

EVIDENCE-BASED RESOURCE GUIDE SERIES

# Preventing Marijuana Use Among Youth



***SAMHSA***  
Substance Abuse and Mental Health  
Services Administration

# Preventing Marijuana Use Among Youth

## Acknowledgments

This report was prepared for the Substance Abuse and Mental Health Services Administration (SAMHSA) under contract number HHSS283201700001/ 75S20319F42002 with SAMHSA, U.S. Department of Health and Human Services (HHS). Donelle Johnson served as contracting officer representative.

## Disclaimer

The views, opinions, and content of this publication are those of the authors and do not necessarily reflect the views, opinions, or policies of SAMHSA. Nothing in this document constitutes a direct or indirect endorsement by SAMHSA of any non-federal entity's products, services, or policies, and any reference to any non-federal entity's products, services, or policies should not be construed as such.

## Public Domain Notice

All material appearing in this publication is in the public domain and may be reproduced or copied without permission from SAMHSA. Citation of the source is appreciated. However, this publication may not be reproduced or distributed for a fee without the specific, written authorization of the Office of Communications, SAMHSA.

## Electronic Access

This publication may be downloaded from <http://store.samhsa.gov>.

## Recommended Citation

Substance Abuse and Mental Health Services Administration (SAMHSA). Preventing Marijuana Use Among Youth. SAMHSA Publication No. PEP21-06-01-001. Rockville, MD: National Mental Health and Substance Use Policy Laboratory. Substance Abuse and Mental Health Services Administration, 2021.

## Originating Office

National Mental Health and Substance Use Policy Laboratory, Substance Abuse and Mental Health Services Administration, 5600 Fishers Lane, Rockville, MD 20857, Publication No. PEP21-06-01-001.

## Nondiscrimination Notice

SAMHSA complies with applicable federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex.

SAMHSA cumple con las leyes federales de derechos civiles aplicables y no discrimina por motivos de raza, color, nacionalidad, edad, discapacidad o sexo.

Publication No. PEP21-06-01-001

Released 2021

## **Abstract**

Marijuana use among youth and young adults is a major public health concern. Early youth marijuana use is associated with:

- Neuropsychological and neurodevelopmental decline
- Poor school performance
- Increased school drop-out rates
- Increased risk for psychotic disorders in adulthood
- Increased risk for later depression
- Suicidal ideation or behavior

As policy and legalization efforts evolve and the availability of legal marijuana increases, communities and families need guidance to support the prevention of marijuana use among youth.

This guide covers programs and policies to prevent marijuana use among youth aged 12 to 17, including:

- Environmental strategies, such as regulating the price of marijuana products, where these products are sold, the products themselves, and their promotion and advertising
- School- and community-based substance use prevention programs to implement along with environmental interventions as part of a comprehensive prevention strategy

The guide provides considerations and strategies for key stakeholders (including policy makers, community coalitions, businesses, school administrators, educators, and other community members), states, and the prevention workforce to prevent and reduce marijuana use among youth.

## Evidence-Based Resource Guide Series Overview

---

The Substance Abuse and Mental Health Services Administration (SAMHSA), and specifically, its National Mental Health and Substance Use Policy Laboratory (Policy Lab), is pleased to fulfill the charge of the 21st Century Cures Act to disseminate information on evidence-based practices and service delivery models to prevent substance misuse and help people with substance use disorders (SUD), serious mental illnesses (SMI), and serious emotional disturbances (SED) get the treatment and support they need.

Prevention of, treatment for, and recovery from SUD, SMI, and SED can vary based on several factors, including geography, socioeconomic factors, culture, gender, race, ethnicity, and age. This can complicate evaluating the effectiveness of services, treatments, and supports. Despite these variations, however, there is substantial evidence to inform the types of resources that can help prevent and reduce substance use, lessen symptoms of mental illness, and improve quality of life.

The Evidence-Based Resource Guide Series is a comprehensive set of modules with resources to improve health outcomes for people at risk for, experiencing, or recovering from mental and/or substance use disorders. It is designed for practitioners, administrators, community leaders, and others considering an intervention for their organizations or communities.

A priority topic for SAMHSA is preventing marijuana use among youth. This guide reviews the related literature and science, examines emerging and best practices, identifies gaps in knowledge, and discusses challenges and strategies for implementation.

Expert panels of federal, state, and non-governmental participants provided input for each guide in this series. The panels included accomplished scientists, researchers, service providers, community administrators, federal and state policy makers, and people with lived experience. Members provided input based on their knowledge of healthcare systems, implementation strategies, evidence-based practices, provision of services, and policies that foster change.

Research shows that implementing new programs or policies requires a comprehensive, multi-pronged approach. This guide is one piece of an overall approach to implement and sustain change. Readers are encouraged to review the [SAMHSA website](#) for additional tools and technical assistance opportunities.

# Content of the Guide

This guide contains a foreword and five chapters. The chapters stand alone and do not need to be read in order. Each chapter is designed to be brief and accessible to anyone working to prevent and reduce youth marijuana use.

The goal of this guide is to review the literature on prevention of marijuana use among youth, distill the research evidence into recommendations for practice, and provide examples of the ways stakeholders can implement the recommendations.

---

## **FW Evidence-Based Resource Guide Series Overview**

Introduction to the series.

---

### **1 Issue Brief**

Overview of current approaches and challenges to reducing marijuana use among youth.

---

### **2 What Research Tells Us**

Current evidence on effectiveness of prevention strategies to address youth marijuana use.

---

### **3 Guidance for Selecting and Implementing Evidence-Based Policies and Programs**

Practical information to consider when selecting and implementing programs and policies to address marijuana use among youth.

