“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. Later, it was adopted by American pop culture, amassing celebrity advocates such as Snoop Dogg, Willie Nelson, Whoopi Goldberg, and Woody Harrelson. As pop culture and social movements brought marijuana into the limelight, popular opinion shifted towards supporting marijuana legalization. Many marijuana advocates cited the drug’s potential medicinal properties as a reason that it should be legalized. In 1996, California became the first state to pass legislation legalizing medical marijuana, and over the next few decades thirty-two other states and the District of Columbia followed suit. 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.


4 Id.


6 Id.

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. 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. There is also a generational divide in perceptions of whether marijuana should be legal. 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). 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. 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. These numbers are up dramatically from just 21% and 17% in 1990, respectively.

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, federal law still...

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11 Id.


13 Geiger, supra note 10.

14 Id.

15 See 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).

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.\footnote{Alice G. Walton, \textit{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].} 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.\footnote{Jeff Rossen & Jovanna Billington, \textit{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].} 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.
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.\textsuperscript{19} It is native to the steppes of Central Asia and believed to be indigenous to present-day Mongolia and southern Siberia.\textsuperscript{20} The genus cannabis is made up of a group of closely related species.\textsuperscript{21} The two subspecies that are most prevalent are \textit{cannabis sativa L.} and \textit{cannabis sativa L.}\textsuperscript{22} \textit{Cannabis sativa L.} is known as hemp and is not psychoactive.\textsuperscript{23} \textit{Cannabis sativa} is psychoactive and is most widely known as marijuana.\textsuperscript{24} As human migration spread marijuana across Europe, Asia, and Africa, \textit{Cannabis sativa L.} became widely cultivated in historical civilizations that were located in cooler climates.\textsuperscript{25} \textit{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.\textsuperscript{26} \textit{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.\textsuperscript{27} In India, cannabis became interwoven into traditions and cultures, and had an influence on religion and medicine.\textsuperscript{28} Over the centuries, migratory and conquest patterns brought \textit{Cannabis sativa}, as well as the historical practice of using the plant for its psychoactive properties, to the rest of the globe.\textsuperscript{29}

The psychoactive effects of marijuana are the result of a resin produced by the female marijuana plant.\textsuperscript{30} This resin contains cannabinoids, including delta-9-tetrahydrocannabinol (THC).\textsuperscript{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.\textsuperscript{32} The effects of THC vary from person to person based on differences such as dose, age, and strain of marijuana.\textsuperscript{33} In order to be absorbed into the

\begin{itemize}
\item \textsuperscript{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.").
\item \textsuperscript{21} Id. at 416.
\item \textsuperscript{22} Id.
\item \textsuperscript{23} Id.
\item \textsuperscript{24} Id.
\item \textsuperscript{25} See id., supra note 19, at 4.
\item \textsuperscript{26} See id.
\item \textsuperscript{27} Warf, supra note 8, at 420.
\item \textsuperscript{28} Id. at 420–21.
\item \textsuperscript{29} Id. at 418–33.
\item \textsuperscript{30} Id. at 416.
\item \textsuperscript{31} Id.
\item \textsuperscript{32} Id.
\item \textsuperscript{33} Warf, supra note 8, at 416.
\end{itemize}
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).  

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. 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. 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. States began passing laws restricting marijuana use beginning in 1911, and the first local ordinance that banned citizens from selling or possessing marijuana was issued by El Paso, Texas in 1914.

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

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

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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

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47 Id.
48 See id.
50 Id.
51 Id.
52 Id. at 690–91.
53 Warf, *supra* note 8, at 429.
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. Hirliman Productions 1936); see Warf, *supra* note 8, at 430.
to criminalize the use of marijuana.\textsuperscript{58} By 1937, all fifty states had passed laws restricting the use of marijuana, and thirty-five states had criminalized the drug.\textsuperscript{59}

In addition, Congress passed the Marijuana Tax Act in 1937.\textsuperscript{60} The Act put the regulation of cannabis under the control of the Drug Enforcement Agency (DEA)\textsuperscript{61} and made marijuana sales illegal to anyone without a prescription for its use, effectively criminalizing the drug.\textsuperscript{62} The DEA further promoted anti-hemp programs following World War II, and in 1948 it was again criminalized.\textsuperscript{63} Three years later Congress made the penalties for marijuana possession equal to heroin when it passed the Boggs Act.\textsuperscript{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.\textsuperscript{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.\textsuperscript{66} As a result, many states’ legal penalties for the use of marijuana were reduced in the 1960s.\textsuperscript{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.”\textsuperscript{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.\textsuperscript{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.\textsuperscript{70} At the time

