.3 ng of THC per milliliter of blood in his system, less than the legal limit.³¹⁸ Richard Kirk originally claimed that he was not guilty due to reason of insanity because of marijuana-induced psychosis.³¹⁹ However, he eventually agreed to a plea deal of thirty years in prison.³²⁰ The prosecutor in the case stated that Kirk's marijuana use factored into her decision to broker a plea deal.³²¹

In March of 2015, Luke Goodman, a 22-year-old Oklahoma man, consumed between four and five servings of edibles after purchasing them while on a Keystone, Colorado family ski vacation.³²² After his family left the condo where they were staying, Goodman shot himself with a handgun that he traveled with for protection.³²³ Goodman's family was adamant that the edible marijuana had caused his suicide, stating that Goodman had no history of depression that would lead them to be concerned about suicidal tendency.³²⁴ The toxicology report, released by the Summit County Sheriff's Office, found that Goodman's blood contained 3.1 ng of THC per milliliter, which in Colorado is below the level of

-tonight/articles/2015/1/8/colorado-marijuanaediblesinfusedthcoverdose.html
[<https://perma.cc/GA4Q-J553>].

³¹³ *Id.*

³¹⁴ *Id.*

³¹⁵ Bobbi Sheldon et al., *Man, High on Pot Candy, Gets 30 Years Prison for Killing Wife*, USA TODAY (Apr. 7, 2017), <https://www.usatoday.com/story/news/nation-now/2017/04/07/husband-killed-wife-pot-candy/100190066/> [<https://perma.cc/TB9E-SVVX>].

³¹⁶ *Id.*

³¹⁷ ASSOCIATED PRESS, *Denver Man Who Said Marijuana Made Him Kill His Wife Gets 30 Years*, NBC NEWS (Apr. 7, 2017), <https://www.nbcnews.com/news/us-news/denver-man-who-said-marijuana-made-him-kill-his-wife-n744056> [<https://perma.cc/WFL9-PP57>] [hereinafter ASSOCIATED PRESS]; Sheldon, *supra* note 315.

³¹⁸ Sheldon et al., *supra* note 315.

³¹⁹ *Id.*

³²⁰ *Id.*

³²¹ ASSOCIATED PRESS, *supra* note 317.

³²² Ricardo Baca, *Oklahoma Man Killed Self in Keystone After Friend Says He Ate Pot Candies*, DENVER POST, <http://www.denverpost.com/2015/03/26/oklahoma-man-killed-self-in-keystone-after-friend-says-he-ate-pot-candies/> [<https://perma.cc/NR3B-SQPH>] (last updated Oct. 2, 2016).

³²³ *Id.*

³²⁴ *Id.*

THC that is considered to be legally impaired.³²⁵ However, the coroner stated that the results characterize a “gray area” and may not represent the original full dosage that Goodman had in his system at the time of death.³²⁶ Within the first hour of ingestion, THC levels in the blood drop sharply, but following this initial time period, the half-life of the drug is longer.³²⁷ THC in the blood is “relatively short-lived—not something that [is] going to stay in the blood for a long time . . . [THC is] going to affect people differently. There is no across-the-board, cookie-cutter standard.”³²⁸

And perhaps the most famous account of edibles-gone-wrong comes from *New York Times* op-ed columnist Maureen Dowd, who tried part of an edible marijuana candy bar when reporting on the marijuana revolution in Colorado in June of 2014.³²⁹ She ate part of the bar while in her Denver hotel room.³³⁰ What followed were eight hours in which she lost control of her body.³³¹ As Dowd recounts:

I felt a scary shudder go through my body and brain. I barely made it from the desk to the bed, where I lay curled up in a hallucinatory state for the next eight hours. I was thirsty but couldn’t move to get water. Or even turn off the lights. I was panting and paranoid, sure that when the room-service waiter knocked and I didn’t answer, he’d call the police and have me arrested for being unable to handle my candy. I strained to remember where I was or even what I was wearing, touching my green corduroy jeans and staring at the exposed-brick wall. As my paranoia deepened, I became convinced that I had died and no one was telling me.³³²

Dowd learned the next day that, for novices, the candy bar she had tried was supposed to be cut into sixteen pieces.³³³

³²⁵ Elise Reuter, *Toxicology Report Released Following Keystone Marijuana Suicide*, SUMMIT DAILY (Apr. 26, 2015), <http://www.summitdaily.com/news/crime/toxicology-report-released-following-keystone-marijuana-suicide/> [https://perma.cc/99W7-AAXQ].

³²⁶ *Id.*

³²⁷ *Id.*

³²⁸ *Id.* (quote by George Behonick, a toxicologist with the American Institute of Toxicology, the lab that processed Goodman’s results).

³²⁹ Maureen Dowd, *Don’t Harsh Our Mellow, Dude*, N.Y. TIMES (June 3, 2014), <https://www.nytimes.com/2014/06/04/opinion/dowd-dont-harsh-our-mellow-dude.html> [on file with *Ohio State Law Journal*].

³³⁰ *Id.*

³³¹ *Id.*

³³² *Id.*

³³³ *Id.*

C. The Root of Negative Reactions to Edibles: Ingesting Versus Smoking Marijuana

Edibles present unique risks distinct from other methods of consuming marijuana.³³⁴ This is mainly due to the difference in the way that the body processes ingested versus smoked marijuana.³³⁵ Once marijuana has reached the blood stream, it is quickly circulated to the brain and operates there to induce the typical symptoms thought of as a “high.”³³⁶ When marijuana is smoked, peak blood levels occur within five to ten minutes.³³⁷ Conversely, when marijuana is ingested as an edible, peak blood levels do not occur until one to two hours later.³³⁸ The duration of marijuana intoxication is also much longer when ingested than when smoked.³³⁹ Because of the lengthened wait for individuals to feel the effects of edibles, users sometimes consume multiple servings close together before feeling the effects of the original serving.³⁴⁰ “[I]t’s easier to self-monitor when smoking a joint, since one feels the effects so quickly. But with edible pot, because there can be an hours-long lag before experiencing the high, you might inadvertently consume an overdose amount while waiting [for the first effects to occur].”³⁴¹

Furthermore, edibles interact differently and less predictably with the body than smoking.³⁴² When inhaling marijuana, the drug goes directly to the brain.³⁴³ But edibles present a situation in which THC interacts with the digestive system of the body.³⁴⁴ Variables such as how recently the user has eaten and whether the user has taken other medications can affect how THC is metabolized.³⁴⁵ The amount of THC in the blood can be changed five-fold by these variables.³⁴⁶ The unpredictable nature of edible marijuana makes it more difficult to use with accuracy than inhaled marijuana.³⁴⁷ For instance, the Colorado Department of Revenue commissioned a report to determine the dosage equivalency between edibles and smoked marijuana in Colorado’s marijuana market.³⁴⁸ The report found that 1 mg of THC in an edible affects

³³⁴ Blake, *supra* note 301; MacCoun & Mello, *supra* note 287, at 989.