---

### **4 Examples of Interventions for Prevention of Marijuana Use Among Youth**

Descriptions of programs and policies that address marijuana use among youth.

---

### **5 Resources for Evaluation and Quality Improvement**

Guidance and resources for evaluating implementation of prevention strategies and programs, monitoring outcomes, and improving quality.

---

- 1 Substance Abuse and Mental Health Services Administration. (2020). *Key substance use and mental health indicators in the United States: Results from the 2019 National Survey on Drug Use and Health*. Retrieved from <https://www.samhsa.gov/data/release/2019-national-survey-drug-use-and-health-nsduh-releases>.
- 2 D’Souza, D. C., Radhakrishnan, R., Sherif, M., Cortes-Briones, J., Cahill, J., Gupta, S., ... Ranganathan, M. (2016). Cannabinoids and Psychosis. *Current Pharmaceutical Design*, 22, 6380-6391.
- 3 Jacobus J, Tapert SF. (2014). Effects of cannabis on the adolescent brain. *Current Pharmaceutical Design*, 20(13):2186-2193. doi:10.2174/13816128113199990426

## FOCUS OF THE GUIDE

Marijuana use among youth and adolescents is a major public health concern. In 2019, about 1 in 8 adolescents aged 12 to 17 (13 percent) used marijuana in the past year, about 3.3 million people.

Marijuana use during adolescence, a period when the brain is still developing, is associated with: negative impacts on brain development; poor school performance; increases in drop-out rates; increased risk for psychotic disorders and depression in adulthood; and suicidal ideation or behavior.<sup>1-3</sup>

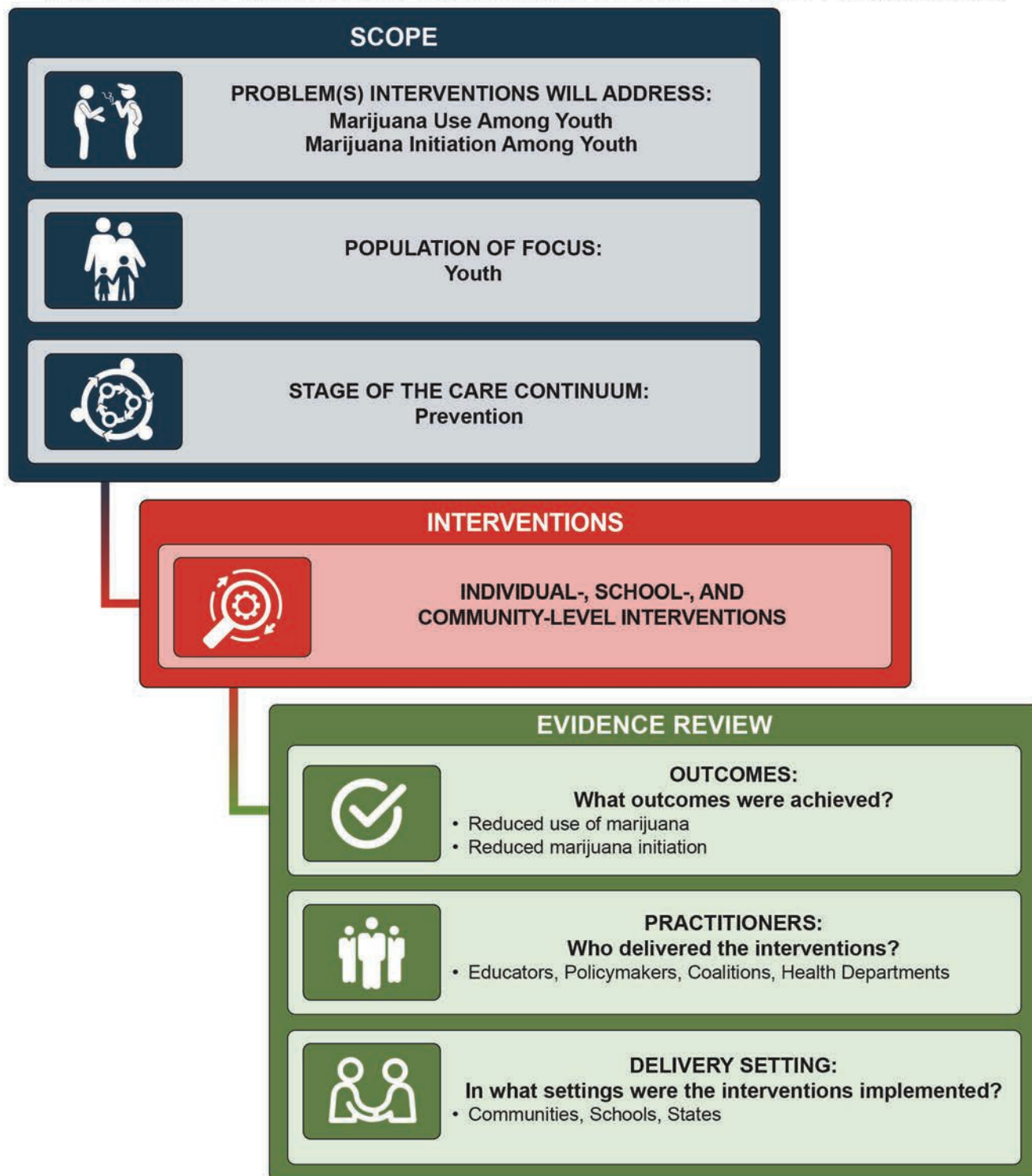
As policy and legalization efforts evolve and availability of legal marijuana increases, communities and families need guidance to support the prevention of marijuana use among youth. For this guide, the terms “youth” and “adolescents” are individuals aged 12 to 17.