\textsuperscript{59} Reid, supra note 16, at 170.
\textsuperscript{61} Warf, supra note 8, at 430.
\textsuperscript{62} Reid, supra note 16, at 170; Warf, supra note 8, at 430.
\textsuperscript{63} Warf, supra note 8, at 430.
\textsuperscript{65} Warf, supra note 8, at 430.
\textsuperscript{66} Id. at 430–31.
\textsuperscript{67} MARIJUANA REFORM, supra note 35, at x.
\textsuperscript{69} Controlled Substances Act § 812; Reid, supra note 16, at 170.
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

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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.”).
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)*

<table>
<thead>
<tr>
<th>State</th>
<th>Medical Marijuana</th>
<th>Recreational Marijuana</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Legalized?</td>
<td>Legislation (date passed)</td>
</tr>
<tr>
<td>Alabama</td>
<td>No</td>
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</tr>
<tr>
<td>Arizona</td>
<td>Yes</td>
<td>Ballot Proposition 203 (2010)</td>
</tr>
<tr>
<td>Arkansas</td>
<td>Yes</td>
<td>Ballot Measure Issue 6 (2016)</td>
</tr>
<tr>
<td>Connecticut</td>
<td>Yes</td>
<td>HB 5389 (2012)</td>
</tr>
<tr>
<td>Delaware</td>
<td>Yes</td>
<td>SB 17 (2011)</td>
</tr>
<tr>
<td>Florida</td>
<td>Yes</td>
<td>Ballot Amendment 2 (2016)</td>
</tr>
<tr>
<td>Georgia</td>
<td>No</td>
<td>–</td>
</tr>
<tr>
<td>Hawaii</td>
<td>Yes</td>
<td>SB 862 (2000)</td>
</tr>
<tr>
<td>Idaho</td>
<td>No</td>
<td>–</td>
</tr>
<tr>
<td>Illinois</td>
<td>Yes</td>
<td>HB 1 (2013)</td>
</tr>
<tr>
<td>Indiana</td>
<td>No</td>
<td>–</td>
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<tr>
<td>Iowa</td>
<td>No</td>
<td>–</td>
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<tr>
<td>Kansas</td>
<td>No</td>
<td>–</td>
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<tr>
<td>Kentucky</td>
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</tr>
<tr>
<td>Louisiana</td>
<td>Yes</td>
<td>SB 271 (2017)</td>
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</table>

81 Id.; NCSL, *supra* note 5.
<table>
<thead>
<tr>
<th>State</th>
<th>Result</th>
<th>Measure or Bill</th>
<th>Result</th>
<th>Measure or Bill</th>
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<tbody>
<tr>
<td>Maryland</td>
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<td>SB 293 (2014)</td>
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<tr>
<td>Minnesota</td>
<td>Yes</td>
<td>SB 2471 (2014)</td>
<td>No</td>
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<tr>
<td>Mississippi</td>
<td>No</td>
<td>–</td>
<td>No</td>
<td>–</td>
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<tr>
<td>Missouri</td>
<td>Yes</td>
<td>Amendment 2 (2018)</td>
<td>No</td>
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<tr>
<td>Nebraska</td>
<td>No</td>
<td>–</td>
<td>No</td>
<td>–</td>
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<tr>
<td>New Hampshire</td>
<td>Yes</td>
<td>HB 573 (2013)</td>
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<td>–</td>
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<tr>
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<td>Yes</td>
<td>SB 119 (2009)</td>
<td>No</td>
<td>–</td>
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<tr>
<td>New Mexico</td>
<td>Yes</td>
<td>SB 523 (2007)</td>
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<td>–</td>
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<tr>
<td>New York</td>
<td>Yes</td>
<td>Assembly Bill 6357 (2014)</td>
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<td>–</td>
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<td>North Carolina</td>
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<td>North Dakota</td>
<td>Yes</td>
<td>Ballot Measure 5 (2016)</td>
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<td>Ohio</td>
<td>Yes</td>
<td>HB 523 (2016)</td>
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<td>Oklahoma</td>
<td>Yes</td>
<td>SQ 788 (2018)</td>
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<tr>
<td>Pennsylvania</td>
<td>Yes</td>
<td>SB 3 (2016)</td>
<td>No</td>
<td>–</td>
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<tr>
<td>Rhode Island</td>
<td>Yes</td>
<td>SB 791 (2007)</td>
<td>No</td>
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<tr>
<td>South Carolina</td>
<td>No</td>
<td>–</td>
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</table>
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. 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.” 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. The Ogden Memo also stated, however, that:

<table>
<thead>
<tr>
<th>State</th>
<th>Legal Status of Medical Marijuana</th>
<th>Legal Status of Recreational Marijuana</th>
</tr>
</thead>
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<td>South Dakota</td>
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<td>No</td>
</tr>
<tr>
<td>Tennessee</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Texas</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Utah</td>
<td>Yes</td>
<td>Prop 2 (2018)</td>
</tr>
<tr>
<td>Vermont</td>
<td>Yes</td>
<td>SB 76 (2004)</td>
</tr>
<tr>
<td>Virginia</td>
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<td>No</td>
</tr>
<tr>
<td>Washington</td>
<td>Yes</td>
<td>Initiative 692 (1998)</td>
</tr>
<tr>
<td>West Virginia</td>
<td>Yes</td>
<td>SB 386 (2017)</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Wyoming</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>


83 Ogden Memo, supra note 82, at 1–2.

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.
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.” 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.