³³⁵ See Hancock-Allen et al., *supra* note 304.

³³⁶ Walton, *supra* note 17.

³³⁷ Hancock-Allen et al., *supra* note 304.

³³⁸ *Id.*

³³⁹ *Id.*

³⁴⁰ *Id.*

³⁴¹ Walton, *supra* note 17.

³⁴² *Id.*

³⁴³ *Id.*

³⁴⁴ *Id.*

³⁴⁵ *Id.*

³⁴⁶ *Id.*

³⁴⁷ Walton, *supra* note 17.

³⁴⁸ ADAM ORENS ET AL., COLO. DEP’T OF REVENUE, MARIJUANA EQUIVALENCY IN PORTION AND DOSAGE (Aug. 2015).

behavior similarly to 5.71 mg of THC in smoked marijuana.³⁴⁹ Currently, many states define a single edible serving size as 10 mg, but researchers recommend that edible users start with a low dose and gradually raise the dosage level until they find an effective dose in order to prevent accidental overdose.³⁵⁰

D. Statistics and Studies on Edibles

Although studies on the differences between the effects of edibles versus smoked marijuana are scant,³⁵¹ some preliminary research has been done on the topic. Typically, marijuana-induced psychotic symptoms due to an overdose of cannabis only last while an individual is intoxicated.³⁵² However, in some cases these psychotic symptoms persist for much longer—up to days afterwards.³⁵³ “Literature regarding such cases of ‘cannabis-induced psychosis’ is limited, but the condition is believed to be the result of overconsumption of [THC], and many of the reported cases occur following ingestion of an edible.”³⁵⁴ Studies have found that nonusers report a greater negative reaction to edibles than to smoked marijuana.³⁵⁵ Another study found that the majority of hospital visits concerning marijuana intoxication are due to edibles, likely because users do not account for the delayed effects of ingested cannabis.³⁵⁶ Furthermore, inaccuracy of edible dosing can present huge problems for users.³⁵⁷ One study found that 83% of medicinal edibles from California and Washington contained THC levels that differed by over 10% from the labeled amounts when tested.³⁵⁸ Of these edibles, more than one-half contained significantly less THC and one-quarter contained significantly more THC than labeled.³⁵⁹

³⁴⁹ Barrus et al., *supra* note 288, at 6 (citing ORENS ET AL., *supra* note 348, at 7).

³⁵⁰ *Id.* (citing ORENS ET AL., *supra* note 348, at 6).

³⁵¹ *See id.* at 2.

³⁵² *Id.* at 5.

³⁵³ *Id.*

³⁵⁴ *Id.* (citing three studies: Quan M. Bui et al., *Psychiatric and Medical Management of Marijuana Intoxication in the Emergency Department*, 16 W. J. EMERGENCY MED. 414, 415 (2015); Bernard Favrat et al., *Two Cases of “Cannabis Acute Psychosis” Following the Administration of Oral Cannabis*, BMC PSYCHIATRY (2005); Marissa Hudak et al., *Edible Cannabis-Induced Psychosis: Intoxication and Beyond*, 172 AM. J. PSYCHIATRY 911, 911 (2015)).

³⁵⁵ Barrus et al., *supra* note 288, at 3 (citing Sarah R. Calhoun et al., *Abuse Potential of Dronabinol (Marinol)*, 30 J. PSYCHOACTIVE DRUGS 187, 192 (1998); Margaret Haney, *Opioid Antagonism of Cannabinoid Effects: Differences Between Marijuana Smokers and Nonmarijuana Smokers*, NEUROPSYCHOPHARMACOLOGY 1391, 1391 (2007).

³⁵⁶ *Id.* at 5–6 (citing Andrew A. Monte et al., *The Implications of Marijuana Legalization in Colorado*, 313 JAMA 241, 242 (2015)).

³⁵⁷ *Id.* at 5.

³⁵⁸ *Id.* at 8 (citing Ryan Vandrey et al., *Cannabinoid Dose and Label Accuracy in Edible Medical Cannabis Products*, 313 JAMA 2491, 2491 (2015)).

³⁵⁹ *Id.* (citing Vandrey et al., *supra* note 358, at 2491).

Children in particular are susceptible to the risks that edibles present.³⁶⁰ A 2016 study used National Poison Data System data in finding that poison centers received 1,969 calls related to children younger than six being exposed to cannabis between the years 2000 and 2013.³⁶¹ Of these calls, 75% occurred because a child had ingested cannabis or a cannabis product.³⁶² The side effects associated with these incidences ranged from lethargy to cardiovascular symptoms to respiratory depression to coma.³⁶³ According to another report analyzing poison control calls between 2005 and 2011, the rate of calls for unintentional pediatric cannabis exposures increased by 1.5% annually in states where cannabis was illegal; increased by 11.5% in states transitioning to decriminalization; and increased by 30.3% in states where cannabis was legalized.³⁶⁴ According to this report, ingestion accounted for 78% of all documented incidents, making it the most common method of accidental pediatric exposure.³⁶⁵ The Children's Hospital of Colorado reported that fourteen children under ten were admitted to the hospital for edible ingestion in the first eleven months of 2014, seven of whom required ICU treatment.³⁶⁶ The Colorado Department of Public Health and Environment, informed by the above evidence, "found moderate evidence that more unintentional pediatric cannabis exposures have occurred in states with increased legal access to cannabis and that the exposures can lead to significant clinical effects requiring medical attention."³⁶⁷ According to a recent study in the JAMA Pediatrics medical journal, the number of children visiting the Children's Hospital of Colorado emergency room for marijuana was nearly twice that in 2014 and 2015 as it was before recreational marijuana stores were opened, and poison control center calls multiplied by five.³⁶⁸ The study found that of the cases of pediatric accidental marijuana ingestion seen at the Children's Hospital of Colorado, edibles caused almost half.³⁶⁹

Increases in negative reactions to edibles are not limited to children, however. Adults, particularly novices and tourists in states that have legalized

³⁶⁰ MacCoun & Mello, *supra* note 287, at 989.