The purpose of this Evidence-Based Resource Guide is to provide strategies for preventing youth marijuana use to states, communities, the prevention workforce, and other stakeholders. Youth are the focus, as significant evidence suggests early initiation is associated with some of the most serious harms. This guide discusses programs and policies key stakeholders (including policy makers, community coalitions, businesses, school administrators, educators, and other community members) can implement to prevent and reduce marijuana use among youth and young adults.



The framework below provides an overview of this guide and prevention efforts that have been implemented and evaluated among youth. The review of these policies and programs in Chapter 2 includes specific outcomes, stakeholders, and delivery settings for the interventions.

## PREVENTING MARIJUANA USE AMONG YOUTH – GUIDE FRAMEWORK





## Issue Brief

Addressing marijuana use among youth is a major public health concern. Some studies suggest early use can cause disruptions to adolescent brain development that may result in negative consequences, such as cognitive impairment and delayed maturation of the brain areas responsible for decision-making.<sup>2</sup>

Research on long-lasting effects has produced mixed results. However, there is increasing evidence that heavy and/or regular (e.g., daily or near daily) marijuana use among young people may be associated with cognitive deficits, such as impaired learning.<sup>2</sup> Other concerning risks include physical changes in the brain areas responsible for attention and memory, and increased risk for and early onset of psychiatric conditions and SUDs, such as schizophrenia and marijuana use disorder.<sup>9</sup>

Youth marijuana use is also correlated with suicidal ideation and behavior,<sup>10</sup> poor school performance, increased high school dropout rates,<sup>12</sup> and negative effects on male fertility.<sup>14-15</sup>

### Terminology

The terms "marijuana" and "cannabis" are often used interchangeably, although there are historical and scientific distinctions.<sup>4-5</sup> This document primarily uses the term "marijuana," including when speaking about use disorders.

The full scope of long-term health and social effects of youth marijuana use is still unknown, particularly among those who may be using marijuana regularly or daily.<sup>12</sup>

The high prevalence of youth marijuana use is concerning, with rates of daily use among 8<sup>th</sup> and 10<sup>th</sup> graders increasing between 2018 and 2019 (although rates of daily use remained relatively constant between 2010 and 2020).<sup>7, 16</sup> Daily use rates rise rapidly by the ages of 18 to 22, and marijuana use among this age group is currently at a 35-year high.<sup>17</sup>

National estimates indicate more than 3 million youth aged 12 to 17 used marijuana in the past year and 1.9 million in the past month; more youth reported using marijuana than any other illicit drug.<sup>6-7</sup>

Several factors impact the growing use of marijuana. For example:

- Widespread availability of marijuana via illegal market sources and state-regulated retail sales
- Increasing legalization of medical and non-medical adult use of marijuana across the country, despite remaining illegal at the federal level

- Mass commercialization of higher potency marijuana, and the availability of an array of consumer-friendly products that often appeal to youth (e.g., candy and baked goods infused with marijuana)
- High and frequent rates of youth use, with increases in the number of people initiating marijuana use each year

These factors, combined with marijuana’s clear evidence of harm, makes preventing initiation of its use among youth a public health priority.

The purpose of this Evidence-Based Resource Guide is to provide states, communities, the prevention workforce, and other stakeholders with strategies for preventing youth marijuana use. The population of focus is youth aged 12 to 17, as significant evidence suggests initiation of marijuana use at a young age is associated with some of the most serious harms.<sup>18-19</sup>

The guide reflects regulatory structures that currently exist in the country, including states where non-medical (i.e., recreational) or medical use of marijuana is considered legal. It is important to note that no state has legalized non-medical marijuana use for people under the age of 21.

To fully recognize the nature and consequences of youth marijuana use, it is important to first understand the different types of marijuana, its potency (THC content), and how methods of use have evolved in the 21<sup>st</sup> century.

## What Is Marijuana?

Under the Controlled Substances Act (CSA), cannabis (family Cannabaceae) falls into two categories—marijuana and hemp—but, in fact, both come from the same group of plants. Marijuana refers to the cannabis plant, or derivative products that contain more than 0.3 percent of the chemical compound delta-9-tetrahydrocannabinol (THC), the main psychoactive component responsible for the plant’s intoxicating effects. The term “hemp” denotes a cannabis plant that contains THC levels no more than 0.3 percent or less.

Composition and characteristics vary across marijuana plants and products. Marijuana plants contain more than 100 cannabinoids (chemical substances unique to the cannabis plant), in addition to many other chemicals (e.g., terpenes and flavonoids) found in other plant species. THC is the principal psychoactive constituent

of marijuana, producing psychotropic or mind-altering effects, with high misuse potential.<sup>1</sup> The other chemical constituents present in marijuana have minor effects relative to THC, and, therefore, the potency of marijuana is related to its THC content. Cannabidiol<sup>1</sup> (CBD), the second most common ingredient in marijuana, does not produce a high.

## Marijuana Types<sup>1</sup>

**Plant form or “flower”:** The most known form of marijuana; the dried flowers of the cannabis plant.

**Sinsemilla:** Seedless flowers from unfertilized female plants; contain more THC than other marijuana plant parts or fertilized flowers.

**Hashish:** Historically produced by a manual process of compressing dried cannabis flowers through screens to amass trichomes—the part with the most THC—resulting in a dried resin-type substance more potent than dried flowers.

**Concentrates/Extracts:** The modern process of extracting cannabinoids, especially THC, from the entire marijuana/cannabis plant with solvents or carbon dioxide extraction processes. The plant body is mostly discarded, leaving a more potent product (akin to grain alcohol). Concentrates may not smell like marijuana, depending on how refined the extraction is. Commonly used terms for concentrates include dabs, budder/badder, wax, shatter, crystalline, distillate, crumble, and sift.