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

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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

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98 Id.
100 See Gonzales v. Raich, 545 U.S. 1, 22 (2005) (holding that Congress did not exceed its Commerce Clause powers by regulating marijuana).
103 NASEM, supra note 8, at 77.
105 DEP’T OF THE TREASURY, supra note 101; NASEM, supra note 8, at 77.
108 The Consolidated Appropriations Act of 2017 states:
Several pieces of legislation were proposed in the 114th Congress that would lessen federal marijuana restrictions. These proposals range from making cannabis more accessible to researchers to removing marijuana completely from the CSA and treating it like alcohol. For example, Senator Cory Booker of New Jersey proposed a bill that would completely remove marijuana as a scheduled drug under the CSA. Under this proposal, states would be free to choose their own marijuana laws without fear of federal government interference. 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. 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. Part of the bill’s aim is to reduce the harm caused disproportionately to low-income and minority communities so that past and current harm caused by federal marijuana laws can be reduced.

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.

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

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119 United States v. McIntosh, 833 F.3d 1163, 1177 (9th Cir. 2016).
120 Id. at 1176–77.
122 Ingraham, supra note 121.
123 Id.
125 Id.; see also NASEM, supra note 8, at 384–85.
regulatory power over the cultivation of marijuana for research purposes. The DEA sets forth specific licensing requirements and quotas for yearly aggregate production under the CSA. So far, the DEA has only issued one marijuana research cultivation license to the University of Mississippi. Therefore, the sole source of marijuana for the entire nation’s research originates from one plot of land. 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.” 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. Before researchers may obtain NIDA funding and marijuana materials for their projects they must meet strict requirements. 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.”

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. U.S. Patent 6,630,507 was issued to DHHS, and was a result of NIH research, of which NIDA is a subset. 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. Research companies must apply for licenses

127 Id.
128 Id.
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.
135 Id.; NASEM, supra note 8, at 384.
136 Id.
in order to use the technology covered in the patent.\textsuperscript{137} On the positive side, much of this will change on April 21, 2019, when the patent is due to expire.\textsuperscript{138} After that date, researchers will be free to use the cannabinoids covered in the patent and competitive research should bloom.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.”\textsuperscript{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.”\textsuperscript{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.\textsuperscript{144} Washington State reports its revenue at over $686 million since its legalization of marijuana in 2014.\textsuperscript{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

\textsuperscript{137} Id.
\textsuperscript{138} Id.
\textsuperscript{139} See id.
\textsuperscript{140} See NASEM, supra note 8, at 377–78.
\textsuperscript{141} See id.
\textsuperscript{142} Ingraham, supra note 124.
year, and over $82 million in the 2018 fiscal year. In less than two full years, Oregon collected $108.6 million in taxes on the state and local levels. 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. Market valuation estimates put the 2016 legal marijuana market at approximately $7.2 billion, with a projected compound annual growth rate of 17%. Medical marijuana alone is estimated to increase in sales from $4.7 billion in 2016 to $13.3 billion in 2020. Recreational marijuana is projected to grow in sales from $2.6 billion in 2016 to $11.2 billion by 2020. And these numbers do not include any additional markets from other states that are likely to pass legalization initiatives by 2020.

States that legalize marijuana also experience the economic benefit of reduced expenditures on law enforcement—police, judicial, legal, and corrections. Police resource expenditures would be reduced because there would be fewer drug arrests. Legal and judicial expenses would also be reduced because there would be fewer drug prosecutions. Finally, correctional resource expenditures would be reduced because fewer people would be incarcerated for drug offenses. 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.

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150 Id.
151 Id.
152 Id.
155 Id. at 2.
156 Id.
between the years of 2000 and 2010. In 2010, Colorado spent almost $38 million on marijuana possession enforcement. In the same year, Oregon spent over $50 million and Washington spent over $34 million. California, one of the most recent states to legalize recreational marijuana, spent a massive $491 million. The vast majority of those costs can now be eliminated from cash-strapped budgets and allocated to other pressing concerns like education and transportation.

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. Economists have been predicting this benefit for quite some time. 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. 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. 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. 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.

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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.


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).