³⁶¹ NASEM, *supra* note 8, at 233 (citing Bridget Onders et al., *Marijuana Exposure Among Children Younger than Six Years in the United States*, 55 CLINICAL PEDIATRICS 428, 430 (2016)).

³⁶² *Id.*

³⁶³ *Id.* at 233–34.

³⁶⁴ Barrus et al., *supra* note 288, at 6–7 (citing George S. Wang et al., *Association of Unintentional Pediatric Exposures with Decriminalization of Marijuana in the United States*, 63 ANNALS EMERGENCY MED. 684, 686 (2014)).

³⁶⁵ NASEM, *supra* note 8, at 234.

³⁶⁶ Gliha, *supra* note 312.

³⁶⁷ NASEM, *supra* note 8, at 234.

³⁶⁸ John Ingold, *Kids' Emergency Room Visits for Marijuana Increased in Colorado After Legalization, Study Finds*, DENVER POST (Oct. 2, 2016), <https://www.denverpost.com/2016/07/25/colorado-kids-emergency-room-visits-marijuana-increased/> [<https://perma.cc/A48D-S69T>].

³⁶⁹ *Id.*

marijuana, have also experienced increased emergency room visits since legalization.³⁷⁰ For instance, in Aurora, Colorado, one study found that the amount of non-Colorado resident patient hospital visits due to marijuana almost doubled from 85 in every 10,000 visits in 2013 to 168 in every 10,000 visits in 2014.³⁷¹ The study attributed the increase in hospital visits to higher potency of marijuana products and the visiting individuals' unfamiliarity with edible products.³⁷² The Colorado Department of Public Health also released a report in 2016 that found hospitalizations of patients with possible marijuana exposures increased from 803 per 100,000 between 2001 and 2009 to 2,413 per 100,000 between 2014 and June of 2015 (after commercialization).³⁷³ This is an increase from approximately .8% pre-legalization to a little over 2.4% post-legalization.³⁷⁴ Edibles were the most common form of marijuana responsible for these exposures.³⁷⁵

Furthermore, a 2016 study analyzing data obtained from the National Poison Data System shows that between 2013 and 2015 there was an increase in poison control center calls directly related to edibles.³⁷⁶ Edible-related calls were most commonly placed in Washington and Colorado, and (a shocking) 91% of these calls occurred in states in which marijuana has been decriminalized.³⁷⁷ The calls increased every year of the study.³⁷⁸ The study concluded that most symptoms were minor, with some adults and children requiring ventilator support.³⁷⁹ Finally, the study speculated "the increasing exposures may be related to a combination of delayed absorption [of THC] . . . lagging packaging regulations, increased accessibility in decriminalized states, and increased familiarity of poison center specialists with edible product codes."³⁸⁰ The above data suggest that negative reactions to edible exposure will continue to increase as the trend of legalization among the states continues.³⁸¹

³⁷⁰ Barrus et al., *supra* note 288, at 7.

³⁷¹ *Id.* at 7 (citing *Marijuana Tourism*, *supra* note 279, at 797–98).

³⁷² *Id.*

³⁷³ JACK K. REED, COLO. DEP'T OF PUBLIC SAFETY, MARIJUANA LEGALIZATION IN COLORADO: EARLY FINDINGS, A REPORT PURSUANT TO SENATE BILL 13-283, at 7 (2016).

³⁷⁴ *See id.*

³⁷⁵ Barrus et al., *supra* note 288, at 7 (citing Wang et al., *supra* note 364, at 688); *see also* Gillian Mohney, *Colorado Marijuana Report Reveals Increase in Hospital Visits After Legalization*, ABC NEWS (Apr. 19, 2016), <http://abcnews.go.com/Health/colorado-marijuana-report-reveals-increase-hospital-visits-legalization/story?id=38514764> [<https://perma.cc/F26W-PYM2>].

³⁷⁶ Dazhe Cao et al., *Characterization of Edible Marijuana Product Exposures Reported to United States Poison Centers*, 54 CLINICAL TOXICOLOGY 840, 841 (2016).

³⁷⁷ *Id.*

³⁷⁸ *Id.*

³⁷⁹ *Id.* at 845.

³⁸⁰ *Id.* at 840.

³⁸¹ Barrus et al., *supra* note 288, at 7.

E. Edible Regulations by State

As more states begin to legalize recreational marijuana, varying regulatory regimes are emerging with respect to edibles. All states have instituted labeling requirements for edibles, but there is a wide range of approaches to those requirements. All states require that warning labels about the intoxicating effects of THC are included,³⁸² some require a state-designated marijuana symbol to be included on the label,³⁸³ some require nutrition facts on the label,³⁸⁴ and some merely require a list of ingredients on the label.³⁸⁵ States also vary with respect to how many milligrams of THC constitute a serving size, choosing between five milligrams³⁸⁶ and ten milligrams.³⁸⁷ All states limit in some manner the manufacture and presentation of edibles in a way that appeals to children,³⁸⁸ but they vary widely in how they do so. Some only prohibit the use of cartoon characters on the packaging,³⁸⁹ whereas a few prohibit candy altogether.³⁹⁰ Finally, all states require packaging that is child-resistant.³⁹¹

The table below outlines the scattered regulatory state of affairs as of January 2018 for edibles in states in which recreational marijuana use is legal:

³⁸² ALASKA ADMIN. CODE tit. 3, § 306.345 (2016); CAL. CODE REGS. tit. 17, § 40408 (2017); COLO. CODE REGS. § 212-2 R 1003 (2016); NEV. REV. PROPOSED REG. OF DEP'T OF TAX. LCB File No. R092-17 § 225(1)(h) (Dec. 13, 2017); OR. ADMIN. R. 333-007-0070 (2017); WASH. ADMIN. CODE § 314-55-105 (2016).

³⁸³ COLO. CODE REGS. § 212-2 R. 1002-1; OR. ADMIN. R. 333-007-0070.

³⁸⁴ OR. ADMIN. R. 333-007-0070.

³⁸⁵ WASH. ADMIN. CODE § 314-55-105.

³⁸⁶ ALASKA ADMIN. CODE tit. 3, § 306.560; OR. ADMIN. R. 333-007-0210 (referencing THC concentration limits of edibles as stated in Table 1, available at http://www.oregon.gov/oha/PH/DISEASES/CONDITIONS/CHRONICDISEASE/MEDIC_ALMARIJUANAPROGRAM/Documents/rules/333-007-0210-Table-1-eff-05-31-17.pdf).