Learn more about the different types of marijuana [here](#) and [here](#).

Specific pharmaceutical CBD and THC formulations have approval from the U.S. Food and Drug Administration (FDA) for the treatment of defined health conditions. For example, these include seizures, nausea from cancer treatments, and acquired immunodeficiency syndrome (AIDS) wasting syndrome.

The following FDA-approved medications are available through a pharmacy via prescription written by a licensed healthcare provider:

- Epidiolex<sup>®</sup> contains cannabis-derived CBD and is approved for the treatment of seizures associated with Lennox-Gastaut syndrome, Dravet syndrome, or tuberous sclerosis complex in patients one year of age and older.



- Marinol® and Syndros® (dronabinol) are synthetic THC and are indicated for treating anorexia associated with weight loss in patients with AIDS and for nausea and vomiting associated with cancer chemotherapy.
- Cesamet® (nabilone) is a synthetic THC analogue approved for nausea and vomiting associated with cancer chemotherapy.<sup>20</sup>

These FDA-approved products are distinct from non-FDA-approved medical marijuana products, which consumers acquire from a state-run marijuana dispensary rather than a pharmacy.

Medical marijuana is the use of the whole, unprocessed marijuana plant or its basic extracts to treat symptoms of illness as recommended by an authorized practitioner in a state with a medical marijuana law. The FDA does not recognize or approve the marijuana plant as medicine; only the two synthetic and one derivative product described above are approved for medical use.

Sold under a variety of names, such as Spice and K-2, other synthetic cannabinoids are also available on illicit commercial markets. These products activate the same cannabinoid receptors in the human brain as THC.<sup>21</sup> However, they are 10 to 200 times more potent than THC, and, therefore, have the potential to cause serious adverse events, including psychosis and fatal overdose.<sup>22</sup>

### Evolution of the Marijuana Market: Increasing Potency and Product Diversification

Variation in the content of THC and CBD, as well as how it is consumed (e.g., inhaled, orally ingested, or topically applied) heavily influences its effects. In recent decades, the marijuana products in both state-run legal markets and illicit marijuana markets have been increasingly diverse with respect to route of administration, formulation, and dose. Marijuana from both markets is increasingly available, has higher THC content, has flavors and flavor-sounding names, and greater marketing and promotion. All of these factors may have significant impact on youth initiation and use.<sup>13</sup>

Slang terms for marijuana include ganja, pot, weed, boom, bud, gangster, grass, green, hash, herb, kush, loud, reefer, skunk, dope, Mary Jane, hooch, brew, and greens.

Furthermore, the emergence of the legal marijuana industry has led to a wide range of new products, many composed of extracts or concentrates, including vaping products, other oils and resins, edibles, and topical products.

The amount of THC in marijuana flowers has increased from an average of 3 to 4 percent in the early 1990s to 14 percent currently,<sup>23-25</sup> though some marijuana flowers can have THC concentrations of up to about 30 percent.<sup>23, 26</sup> Marijuana concentrates typically have THC concentrations of 40 to 90 percent or greater.<sup>24</sup> Overall, the market has been rapidly shifting to products with increased THC concentrations and higher THC:CBD ratios, with no pre-market evaluation of safety.<sup>25, 27</sup>

Four primary concerns regarding increased THC concentration are:

1. It is difficult to know how much THC is inhaled or otherwise being ingested.
2. Use of marijuana products with higher THC concentrations is associated with greater risk of marijuana use disorder.<sup>28</sup>
3. Use of high potency products is associated with greater risk of psychosis.<sup>29</sup>
4. State adult-use laws limiting sales of these products generally use weight-based measures rather than potency-based measures (the amount of money spent per milligram of THC is lower for concentrates). This allows people to purchase a small amount of high potency products, with potentially high levels of intoxicating effects. The National Institutes of Health (NIH) currently has an initiative working to establish a standard unit for THC, currently asking researchers to use 5 milligrams as the standard unit for consistency.<sup>30</sup>