2. Health Benefits

Though research on the medical and therapeutic impacts of cannabis is scant, 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. 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. It reached the following conclusions, among others:

- “In adults with chemotherapy-induced nausea and vomiting, oral cannabinoids are effective antiemetics.”
- “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.”
- “In adults with multiple sclerosis (MS)-related spasticity, short-term use of oral cannabinoids improves patient-reported spasticity symptoms.”
- “In individuals with schizophrenia and other psychoses, a history of cannabis use may be linked to better performance on learning and memory tasks.”
- “For these [above] conditions the effects of cannabinoids are modest; for all other conditions evaluated there is inadequate information to assess their effects.”

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

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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

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176 NASEM, supra note 8, at 129.
177 Id. at 127.
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 Parmet, 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].
181 See id.

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.\footnote{Committee on Substance Abuse & Committee on Adolescence, The Impact of Marijuana Policies on Youth: Clinical Research, and Legal Updates, 135 PEDIATRICS 584, 586 (2015).} Earning a criminal record in adolescence can have large negative effects for the duration of an individual’s life.\footnote{Id.} In youth, criminal records can result in ineligibility for jobs, financial aid, housing, and higher education programs.\footnote{Id.} 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.\footnote{See id.}

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...
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).
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

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).
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.\footnote{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].} In Portland, Oregon, violent and property crimes have remained steady in the months since legalization.\footnote{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].} Colorado’s violent crime rate decreased 6% and its property crime rate decreased 3% from 2009 to 2014.\footnote{Legalization in Colorado, supra note 204, at 9.} 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%.\footnote{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].} 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.\footnote{Id.} 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.\footnote{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].} Some of the first states to legalize marijuana are beginning to collect information on marijuana DUI citations,\footnote{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].} but the evidence is inconclusive and requires additional study.\footnote{Legalization in Colorado, supra note 204, at 27.} In Washington State, the...
number of samples containing THC in DUI cases nearly doubled from 19% in 2012 to 33% in 2015.\textsuperscript{213} In Colorado, summonses for DUlS concerning marijuana or marijuana-in-combination surprisingly decreased by about 1% between 2014 and 2015.\textsuperscript{214} However, in Denver, DUlS 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.\textsuperscript{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.\textsuperscript{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 DUlS since legalization.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.”\textsuperscript{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.\textsuperscript{221} According to the authors, as well

\begin{thebibliography}{9}
\n\bibitem{213} Kaste, \textit{supra} note 210.
\bibitem{214} \textit{LEGALIZATION IN COLORADO, supra} note 204, at 28.
\bibitem{215} \textit{Id.} at 29.
\bibitem{216} Noelle Crombie, \textit{Legal Pot in Oregon: One Year Later}, \textit{OREGONIAN} (June 30, 2016), http://www.oregonlive.com/marijuana/index.ssf/2016/06/oregon_marks_1_year_anniversary.html [https://perma.cc/Y9ST-YHFB].
\bibitem{217} See \textit{LEGALIZATION IN COLORADO, supra} note 204, at 27.
\bibitem{218} NASEM, \textit{supra} note 8, at 228–30.
\bibitem{220} \textit{Id.} (citing Asbridge et al., \textit{supra} note 219; Elvik, \textit{supra} note 219; Li et al., \textit{supra} note 219).
\bibitem{221} Rogeberg & Elvik, \textit{supra} note 219, at 1355; NASEM, \textit{supra} note 8, at 228–29.
\end{thebibliography}
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 Rogeberg & 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
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
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/NS
DUHresults2013.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.\textsuperscript{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.\textsuperscript{233}

To reduce the risk of workplace injury, \textquotedblleft 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.\textsuperscript{234}\textsuperscript{235} 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.\textsuperscript{236} Under this duty, it may be necessary for employers to exclude from employment individuals who are or potentially could be intoxicated by marijuana.\textsuperscript{237}

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 \textquotedblleft 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.\textsuperscript{238}

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 \textquotedblleft great risk\textquotedblright in using marijuana once per month or even a couple of times per week.\textsuperscript{239} This same survey stated that such a decrease in perceived risk often precedes an increase in use.\textsuperscript{239} In a recent report from the

\textsuperscript{232} Id. at 461.
\textsuperscript{234} Phillips et al., supra note 224, at 464.
\textsuperscript{235} Occupational Safety and Health Act, 29 U.S.C. § 651 (2012).
\textsuperscript{236} Phillips et al., supra note 224, at 464.
\textsuperscript{237} NASEM, supra note 8, at 236.
\textsuperscript{238} 2013 NATIONAL SURVEY, supra note 229, at 73 fig. 6.2.
\textsuperscript{239} Id. at 73 (\textquotedblleft 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.”

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.”

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. 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.

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


Id. at 2.

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)).