³⁸⁷ CAL. CODE REGS. tit. 17, § 40305; COLO. CODE REGS. § 212-2 R 604; NEV. REV. PROPOSED REG. OF DEP'T OF TAX. LCB File No. R092-17 § 167(2); WASH. ADMIN. CODE § 314-55-095.

³⁸⁸ ALASKA ADMIN. CODE tit. 3, § 306.510; CAL. CODE REGS. tit. 17, § 40410; COLO. CODE REGS. § 212-2 R 1-1002; NEV. REV. PROPOSED REG. OF DEP'T OF TAX. LCB File No. R092-17 § 219(1)(b); OR. ADMIN. R. 845-025-7020; WASH. ADMIN. CODE § 314-55-155.

³⁸⁹ CAL. CODE REGS. tit. 17, § 40410; NEV. REV. PROPOSED REG. OF DEP'T OF TAX. LCB File No. R092-17 § 219(1)(c).

³⁹⁰ ALASKA ADMIN. CODE tit. 3, § 306.510(a)(4)(B); OR. ADMIN. R. 845-025-3220; WASH. ADMIN. CODE § 314-55-077.

³⁹¹ ALASKA ADMIN. CODE tit. 3, § 306.345(a)(3); CAL. CODE REGS. tit. 17, § 40415(c); COLO. CODE REGS. § 212-2 R 1002-1; NEV. REV. PROPOSED REG. OF DEP'T OF TAX. LCB File No. R092-17 § 219(2); OR. ADMIN. R. 845-025-7020; WASH. ADMIN. CODE § 314-55-105.

Table 2: *Recreational Marijuana Laws in the United States (January 2018)*

State	Governing Regulatory Body	Laws Governing Edibles	Summary of Laws Governing Edibles
Alaska	Marijuana Control Board	See generally ALASKA ADMIN. CODE tit. 3, § 306 (2016) (including 306.345; 306.510; 306.560; 306.565; 306.645).	<p>Requires labeling of edibles cannabis products. The label must state that cannabis has intoxicating effects.³⁹²</p> <p>Quality control testing information must be maintained.³⁹³</p> <p>Amount of THC that may be included in each individual edible serving is limited to 5 mg, and the amount of THC in a single package of marijuana food product is limited to 50 mg.³⁹⁴</p> <p>Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.³⁹⁵</p> <p>Packaging cannabis products in bright colors or with cartoons or other visuals that would appeal to children are prohibited.³⁹⁶</p> <p>The manufacture of edibles likely to appeal to children (e.g., candy) is prohibited.³⁹⁷</p>

³⁹² ALASKA ADMIN. CODE tit. 3, § 306.345.

³⁹³ *Id.* at § 306.645.

³⁹⁴ *Id.* at § 306.560.

³⁹⁵ *Id.* at § 306.345.

³⁹⁶ *Id.* at § 306.510.

³⁹⁷ *Id.* at § 306.510.

			THC must be uniformly distributed throughout the edible product and inventory tracking from cultivation to sale is required. ³⁹⁸
California	Bureau of Cannabis Control	Proposition 64 (2016) (regulations go into effect January 2018) DPH-17-010E Emergency Cannabis Regulations	<p>Limits the amount of THC that may be included in each individual edible serving to 10 mg, and limits the amount of THC in a single package of marijuana food product to 100 mg.³⁹⁹</p> <p>Edible products consisting of more than one serving shall be marked to indicate one serving or be packaged in a way in which a single serving is easily identifiable.⁴⁰⁰</p> <p>Edible products shall be homogenized (within a standard deviation of 10%).⁴⁰¹</p> <p>The words “cannabis-infused” must be included on the packaging in bold type and a text size larger than the text size used for the identity of the product. The packaging must also include THC content and CBD content expressed in mg per serving.⁴⁰²</p> <p>Packaging of the edible products must be opaque,⁴⁰³ and must not include content</p>

³⁹⁸ ALASKA ADMIN. CODE tit. 3, § 306.560; *Id.* at § 306.565.

³⁹⁹ CAL. CODE REGS. tit. 17, § 40305 (2017).

⁴⁰⁰ *Id.* at § 40305(d).

⁴⁰¹ *Id.* at § 40305(e).

⁴⁰² *Id.* at § 40406.

⁴⁰³ *Id.* at § 40415.

			that is or is designed to be attractive to individuals under twenty-one, including cartoons, imitation candy packaging, etc. ⁴⁰⁴ The packaging must also include California's universal symbol for cannabis. ⁴⁰⁵ The package must be child-resistant and tamper-evident. ⁴⁰⁶
Colorado	Marijuana Enforcement Division	COLO. CODE REGS. § 212-2 (2017).	<p>Requires labeling of edibles cannabis products. The label must state that cannabis has intoxicating effects,⁴⁰⁷ it must contain the state-designated cannabis symbol,⁴⁰⁸ and it must state that intoxicating effects may take up to 2 hours after consumption to experience.⁴⁰⁹</p> <p>Quality control testing information must be made available to the consumer.⁴¹⁰</p> <p>Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.⁴¹¹</p> <p>THC must be uniformly distributed throughout the edible product⁴¹² and</p>

⁴⁰⁴ *Id.* at § 40410.

⁴⁰⁵ CAL. CODE REGS. tit. 17, § 40412.

⁴⁰⁶ *Id.* at § 40415.

⁴⁰⁷ COLO. CODE REGS. § 212-2 R 1003-1 (2017).

⁴⁰⁸ *Id.* at § 212-2 R 604.

⁴⁰⁹ *Id.* at § 212-2 R 1003-1.

⁴¹⁰ *Id.* at § 212-2 R 708(A).

⁴¹¹ *Id.* at § 212-2 R 1002-1.

⁴¹² *Id.* at § 212-2 R 602.

			<p>inventory tracking from cultivation to sale is required.⁴¹³</p> <p>Limits the amount of THC that may be included in each individual edible serving to 10 mg, and limits the amount of THC in a single package of marijuana food product to 100 mg.⁴¹⁴</p>
Massachusetts	Cannabis Control Commission	<p>None as of November 2017: Under Massachusetts General Law c.94G (“The Regulation and Taxation of Marijuana Act”), adults may possess and use marijuana as of December 2015, whereas retail marijuana stores will be permitted to open, after complying with licensing procedures, beginning July 2018.</p>	Not Applicable.
Maine	State Licensing Authority	<p>None as of November 2017: Although the use of recreational</p>	Not Applicable.