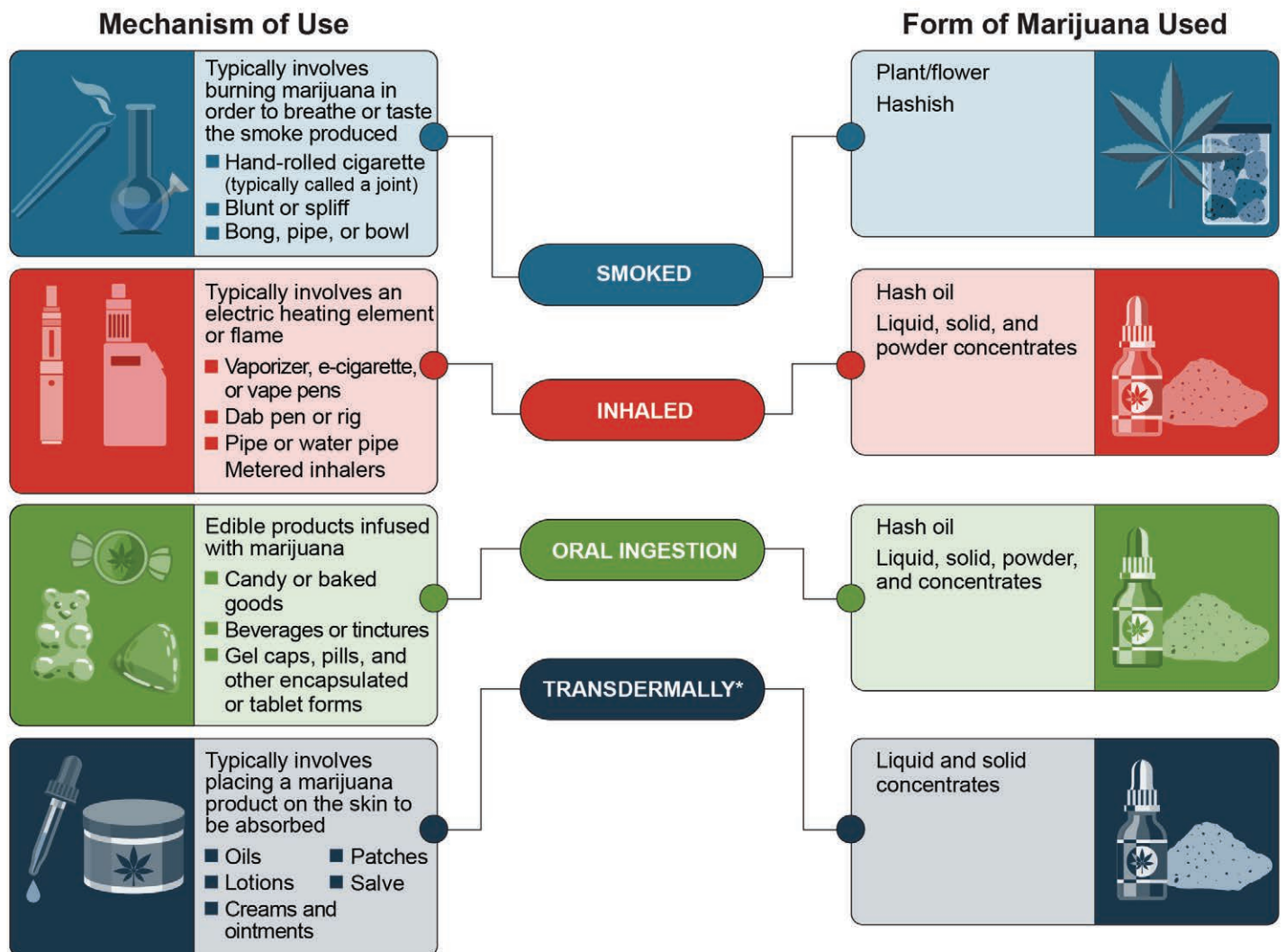
## How Is Marijuana Used?

How people use marijuana has changed substantially over the years. In addition to smoking traditional marijuana cigarettes, a vast array and combinations of manufactured products have evolved. These include edibles, marijuana-infused beverages, topical applications, and various devices for inhalation. There has also been an increase in people using products originally designed for nicotine/tobacco for marijuana, such as blunts, vaporizing devices, and e-cigarettes.<sup>31</sup> Youth are using marijuana via all of these routes, especially edibles and concentrates.<sup>32</sup>

The graphic below shows the variety of ways people can consume marijuana.

In 2018, among U.S. 12<sup>th</sup> grade students who used marijuana in the past year, 89 percent reported smoking it, 34 percent reported vaping it, and 40 percent ingested it in food.<sup>16</sup> Youth who ingest edibles are at increased risk of adverse events in part because the THC concentration can vary across products and batches of a single product. Consumption also has a delayed rate of absorption compared to other routes of administration.<sup>16</sup> As a result, youth may not know how the amount of THC will affect the body. This is relevant because of the variability in how much and how quickly THC is absorbed in the body.

Foods and beverages can be infused with THC, including products such as brownies and cookies, candies such as gummies and lollipops, sodas, and alcoholic beverages

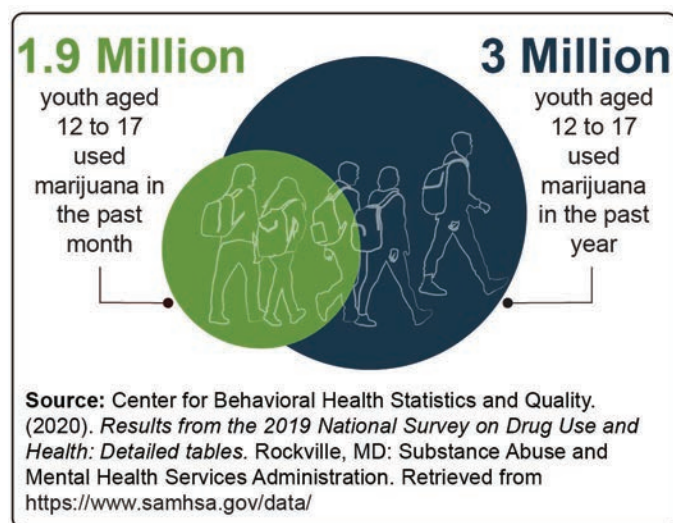


\*Transdermal use of marijuana has low misuse potential and has not been shown to cause acute intoxication or impairment.