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...
help ease nausea due to morning sickness). 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. Heavy marijuana use is also known to cause cannabinoid hyperemesis syndrome, in which individuals experience extreme nausea and vomiting. These symptoms resolve within days of ceasing marijuana use.

Negative physical health effects are especially prevalent in pediatric populations exposed to marijuana. Studies analyzing pediatric populations exposed to marijuana have demonstrated that potentially serious symptoms may result from marijuana exposures. Secondhand marijuana smoke has been linked to respiratory compromise in children. 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. Another report analyzed symptoms in children between eleven and thirty-three months who were admitted to an ICU in Paris. These children had central nervous system symptoms such as drowsiness and coma, and some required intubation and mechanical ventilation. Another report analyzed calls to an Arizona poison control center concerning children under seven who had accidentally ingested marijuana. This report found that “the most commonly reported symptoms were lethargy (48% of cases), an inability to walk (53%), coma (10%), and vomiting (21%).”

257 Id.
259 Lapook, supra note 258.
261 Id.
263 Thomas M. Nappe & Christopher O. Hoyte, Pediatric Death Due to Myocarditis After Exposure to Cannabis, 1 CLINICAL PRACT. & CASES EMERGENCY MED. 166, 166 (2017).
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.” The risk of developing schizophrenia and other psychosis is likely increased by marijuana use. The higher the use of marijuana by an individual, the greater the risk is increased. Heavy users of marijuana are more likely to report suicidal thoughts than those who do not use marijuana. Regular marijuana use also likely increases the risk of the development of social anxiety disorder.

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. 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. In 2012, Washington State had 162 calls to its poison center, a number that spiked up to 245 in 2014. Colorado’s poison control center reported 127 marijuana-related calls in 2013. This number spiked to 233 in 2014. 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.

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

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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.


274 Id.

275 Id.

276 Id.

277 Id.

278 Id.
legalization.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.”\textsuperscript{282} According to Dr. Andrew Monte, an emergency room toxicologist at the University of Colorado Denver, three typical types of visitors are seen.\textsuperscript{283} The first are patients whose underlying medical conditions were exacerbated by marijuana use.\textsuperscript{284} The second are patients who were put in dangerous situations (like motor vehicle accidents) when under the influence of marijuana.\textsuperscript{285} Finally, the third are patients who had smoked or ingested too much marijuana and were overly intoxicated.\textsuperscript{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.\textsuperscript{287} Marijuana edibles come in


\textsuperscript{280} McGhee, supra note 279 (citing \textit{Marijuana Tourism}, supra note 279, at 797–98).

\textsuperscript{281} Id.

\textsuperscript{282} Curry, supra note 279.


\textsuperscript{284} Id.

\textsuperscript{285} Id.

\textsuperscript{286} Id.

\textsuperscript{287} Robert J. MacCoun & Michelle M. Mello, \textit{Half-Baked—The Retail Promotion of Marijuana Edibles}, 372 NEW ENG. J. MED. 989, 989 (2015); Mike Montgomery, \textit{Edibles Are
a vast range of forms and potency levels, such as brownies, chocolate bars, lollipops, and candy. Edibles have become a highly desirable product within legal marijuana markets. “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.” In California, consumers purchased more than $180 million in edibles in 2016, representing 10% of the cannabis market in the state. Washington State’s edible sales increased 121% in 2016. Colorado’s edible sales tripled between the first quarter of 2014 and the third quarter of 2016, increasing from $17 million to $53 million. Typically, 25% to 60% of a dispensary’s profits are attributable to edibles.

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.” But scientific research and evaluation has not yet been completed to determine if these perceptions are legitimate.

Edibles do carry a level of discretion and ease-of-use that other forms of marijuana consumption do not. 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. More than $700,000 worth of

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289 MacCoun & Mello, supra note 287, at 989.
291 Montgomery, supra note 287.
292 Id.
293 Id.
294 Id.
295 Barrus et al., supra note 288, at 2.
296 Id.
Moxey’s mints have been sold nationwide. In Colorado, the top seller in marijuana shops was Americanna’s Sour Leaf Gummies in 2016, another discreet form of edible marijuana.

B. Anecdotes of Edibles Gone Wrong

Many instances of bad edible reactions have been documented since states legalized marijuana. Many of these cases have come from Colorado. 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. 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. The legal limit in Colorado for individuals driving is 5 ng per milliliter. Thamba had consumed an entire marijuana cookie before his death, which had a total THC content of 65 mg. Originally, Thamba had only consumed a single serving size of the cookie (10 mg) as directed by the sales clerk. However, when he did not experience any effects an hour later he consumed what remained of the cookie. Still, the amount of marijuana that Thamba had consumed was by no means a lethal amount. According to one doctor, Thamba likely had a predisposition or underlying mental illness that the ingestion of so much marijuana triggered. According to the police report, Thamba had no known history of mental illness.