⁴¹³ COLO. CODE REGS. § 212-2 R 405 (2017).

⁴¹⁴ *Id.* at § 212-2 R 604.

		<p>marijuana was passed by ballot measure in November of 2016, legislation that would have regulated and taxed the sale of recreational marijuana was vetoed by Maine Governor Paul LePage on November 3, 2017⁴¹⁵ and the Governor's veto was sustained on November 6 by the Maine House.⁴¹⁶ The legislature has since enacted legislation facilitating "the development and administration of a regulated marketplace</p>	
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⁴¹⁵ Penelope Overton, *LePage Just Says No to Bill That Would Launch Maine's Marijuana Market*, PRESS HERALD <http://www.pressherald.com/2017/11/03/lepage-vetoes-marijuana-bill/> (last updated Nov. 30, 2017) [<https://perma.cc/8AKC-48BT>].

⁴¹⁶ Scott Thistle, *Maine House Upholds LePage's Veto of Recreational Marijuana Regulations*, PRESS HERALD, <http://www.pressherald.com/2017/11/06/legislature-set-to-take-up-lepage-veto-of-recreational-marijuana/> [<https://perma.cc/8AKC-48BT>] (last updated Nov. 7, 2017).

		for adult use marijuana.” ⁴¹⁷	
Nevada	State of Nevada Department of Taxation	Emergency regulation to implement packaging and labeling provisions for The Regulation and Taxation of Marijuana Act under NEV. REV. STAT. § 453D (2016). ⁴¹⁸	<p>Requires edibles to be clearly labeled with the words “This is a Marijuana Product”.⁴¹⁹</p> <p>Limits the amount of THC that may be included in each individual edible serving to 10 mg, and limits the amount of THC in a single package of marijuana food product to 100 mg.⁴²⁰</p> <p>The label must state that the intoxicating effects of the edible marijuana may be delayed by two hours or more and that the user should initially ingest a small amount of the product (containing no more than 10 mg of THC) and wait at least two hours before ingesting more. The labeling must also contain information about other side effects associated with marijuana use.⁴²¹</p> <p>Requires child-proof packaging of marijuana and marijuana products, restricts</p>

⁴¹⁷ ME. ST. LEG., RECREATIONAL MARIJUANA IN MAINE <https://legislature.maine.gov/9419> [<https://perma.cc/S478-ULBH>] (last updated Jan. 30, 2019).

⁴¹⁸ STATE OF NEV. DEP’T OF TAXATION, STATEMENT OF EMERGENCY REGULATION TO IMPLEMENT PACKAGING AND LABELING PROVISIONS FOR THE REGULATION AND TAXATION OF MARIJUANA ACT UNDER NRS 453D (June 22, 2017), <https://tax.nv.gov/uploadedFiles/taxnv.gov/Content/FAQs/Emergency%20Regulation%20-%20packaging%20labeling%20marijuana.pdf>.

⁴¹⁹ NEV. REV. PROPOSED REG. OF DEP’T OF TAX. LCB File No. R092-17 (Dec. 13, 2017).

⁴²⁰ *Id.*

⁴²¹ *Id.*

			marketing to children and packaging that would appeal to children (e.g., packaging that contains an image of a cartoon character, etc.), and prohibits marijuana products that are normally consumed or found appealing to children (e.g., lollipops, gummy bears, etc.). ⁴²²
Oregon	Liquor Control Commission	OR. ADMIN. R. 333-007 (2017) (including 333-007-0070, 333-007-0090, 333-007-0200, 333-007-210); OR. ADMIN. R. 845-025 (2016).	<p>Requires labeling of edible cannabis products: the label must contain state-designated cannabis symbol;⁴²³ must state that intoxicating effects may take up to two hours after consumption to experience.⁴²⁴</p> <p>Limits the amount of THC that may be included in each individual edible serving to 5 mg, and limits the amount of THC in a single package of marijuana food product to 50 mg.⁴²⁵</p> <p>Additional materials including information on edibles must be distributed with each edible sale⁴²⁶ or displayed on posters in dispensaries.⁴²⁷</p>

⁴²² *Id.*

⁴²³ OR. ADMIN. R. 333-007-0070 (2017).

⁴²⁴ *Id.*

⁴²⁵ *Id.* at R. 333-007-0210 (referencing THC concentration limits of edibles as stated in tbl.1, available at

<http://www.oregon.gov/oha/PH/DISEASES/CONDITIONS/CHRONICDISEASE/MEDICALMARIJUANAPROGRAM/Documents/rules/333-007-0210-Table-1-eff-05-31-17.pdf>).

⁴²⁶ *Id.* at R. 333-007-0070.

⁴²⁷ *Id.* at R. 845-025-2860.

			<p>Quality control testing information must be maintained.⁴²⁸</p> <p>Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.⁴²⁹ The manufacture of edibles likely to appeal to children (e.g., candy) is prohibited;⁴³⁰ the manufacture of edibles modeled after non-cannabis products consumed by children are prohibited.⁴³¹</p> <p>THC must be uniformly distributed throughout the edible product⁴³² and inventory tracking from cultivation to sale is required.⁴³³</p> <p>Extracts may not be applied to commercially available candy or snack foods.⁴³⁴</p>
Washington	Liquor and Cannabis Board	WASH. ADMIN. CODE § 314-55 (2016) (including 314-55-105; 314-55-095)	<p>Requires labeling of edible cannabis products. The label must state that cannabis has intoxicating effects.⁴³⁵</p> <p>Limits the amount of THC that may be included in each individual edible serving to 10 mg, and limits the amount of THC in a single</p>

⁴²⁸ *Id.* at R. 845-025-3230 (12).

⁴²⁹ OR. ADMIN. R. 845-025-3220 (2017).

⁴³⁰ *Id.* at R. 845-025-7020.

⁴³¹ *Id.* at R. 845-025-3220 (2).

⁴³² *Id.* at R. 845-025-7580.

⁴³³ *Id.* at R. 845-025-7570.

⁴³⁴ *Id.* at R. 845-025-3220 (2)(b).

⁴³⁵ WASH. ADMIN. CODE § 314-55-105 (15)(j) (2016).