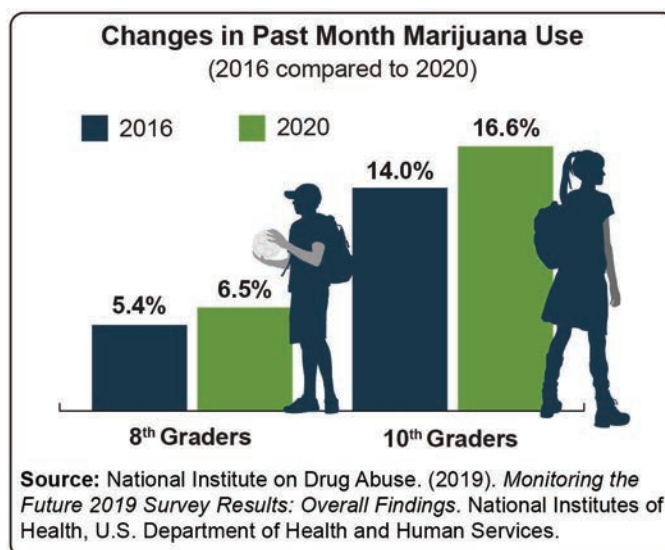
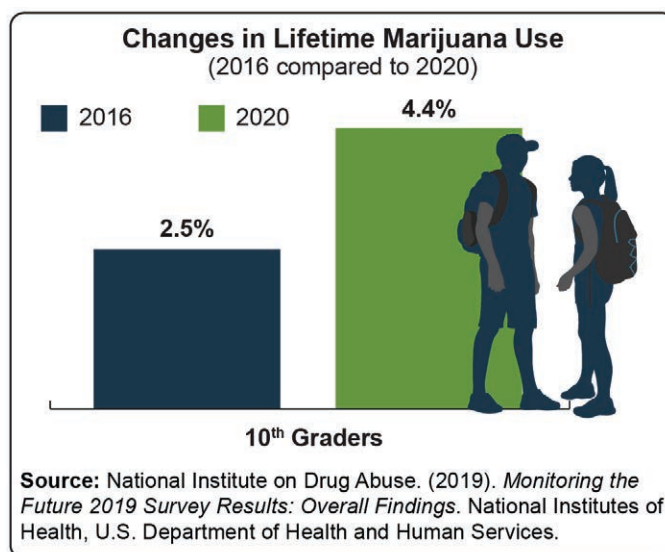
such as wine and beer. Edible marijuana products are especially attractive to youth, as their packaging often look very similar to that of non-marijuana products. Although some states prohibit such packaging, there is little evidence of enforcement.<sup>33</sup> Marijuana-infused beverages, often with sweet flavors such as orange soda, are similar to alcopops that are often marketed in the form of juices, sodas, lemonade, and iced tea, which are known to attract teens, especially girls.<sup>34</sup>

Of note, the timing of a THC high from edibles is different from that of inhaled/smoked sources; it can take 1 to 2 hours to feel an effect from edibles, and peak effects occur later and may last for several hours. When the high is felt and how long it lasts depends on a user's metabolism, the product formulation, what the person ate, and the dose consumed. Overconsumption can lead to severe intoxication and overdose.<sup>35</sup>

Vaping liquid marijuana products can lack the characteristic smell of marijuana, making detection of use difficult. Vaping devices are also packaged in ways that resemble memory sticks or other non-drug paraphernalia devices.<sup>36-37</sup> Detection-free use may be one reason why vaping marijuana has become increasingly popular among youth.<sup>38</sup>



Marijuana products, such as vaping concentrates or hemp wrappers used for blunts, may be flavored. This is a strategy well documented to attract youth to tobacco products and is associated with over 80 percent of youth tobacco initiation.<sup>39-41</sup> Marijuana products also frequently use names implying fruit or other flavors (e.g., grape, peanut butter cup, or pineapple haze), even if that fruit/ flavor is not present.



## Prevalence of Marijuana Use Among Youth

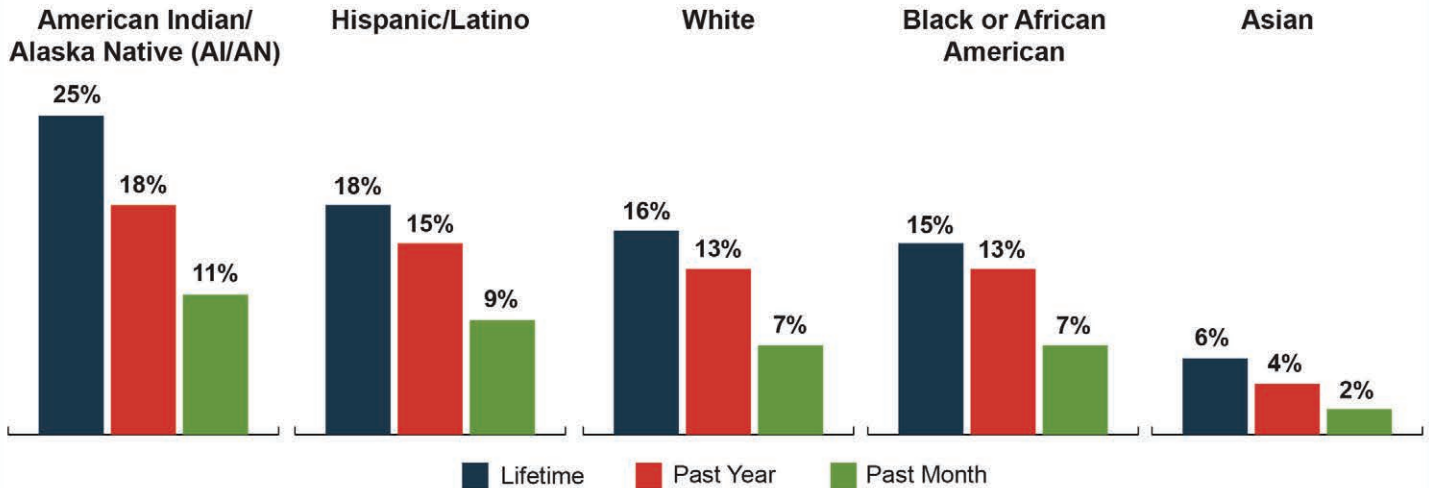
### Overall Prevalence

According to the 2019 National Survey on Drug Use and Health (NSDUH), marijuana was the most commonly used substance after alcohol among 12- to 17-year-olds.<sup>7</sup> Among the youth surveyed, 16, 13, and 7 percent, respectively, reported having used marijuana within their lifetime, within the past year, and within the past month.<sup>7</sup> In this age group, 16- to 17-year-olds had the highest rates of marijuana use; 31 percent reported using marijuana in their lifetime, 25 percent reported using marijuana in the past year, and 14 percent reported using marijuana in the past month. Those aged 12 to 13 reported the lowest rates of marijuana use.<sup>7,17</sup>