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. Within twenty minutes, Coombs began to lose touch with
reality and thought that he was having a heart attack and dying.\textsuperscript{313} His family drove him to the hospital, where he was admitted for a marijuana overdose.\textsuperscript{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.\textsuperscript{315} Richard Kirk shot and killed his wife, Kris Kirk, while she was on the phone with a 911 operator.\textsuperscript{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.\textsuperscript{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.\textsuperscript{318} Richard Kirk originally claimed that he was not guilty due to reason of insanity because of marijuana-induced psychosis.\textsuperscript{319} However, he eventually agreed to a plea deal of thirty years in prison.\textsuperscript{320} The prosecutor in the case stated that Kirk’s marijuana use factored into her decision to broker a plea deal.\textsuperscript{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.\textsuperscript{322} After his family left the condo where they were staying, Goodman shot himself with a handgun that he traveled with for protection.\textsuperscript{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.\textsuperscript{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

\begin{footnotesize}\begin{itemize}
\item \textsuperscript{313} Id.
\item \textsuperscript{314} Id.
\item \textsuperscript{316} Id.
\item \textsuperscript{318} Sheldon et al., \textit{supra} note 315.
\item \textsuperscript{319} Id.
\item \textsuperscript{320} Id.
\item \textsuperscript{321} ASSOCIATED PRESS, \textit{supra} note 317.
\item \textsuperscript{323} Id.
\item \textsuperscript{324} Id.
\end{itemize}\end{footnotesize}
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

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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).
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. This is mainly due to the difference in the way that the body processes ingested versus smoked marijuana. Once marijuana has reached the bloodstream, it is quickly circulated to the brain and operates there to induce the typical symptoms thought of as a “high.” When marijuana is smoked, peak blood levels occur within five to ten minutes. Conversely, when marijuana is ingested as an edible, peak blood levels do not occur until one to two hours later. The duration of marijuana intoxication is also much longer when ingested than when smoked. 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. “It’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].”

Furthermore, edibles interact differently and less predictably with the body than smoking. When inhaling marijuana, the drug goes directly to the brain. But edibles present a situation in which THC interacts with the digestive system of the body. Variables such as how recently the user has eaten and whether the user has taken other medications can affect how THC is metabolized. The amount of THC in the blood can be changed five-fold by these variables. The unpredictable nature of edible marijuana makes it more difficult to use with accuracy than inhaled marijuana. 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. 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. 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.

D. Statistics and Studies on Edibles

Although studies on the differences between the effects of edibles versus smoked marijuana are scant, 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. However, in some cases these psychotic symptoms persist for much longer—up to days afterwards. “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.” Studies have found that nonusers report a greater negative reaction to edibles than to smoked marijuana. 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. Furthermore, inaccuracy of edible dosing can present huge problems for users. 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. Of these edibles, more than one-half contained significantly less THC and one-quarter contained significantly more THC than labeled.

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)).
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. 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. Of these calls, 75% occurred because a child had ingested cannabis or a cannabis product. The side effects associated with these incidences ranged from lethargy to cardiovascular symptoms to respiratory depression to coma. 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. According to this report, ingestion accounted for 78% of all documented incidents, making it the most common method of accidental pediatric exposure. 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. 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.” 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. The study found that of the cases of pediatric accidental marijuana ingestion seen at the Children’s Hospital of Colorado, edibles caused almost half.

Increases in negative reactions to edibles are not limited to children, however. Adults, particularly novices and tourists in states that have legalized...
marijuana, have also experienced increased emergency room visits since legalization.\cite{note: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.\cite{note:371} The study attributed the increase in hospital visits to higher potency of marijuana products and the visiting individuals’ unfamiliarity with edible products.\cite{note: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).\cite{note:373} This is an increase from approximately .8% pre-legalization to a little over 2.4% post-legalization.\cite{note:374} Edibles were the most common form of marijuana responsible for these exposures.\cite{note: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.\cite{note: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.\cite{note:377} The calls increased every year of the study.\cite{note:378} The study concluded that most symptoms were minor, with some adults and children requiring ventilator support.\cite{note: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.”\cite{note:380} The above data suggest that negative reactions to edible exposure will continue to increase as the trend of legalization among the states continues.\cite{note:381}