			<p>package of marijuana food product to 100 mg.⁴³⁶</p> <p>Additional materials including information on edibles must be distributed with each edible sale or displayed on posters in dispensaries. Materials must contain warnings about associated health risks, impaired judgment, delayed activation, pesticides, extraction methods, and keeping out of the reach of children.⁴³⁷</p> <p>Quality control testing information must be made available to the consumer.⁴³⁸</p> <p>Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.⁴³⁹ The manufacture of edibles likely to appeal to children (e.g., candy) is prohibited;⁴⁴⁰ the manufacture of edibles modeled after non-cannabis products consumed by children are prohibited.⁴⁴¹</p> <p>THC must be uniformly distributed throughout the edible product⁴⁴² and</p>
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⁴³⁶ *Id.* at § 314-55-095.

⁴³⁷ *See id.* at § 314-55-105.

⁴³⁸ *Id.*

⁴³⁹ *Id.* at § 314-55-105.

⁴⁴⁰ *Id.* at § 314-55-155.

⁴⁴¹ WASH. ADMIN. CODE § 314-55-155 (2016).

⁴⁴² *Id.* at § 314-55-077.

			inventory tracking from cultivation to sale is required. ⁴⁴³
Washington, D.C.	Not Applicable.	In 2014, voters approved by ballot Initiative 71 the legalization of marijuana possession, cultivation, and gifting of certain amounts of marijuana. ⁴⁴⁴ Congress has refused to allow the District to institute a regulatory framework governing a marijuana market in which the drug can be sold by restricting the District's funding. ⁴⁴⁵ Because "gifting" is legal under Initiative 71, some businesses have been	Not Applicable.

⁴⁴³ *Id.* at § 314-55-083.

⁴⁴⁴ Maddie Garcia, *D.C. Marijuana Market: Stuck in a Gray Zone*, NPR (July 30, 2017), <https://www.npr.org/2017/07/30/537324044/d-c-marijuana-market-stuck-in-a-gray-zone> [<https://perma.cc/8WZX-3FCF>].

⁴⁴⁵ *Id.*

		selling food or clothes along with "bonus" marijuana, which presents the potential for edibles to be dangerously unregulated. 446	
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V. RECOMMENDATIONS FOR THE FUTURE OF EDIBLES

A. *Increased Study of the Edible Industry and Edibles' Impact on Health Is Needed*

Marijuana legalization is still fairly new, and there is a frightening lack of knowledge when it comes to the effect that legalizing edibles has had. Because the federal government still classifies marijuana as a Schedule I drug under the Controlled Substances Act, funding and availability of marijuana for such studies is difficult to obtain, and therefore high-quality, scientifically rigorous research that analyzes the benefits and risks of edibles is scant.⁴⁴⁷ Now that states are beginning to legalize marijuana, funding opportunities for such studies may be more easily attainable. Without question, further research needs to be conducted to truly understand the health risks surrounding edibles, to determine if they can be consumed safely, and to determine how they can be regulated to maximize the benefits associated with marijuana while minimizing the risks that are both marijuana-associated and edible-specific. Without more research in this area, the assumption that marijuana legalization has a positive net utility for society is unfounded, and worse, dangerous. Furthermore, research regarding whether edibles are safe to consume and in which way they can be most safely consumed is important in determining how regulations should be formulated to best reduce the associated risks. Studies that compare how effective the different state regulatory regimes are in reducing the risks of edibles would illuminate which types of regimes are working well and which states require a greater change to their edible regulations.⁴⁴⁸ However, these studies and research take time, and in the meantime steps must be taken today to reduce the risks

⁴⁴⁶ *Id.*

⁴⁴⁷ Barrus et al., *supra* note 288, at 3. See generally NASEM, *supra* note 8, at 432.

⁴⁴⁸ Justice Brandeis was famous for his comment that the states should be laboratories of experimentation—i.e., that their different experiences can inform national debate and future legislation and regulation. See *New State Ice Co. v. Liebmann*, 285 U.S. 262, 311 (1932).

associated with edible use and to protect vulnerable portions of the population from its potentially harmful health effects.

B. States Should Focus Greater Resources on Edible Education for Consumers and Schoolchildren

Despite the popularity of edibles in states that have legalized recreational marijuana, very little is actually known about its effects and risks.⁴⁴⁹ Minimal edible studies and research means that consumers lack information on how to safely use edibles. Consumers need to be educated about, and protected from, the unique risks associated with marijuana edibles, especially its delayed highs and accompanying risk of overdose and hospitalization.⁴⁵⁰ Given the nationwide trend towards legalization however, many novice consumers might think that marijuana use is perfectly safe, and that edibles are just as safe as smoking a joint. It is imperative that we engage in aggressive education to correct these falsehoods.

How can we do so? Risk education should take many forms. States should advertise in venues such as billboards, television, and radio. Within marijuana shops, signage should be required that relays the risks associated with edible consumption and the safest ways to consume edible marijuana. Furthermore, states should implement educational programs at the school-age level that are devoted to preventing adolescent misuse of edibles. Educational programs that explain the particular risk of edible marijuana are important, particularly because adolescent novices who try edible marijuana are at risk of ingesting too much. Now that marijuana is increasingly legal, education programs can give a more in-depth and informational approach to marijuana edibles and the dangers that they pose, which in turn will prepare adolescents for situations in which they will be presented with edibles or will buy edibles once they are of legal age.

C. Prominent Warning Labels on Marijuana Edibles, Though Important, Are Likely Not Effective Risk Reducers

Of course, edible marijuana products should also be prominently labeled with warnings to provide dosing and risk education to potential consumers, though we should not be too optimistic about this approach. Although research is minimal on how users respond to edible labels, other labels required by the FDA are not widely read or followed by consumers.⁴⁵¹ According to a recent survey conducted by the FDA, only 50% of adults report actually reading food product labels when buying the product for the first time.⁴⁵² The amount of

⁴⁴⁹ Barrus et al., *supra* note 288, at ii.

⁴⁵⁰ See Mohny, *supra* note 375.

⁴⁵¹ *Id.* at 9.

⁴⁵² *Id.*

people who report reading the label is likely to be over-representative of those who actually do so.⁴⁵³ Prescription medication labels have also been identified as a source of misunderstanding among patients taking a large number of medications and those with lower literacy levels.⁴⁵⁴ Even when patients understand prescription medication labels, a majority cannot correctly demonstrate the proper way to use the medication.⁴⁵⁵ So we must not be sanguine about the educational effect of labeling laws alone.