Data from the 2019 Monitoring the Future Survey further highlight concerns about youth marijuana use as shown in the following graphics:

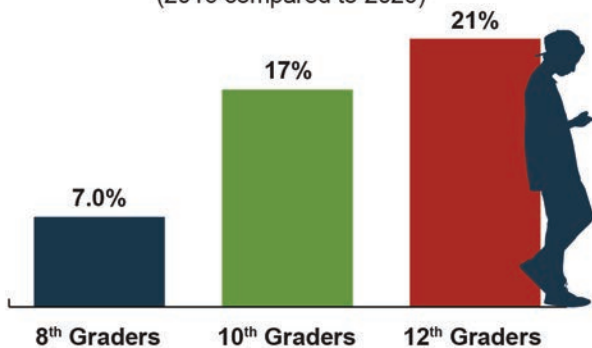


## Marijuana Use Prevalence Among Youth 2019



**Source:** Center for Behavioral Health Statistics and Quality. (2020). *Results from the 2019 National Survey on Drug Use and Health: Detailed tables*. Rockville, MD: Substance Abuse and Mental Health Services Administration. Retrieved from <https://www.samhsa.gov/data/>

## Increases in Past Month Marijuana Use Across All Age Groups (2016 compared to 2020)



**Source:** Miech, R. A., Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2021). *Monitoring the Future national survey results on drug use, 1975–2020: Volume I, Secondary school students*. Ann Arbor: Institute for Social Research, The University of Michigan. Available at <http://monitoringthefuture.org/pubs.html#monograph>

It is also important to look at how past month use increases across the age groups, from 7 percent among 8<sup>th</sup> graders to 17 percent among 10<sup>th</sup> graders and up to 21 percent among 12<sup>th</sup> graders.<sup>16</sup> These data suggest that prevention at younger ages is critical to reducing marijuana use among older adolescents.

## Prevalence of Marijuana Use by Specific Population Groups

Nationally, the prevalence of youth marijuana use varies across demographic groups. In the general population, males report higher rates of marijuana use compared to females. However, among 12- to 17-year-olds, female

and male youth report lifetime, past year, and past month marijuana use at comparable rates nationwide.<sup>7</sup>

Rates of marijuana use also vary by race and ethnicity. American Indian/Alaska Native youth reported the highest rates of lifetime, past year, and past month marijuana use, while Asian youth reported the lowest. A breakdown of marijuana use prevalence by race and ethnicity is shown in the graphic that follows below.<sup>6</sup>

For past month use, youth who identify as sexual and gender minorities are 1.6 times more likely to report recent marijuana use than heterosexual youth<sup>42</sup> and marijuana use is 2.5 times higher among transgender compared to cisgender youth.<sup>43</sup> These differences persist in adulthood, and lesbian, gay, bisexual, transgender, and queer (LGBTQ) youth are more likely to be diagnosed with a marijuana use disorder as adults.<sup>44</sup> Research suggests this difference may be due to greater exposure to stressful life events, discrimination, and stigma among LGBTQ youth as compared to their heterosexual peers.<sup>42, 44–45</sup>

Among sexual minority youth (i.e., whose sexual orientation, gender identity, or sexual characteristics are different from the presumed majority of the population), those assigned male at birth demonstrate greater rates of recent and lifetime marijuana use, despite comparable rates between male and female youth at the national level.<sup>46</sup> These data underscore the importance of culturally specific marijuana prevention strategies for populations who experience disparities in marijuana use prevalence.



# Harms Associated With Youth Marijuana Use

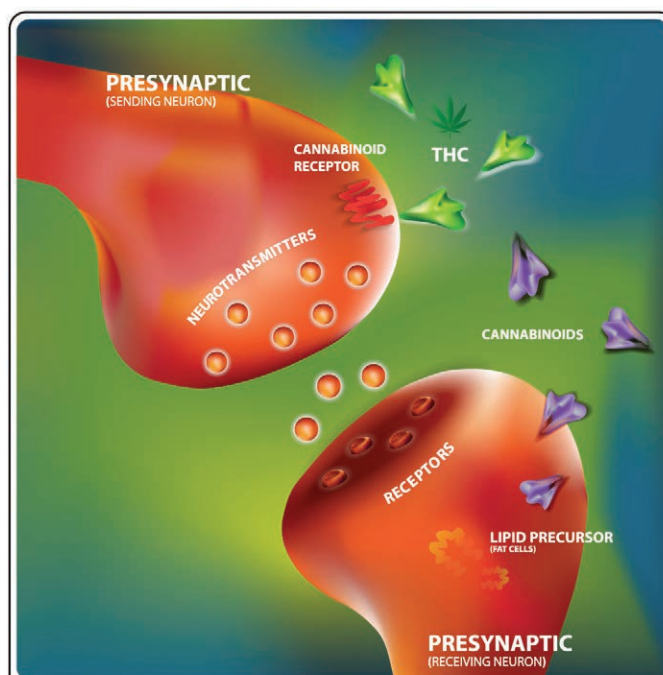
Youth may experience substantial harm resulting from marijuana use, especially heavy and chronic use. Frequent or intensive (e.g., daily or near-daily) marijuana use is strongly associated with higher risks of experiencing many adverse health and social outcomes.<sup>11</sup>