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\begin{itemize}
  \item \cite{note:370} Barrus et al., \textit{supra} note 288, at 7.
  \item \cite{note:371} \textit{Id.} at 7 (citing \textit{Marijuana Tourism, supra} note 279, at 797–98).
  \item \cite{note:372} \textit{Id.}
  \item \cite{note:373} \textsc{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).
  \item \cite{note:374} \textit{See id.}
  \item \cite{note:375} Barrus et al., \textit{supra} note 288, at 7 (citing Wang et al., \textit{supra} note 364, at 688); \textit{see also} Gillian Mohney, \textit{Colorado Marijuana Report Reveals Increase in Hospital Visits After Legalization}, \textsc{ABC News} (Apr. 19, 2016), \url{http://abcnews.go.com/Health/colorado-marijuana-report-reveals-increase-hospital-visits-legalization/story?id=38514764} [\url{https://perma.cc/F26W-PYM2}].
  \item \cite{note:376} Dazhe Cao et al., \textit{Characterization of Edible Marijuana Product Exposures Reported to United States Poison Centers}, 54 \textit{Clinical Toxicology} 840, 841 (2016).
  \item \cite{note:377} \textit{Id.}
  \item \cite{note:378} \textit{Id.}
  \item \cite{note:379} \textit{Id.} at 845.
  \item \cite{note:380} \textit{Id.} at 840.
  \item \cite{note:381} Barrus et al., \textit{supra} note 288, at 7.
\end{itemize}
\end{footnotesize}
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:

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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.
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.
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)

<table>
<thead>
<tr>
<th>State</th>
<th>Governing Regulatory Body</th>
<th>Laws Governing Edibles</th>
<th>Summary of Laws Governing Edibles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>Marijuana Control Board</td>
<td>See generally ALASKA ADMIN. CODE tit. 3, § 306 (2016) (including 306.345; 306.510; 306.560; 306.565; 306.645).</td>
<td>Requires labeling of edibles cannabis products. The label must state that cannabis has intoxicating effects. Requires labeling of edibles cannabis products. The label must state that cannabis has intoxicating effects.392 Quality control testing information must be maintained.393 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 Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.395 Packaging cannabis products in bright colors or with cartoons or other visuals that would appeal to children are prohibited.396 The manufacture of edibles likely to appeal to children (e.g., candy) is prohibited.397</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>California</th>
<th>Bureau of Cannabis Control</th>
<th>Proposition 64 (2016) (regulations go into effect January 2018) DPH-17-010E Emergency Cannabis Regulations</th>
</tr>
</thead>
</table>

THC must be uniformly distributed throughout the edible product and inventory tracking from cultivation to sale is required.\(^{398}\)

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.\(^{399}\)

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.\(^{400}\)

Edible products shall be homogenized (within a standard deviation of 10\%).\(^{401}\)

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.\(^{402}\)

Packaging of the edible products must be opaque,\(^{403}\) and must not include content

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\(^{398}\) \textit{Alaska Admin. Code} tit. 3, § 306.560; \textit{Id.} at § 306.565.


\(^{400}\) \textit{Id.} at § 40305(d).

\(^{401}\) \textit{Id.} at § 40305(e).

\(^{402}\) \textit{Id.} at § 40406.

\(^{403}\) \textit{Id.} at § 40415.
that is or is designed to be attractive to individuals under twenty-one, including cartoons, imitation candy packaging, etc. The packaging must also include California’s universal symbol for cannabis. The package must be child-resistant and tamper-evident.

<table>
<thead>
<tr>
<th>Location</th>
<th>City</th>
<th>Law</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>Marijuana Enforcement Division</td>
<td>COLO. CODE REGS. § 212-2 (2017)</td>
<td>Requires labeling of edibles cannabis products. The label must state that cannabis has intoxicating effects, it must contain the state-designated cannabis symbol, and it must state that intoxicating effects may take up to 2 hours after consumption to experience. Quality control testing information must be made available to the consumer. Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging. THC must be uniformly distributed throughout the edible product and</td>
</tr>
</tbody>
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404 *Id.* at § 40410.
405 CAL. CODE REGS. tit. 17, § 40412.
406 *Id.* at § 40415.
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.
inventory tracking from cultivation to sale is required.\textsuperscript{413}

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.\textsuperscript{414}

<table>
<thead>
<tr>
<th>State</th>
<th>Regulatory Authority</th>
<th>Status as of November 2017:</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>Cannabis Control Commission</td>
<td>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.</td>
<td>Not Applicable.</td>
</tr>
<tr>
<td>Maine</td>
<td>State Licensing Authority</td>
<td>None as of November 2017: Although the use of recreational marijuana is currently prohibited.</td>
<td>Not Applicable.</td>
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</tbody>
</table>

\textsuperscript{413} \textit{Colo. Code Regs.} § 212-2 R 405 (2017).

\textsuperscript{414} \textit{Id.} at § 212-2 R 604.
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, 2017 and the Governor’s veto was sustained on November 6 by the Maine House. The legislature has since enacted legislation facilitating “the development and administration of a regulated marketplace.”