D. State Regulations of Edibles Should Be Overhauled

The state-specific regulatory marijuana regime has created a disturbing lack of uniformity in edible regulation, and in turn makes controlling the harmful effects of edibles extremely difficult. This problem can most clearly be seen in the pattern of inaccuracies when it comes to dosage, labeling, and consistency of THC levels throughout edible products.⁴⁵⁶ These inaccuracy issues stem from the edible industry's nonexistent standardization in product-preparation and quality control.⁴⁵⁷ Unlike alcohol and tobacco, which are subject to standardized federal regulation, marijuana is still illegal at the national level.⁴⁵⁸ Edibles are therefore not governed by federal quality control regulations, and the variance from state to state of regulations results in inconsistencies and unpredictability both between states and within states with less stringent edible regulations.⁴⁵⁹ Compounding this issue is the fact that many of those exposed to edibles are novices, children, and other vulnerable portions of the population who may be more susceptible to the negative effects that accompany inconsistencies in edible products.

1. No "Gummy Bear" Edibles: Pot Is Not Candy

In order to reduce edible-associated risks, certain universal regulations should be implemented in each state. First, edible regulations in all states that have legalized marijuana should institute a prohibition of any edibles that are modeled after non-cannabis products consumed by children, such as gummy bears, lollipops, and other candies. This requirement, present in Alaska, Nevada, Oregon, and Washington's regulatory regime, should be implemented in any

⁴⁵³ *Id.* (citing Gill Cowburn & Lynn Stockley, *Consumer Understanding and Use of Nutrition Labeling: A Systematic Review*, 8 PUB. HEALTH NUTRITION 21, 24 (2005)).

⁴⁵⁴ *Id.* (citing Terry C. Davis et al., *Literacy and Misunderstanding Prescription Drug Labels*, 145 ANNALS INTERNAL MED. 887, 888 (2006)).

⁴⁵⁵ *Id.*

⁴⁵⁶ See generally Barrus et al., *supra* note 288 (discussing issues with dosage, labeling, and consistency of THC levels through edible products).

⁴⁵⁷ *Id.* at 8.

⁴⁵⁸ *Id.* at 8–9.

⁴⁵⁹ *Id.* at 8–9.

other states that have legalized recreational marijuana.⁴⁶⁰ Edibles in the form of children's candies pose the same risks seen in Tide Pods⁴⁶¹ and gummy vitamins.⁴⁶² Children believe them to be candy because of their bright and appealing properties and will ingest them.⁴⁶³ Reducing the allure of edible marijuana to children is critical in preventing children from inadvertently ingesting marijuana. It is no different than the seminal "attractive nuisance" doctrine learned by every first-year student in law school.⁴⁶⁴

2. Eliminate THC Labeling Inaccuracies

Second, much too frequently a variation exists between the amount of THC claimed on an edible label to the amount it actually contains. The finding that over 80% of California and Washington edibles had actual THC levels different than what was advertised on their package demonstrates the prevalence of this problem and should shock our consciences.⁴⁶⁵ Combined with the negative reactions that many people can experience when ingesting too much edible marijuana, inaccurate THC dosing in a single edible serving can have disastrous consequences. Regulatory agencies must find a way to lower the variances witnessed between labeled THC content and actual THC content, or else should put those nonconforming producers out of business. States should do this via regular, stringent testing of all lines of edible products being sold. Furthermore, the amount of variance allowed under the testing standards should be small—within 5% of the THC limit per serving.

3. Reduce the Amount of Permissible THC per Serving

Third, another way to lessen harm from inaccurate dosing within an edible serving size is to lower the amount of THC allowed in each serving. For instance, Oregon and Alaska limit the amount of THC in each serving to 5 mg, rather than the more common 10 mg limit among other states in which marijuana

⁴⁶⁰ ALASKA ADMIN. CODE tit. 3, § 306.510(a)(4)(B) (2016); OR. ADMIN. R. 845-025-3220 (2017); WASH. ADMIN. CODE § 314-55-077 (2016); NEV. REV. PROPOSED REG. OF DEP'T OF TAX. LCB File No. R092-17 § 219(1)(b) (Dec. 13, 2017).

⁴⁶¹ Catherine Saint Louis, *Detergent Pods Pose Risk to Children, Study Finds*, N.Y. TIMES (Nov. 10, 2014), <https://www.nytimes.com/2014/11/10/health/detergent-pods-pose-risk-to-children-study-finds.html> [on file with *Ohio State Law Journal*].

⁴⁶² Jennifer Marquez, *Can a Child Overdose on Gummy Vitamins?*, PROVIDENCE ST. JOSEPH HEALTH (May 26, 2015), <https://www.stjhs.org/healthcalling/2015/may/can-a-child-overdose-on-gummy-vitamins/> [<https://perma.cc/U6DZ-P572>].

⁴⁶³ MacCoun & Mello, *supra* note 287, at 989.

⁴⁶⁴ See, e.g., *Bennett v. Stanley*, 748 N.E.2d 41, 47 (Ohio 2001) (finding that the attractive nuisance doctrine applies when a child wanders onto a neighbor's property to look at a swimming pool and subsequently drowns).

⁴⁶⁵ Barrus et al., *supra* note 288, at 8 (citing Ryan Vandrey et al., *Cannabinoid Dose and Label Accuracy in Edible Medical Cannabis Products*, 313 JAMA 2491–93 (2015)).

is legal recreationally.⁴⁶⁶ A reduction in 5 mg of THC per serving size would likely reduce some of the risk associated with edibles because it would allow novices to “up-titrate” their doses starting at a smaller dose,⁴⁶⁷ thereby reducing overdose situations.