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<tr>
<td></td>
<td></td>
<td>Requires edibles to be clearly labeled with the words “This is a Marijuana Product”. Requires edibles to be clearly labeled with the words “This is a Marijuana Product”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Requires child-proof packaging of marijuana and marijuana products, restricts</td>
</tr>
</tbody>
</table>


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.).

| 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). | Requires labeling of edible cannabis products: the label must contain state-designated cannabis symbol; must state that intoxicating effects may take up to two hours after consumption to experience.

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.

Additional materials including information on edibles must be distributed with each edible sale or displayed on posters in dispensaries.

Quality control testing information must be maintained.\footnote{Id. at R. 845-025-3230 (12).}

Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.\footnote{OR. ADMIN. R. 845-025-3220 (2017).} The manufacture of edibles likely to appeal to children (e.g., candy) is prohibited;\footnote{Id. at R. 845-025-7020.} the manufacture of edibles modeled after non-cannabis products consumed by children are prohibited.\footnote{Id. at R. 845-025-3220 (2).}

THC must be uniformly distributed throughout the edible product\footnote{Id. at R. 845-025-7580.} and inventory tracking from cultivation to sale is required.\footnote{Id. at R. 845-025-7570.}

Extracts may not be applied to commercially available candy or snack foods.\footnote{Id. at R. 845-025-3220 (2)(b).}

| Washington | Liquor and Cannabis Board | WASH. ADMIN. CODE § 314-55 (2016) (including 314-55-105; 314-55-095) | Requires labeling of edible cannabis products. The label must state that cannabis has intoxicating effects.\footnote{WASH. ADMIN. CODE § 314-55-105 (15)(j) (2016).} 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.\footnote{Id. at § 314-55-095.}

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.\footnote{See id. at § 314-55-105.}

Quality control testing information must be made available to the consumer.\footnote{Id. at § 314-55-077.}

Edibles cannot be packaged in a way that appeals to children, and must be packaged in child-resistant packaging.\footnote{Id. at § 314-55-105.} The manufacture of edibles likely to appeal to children (e.g., candy) is prohibited;\footnote{Id. at § 314-55-155.} the manufacture of edibles modeled after non-cannabis products consumed by children are prohibited.\footnote{WASH. ADMIN. CODE § 314-55-155 (2016).}

THC must be uniformly distributed throughout the edible product\footnote{Id. at § 314-55-077.} and

\begin{tabular}{|l|}
\hline
\footnote{Id. at § 314-55-095.} \\
\footnote{See id. at § 314-55-105.} \\
\footnote{Id. at § 314-55-077.} \\
\footnote{Id. at § 314-55-105.} \\
\footnote{Id. at § 314-55-155.} \\
\footnote{WASH. ADMIN. CODE § 314-55-155 (2016).} \\
\footnote{Id. at § 314-55-077.} \\
\hline
\end{tabular}
| 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. 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. Because “gifting” is legal under Initiative 71, some businesses have been | Not Applicable. |

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443 *Id.* at § 314-55-083.


445 *Id.*
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 Mohney, *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. 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. Even when patients understand prescription medication labels, a majority cannot correctly demonstrate the proper way to use the medication. 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. These inaccuracy issues stem from the edible industry’s nonexistent standardization in product-preparation and quality control. Unlike alcohol and tobacco, which are subject to standardized federal regulation, marijuana is still illegal at the national level. 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. 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. Edibles in the form of children’s candies pose the same risks seen in Tide Pods and gummy vitamins. Children believe them to be candy because of their bright and appealing properties and will ingest them. 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.

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. 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

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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.\footnote{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); \textsc{alaska admin. code} tit. 3, § 306.560 (2016).} 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,\footnote{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.”).} 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.\footnote{Id. at 5.} An edible candy bar containing multiple delineated edible servings can contain varying THC doses in each separate serving.\footnote{Id.} 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.\footnote{See, e.g., \textsc{Colo. Code Regs.} § 212-2 R 712 (2017).} 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.\footnote{Id. at § 212-2 R 604.} 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.\footnote{Id. at § 212-2 R 103 (Rule 103 (defining a “multiple-serving edible retail marijuana product”)).} 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.\footnote{Barrus et al., supra note 288, at 5.} 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.\footnote{\textsc{Colo. Code Regs.} § 212-2 R 712(F)(4).} 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.”\footnote{Id.} 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
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. 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. Alaska and Oregon both limit the amount of THC allowed in a total package of edibles to 50 mg. 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. 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.\textsuperscript{480} Increases in children with marijuana overdose symptoms are increasingly being seen in emergency rooms, and horrifically negative reactions to edibles are still occurring.\textsuperscript{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.

\textsuperscript{480} Hesse, \textit{supra} note 273.
\textsuperscript{481} \textit{See supra} Part IV.B; \textit{see also NASEM, supra} note 8, at 232–34.