4. *Make Each Serving Size Consistent in Its Potency*

Fourth, the amount of THC throughout a multiple-serving edible can vary significantly.⁴⁶⁸ An edible candy bar containing multiple delineated edible servings can contain varying THC doses in each separate serving.⁴⁶⁹ This problem is exacerbated by a lack of regulatory accountability for edible manufacturers. Some states’ threshold testing requirements only test to determine if the entirety of the edible (not each individual serving size) meets state requirements.⁴⁷⁰ For instance, in Colorado 10 mg of THC is one serving size and 100 mg is the maximum amount of THC allowed in a single edible product.⁴⁷¹ Under these regulations, a candy bar containing 100 mg of THC may be produced with demarcations along the bar to indicate each 10 mg serving size.⁴⁷² But because THC levels may not be consistent throughout the bar, one demarcated serving may contain less than 10 mg, and another demarcated serving may contain more.⁴⁷³ Colorado’s threshold testing for THC content does not analyze whether 10 mg of THC is in each serving; rather it measures whether the entire bar contains equal to or less than 100 mg of THC.⁴⁷⁴ Colorado does test loosely for homogeneity in that the regulations state that a sample will fail the threshold test if “10% of the infused portion of the Retail Marijuana Product contains more than 20% of the total THC contained within the entire Retail Marijuana Product.”⁴⁷⁵ This means as many as 20 mg of THC can be present in one serving and the edible product will still be considered homogenous. Given that studies have shown 1 mg of ingested THC can be as potent as 5.7 mg of THC in smoked marijuana, doubling the potential THC in a serving size that

⁴⁶⁶ OR. ADMIN. R. 333-007-0210 (2017) (referencing THC concentration limits of edibles as stated in Table 1, available at <http://www.oregon.gov/oha/PH/DISEASES/CONDITIONS/CHRONICDISEASE/MEDICALMARIJUANAPROGRAM/Documents/rules/333-007-0210-Table-1-eff-05-31-17.pdf>); ALASKA ADMIN. CODE tit. 3, § 306.560 (2016).

⁴⁶⁷ Barrus et al., *supra* note 288, at 6 (“In order to minimize risk of accidental overdose, it is recommended that users of edibles gradually up-titrate their dose until they find an effective dose.”).

⁴⁶⁸ *Id.* at 5.

⁴⁶⁹ *Id.*

⁴⁷⁰ See, e.g., COLO. CODE REGS. § 212-2 R 712 (2017).

⁴⁷¹ *Id.* at § 212-2 R 604.

⁴⁷² *Id.* at § 212-2 R 103 (Rule 103 (defining a “multiple-serving edible retail marijuana product”)).

⁴⁷³ Barrus et al., *supra* note 288, at 5.

⁴⁷⁴ COLO. CODE REGS. § 212-2 R 712(F)(4).

⁴⁷⁵ *Id.*

was already 10 mg (potentially as potent as 57 mg of THC in smoked marijuana) could result in a potency level akin to 114 mg of THC from smokable marijuana.⁴⁷⁶ The disturbing result is that an individual attempting to consume only one serving may inadvertently consume much more THC than intended. States should institute more stringent guidelines on testing both the level of THC present in the entire edible product and the amount of THC in each serving, and should reduce the level of variation that is allowed between serving sizes to less than that allowed in Colorado.

5. Reduce Total THC Allowed per Product

Fifth, the amount of THC allowed in a total edible package should be lower than 100 mg, which is the typical amount allowed in most states.⁴⁷⁷ Alaska and Oregon both limit the amount of THC allowed in a total package of edibles to 50 mg.⁴⁷⁸ Other states should follow suit and lower the amount of THC that is allowed in an edible package. This would prevent consumers from ingesting a large amount of THC if they failed to understand or follow directions to consume only one serving size at a time. It would also prevent children who managed to get a hold of a package of edible marijuana from consuming a much larger amount of THC than they otherwise would. It is not difficult to imagine how a child or novice user at a party might reasonably consume an entire “candy” bar of marijuana, without realizing that they had actually ingested up to ten times a single dose.

6. Separate Wrappers for Separate Servings

Finally, states should require that individual servings be packaged separately from the rest of the servings in an edible product. For instance, if a package of edible marijuana contains candies with 100 mg of THC total, each 10 mg serving should be individually packaged to prevent a consumer from misunderstanding how much of the edible is equal to one serving. Because many consumers do not read the directions on labels, individually packaging each serving will better alert the consumer that they are ingesting one full serving size.⁴⁷⁹ This could also potentially help with the issue of non-homogenous THC content among the serving sizes because individual edibles are more easily tested for 10 mg of THC than products with multiple servings.

E. Short-Term Solutions in the Interim

Study and research of the effects of edibles on society will take money, hard work, and time. So too will the crafting of regulations that will appropriately

⁴⁷⁶ Barrus et al., *supra* note 288, at 6 (citing ORENS ET AL., *supra* note 348, at 7).

⁴⁷⁷ See *supra* Part IV.E, Table 2.

⁴⁷⁸ See *supra* Part IV.E, Table 2.

⁴⁷⁹ Barrus et al., *supra* note 288, at 9.

remedy the dangers that edibles currently pose. In the meantime, we must recognize and address the reality that there is a statistically significant increase in marijuana-related poison control center calls and emergency room visits in states that have legalized marijuana.⁴⁸⁰ Increases in children with marijuana overdose symptoms are increasingly being seen in emergency rooms, and horrifically negative reactions to edibles are still occurring.⁴⁸¹ Although risk of marijuana edible overdoses cannot be lowered to zero, the benefit of a more discreet form of marijuana ingestion may not outweigh the negative effects that many are facing after consuming edibles. Until more is known on the health effects of edibles and the impact that they have on society, and until more effective and consistent regulation can be instituted, state-based restrictions on edibles may be necessary. Such measures would unquestionably reduce health risks to children, pot-tourists, novice users, and edible users in general.

VI. CONCLUSION

Recreational marijuana legalization has quickly expanded across America in the past five years from zero states in 2012 to seven states and Washington, D.C., today, and is likely only to increase in pace going forward. As marijuana use and popular opinion steadily increases in support, perceptions of risks surrounding the drug steadily fall. But we must be careful not to be overcome by a false sense of security that the wave of legalization has created. Because of marijuana's historical criminalization, there is insufficient public research to determine if the benefits of recreational use outweigh its risks. This is particularly the case with respect to marijuana edibles, which are far more unpredictable and dangerous to vulnerable populations than smoked marijuana, though few casual observers realize this reality.

In order to minimize the risks of marijuana edibles and maximize the benefits, the effect of edibles on population health, and whether edibles can be sold and consumed safely, must be studied. Research is needed to determine the best methods of edible regulation to ensure consistent product quality and minimize dosage variances. States should also regulate edibles more tightly to reduce the risk of THC overdose in edible users and in children inadvertently exposed to edibles. In the meantime, state-implemented restrictions on edible marijuana products may be necessary to stem the tide of increasing calls to poison control centers and unfortunate visits to hospital emergency rooms.

⁴⁸⁰ Hesse, *supra* note 273.

⁴⁸¹ See *supra* Part IV.B; see also NASEM, *supra* note 8, at 232–34.