## Effects of Marijuana Use on the Brain

Human brain development continues well into an individual's twenties and several genetic and environmental factors can influence this process.<sup>47</sup> Findings from animal studies show chemicals (e.g., cannabinoids) in marijuana bind to the brain's own endocannabinoid system, disrupting the body's normal levels of naturally occurring cannabinoids.<sup>24</sup> The important role of the endocannabinoid system in neurodevelopment may explain why youth are particularly susceptible to the effects of marijuana. Exposure to marijuana during this time can alter the brain's normal communication mechanisms and epigenetic (how behaviors and environment can cause changes that affect the way genes work) development.<sup>47</sup> THC attaches to cannabinoid receptors in the brain, like a key to a lock, which in part activates the brain's reward pathway, resulting in the intoxicating effects when people use marijuana.

In addition to intoxication, flooding the brain with large amounts of THC may impact normal functions for short or long periods of time, including:

- Learning, memory, and other cognitive processes critical to learning
- Pleasure/reward
- Appetite
- Motion/motor control
- Sleep
- Reproduction/fertility



**Source:** Jacobus, J., & F Tapert, S. (2014) Effects of cannabis on the adolescent brain. *Current Pharmaceutical Design*, 20(13), 2186-2193.

Other possible effects can include altered senses, changes in mood, and hallucinations.<sup>48-49</sup>

THC can also result in disruption of cognitive processes that are important for academic performance and activities like driving and sports.<sup>50,51</sup> In some studies, chronic, long-term marijuana use has been associated with altered brain structure and impaired cognitive functioning.<sup>50</sup> There is debate about the clinical significance of these changes and whether they reverse with abstinence. Collectively, these studies suggest a potential risk associated with adolescent marijuana use related to brain development.<sup>52</sup> It is important to note that much of this information comes from preclinical studies, meaning more research with larger populations is needed.

## Short- and Long-Term Adverse Effects of Marijuana Use

### Common Short-Term Adverse Effects

- Brief periods of: increased heart rate; altered sense of time; increased anxiety/paranoia; slow reaction time; problems with balance and coordination; impaired driving; increased appetite; difficulty with thinking and problem solving; memory impairment.<sup>1</sup> The likelihood of adverse effects increases with increasing doses of marijuana.<sup>53</sup>

### Less Common Short-Term Adverse Effects

- Increased heart rate, which may increase the risk of a heart attack; nausea and vomiting;<sup>54</sup> panic attacks; psychosis (losing touch with reality); hallucinations (seeing or hearing things that are not really there); delusions (believing something that is not true).<sup>55</sup>

### Long-Term Effects

- Lung and breathing problems (particularly when smoked and often among those who also smoke cigarettes), though these problems often manifest later in life; stroke, poor academic performance;<sup>56</sup> truancy;<sup>57</sup> increased risk for social anxiety;<sup>58</sup> suicidal ideation,<sup>2</sup> attempts, and completion.<sup>59</sup>
- Babies exposed to marijuana during pregnancy are exposed to similar harms. Specifically, prenatal marijuana use is associated with poor birth outcomes such as low birth weight and brain development delays, which may have longer term effects on the adolescent brain.<sup>60-61</sup>
- Chronic marijuana use is also associated with a condition called “cannabinoid hyperemesis syndrome,” characterized by repeated and severe instances of nausea and vomiting.<sup>54</sup>

### Marijuana Use Disorder

- People who begin using marijuana at or before the age of 18 are 4 to 7 times more likely to develop a marijuana use disorder than adults who did not use under age 18.<sup>62</sup> Three in 10 people who used marijuana developed a marijuana use disorder between 2012 and 2013.<sup>63</sup>
- Those who have a marijuana use disorder may experience withdrawal symptoms (anxiety, insomnia, depression),<sup>64</sup> which may create acute discomfort and an incentive to continue marijuana use.<sup>65</sup>

- Most individuals who seek treatment for marijuana use disorder fail to achieve sustained abstinence (one study reported 8 percent of their sample had sustained abstinence); rates of successful quitting are comparable to those for individuals who use tobacco.<sup>66-67</sup> Other substance use disorders show success rates between 20 and more than 50 percent, though research suggest an average of approximately 18 percent sustained abstinence.<sup>68</sup>

### Psychotic Symptoms and Disorders

- Marijuana use is associated with higher risk and worsening outcomes of later psychotic disorder, such as schizophrenia, for those with the disorder, but causality remains unclear.<sup>2, 29</sup>
- Youth who have psychoses or psychotic symptoms and who use marijuana typically have an earlier age of first-episode psychosis.<sup>69</sup>
- Evidence supports that stopping marijuana use can reduce the onset and occurrence of psychotic symptoms.<sup>70</sup>

### Personal Harms

- Frequent marijuana use between the ages of 14 to 21 is associated with lower high school completion and college graduation,<sup>71</sup> subsequent lower income at age 25, and lower levels of relationship and life satisfaction.<sup>72</sup>
- Daily or near-daily marijuana use is associated with financial difficulties, antisocial behavior in the workplace, and more interpersonal relationship conflict. This is particularly true among those who reported a longer history of marijuana use and development of a marijuana use disorder.<sup>73-74</sup>
- Recent studies suggest marijuana use is associated with higher rates of depression and suicide, especially among youth.<sup>75-77</sup>
- Initiation of marijuana use before the age of 18 is also a predictor of opioid use disorder in adulthood.<sup>78</sup>
- Marijuana has been found to be contaminated with bacteria, viruses, and metals that can negatively impact health, particularly among immunocompromised youth.<sup>79</sup>

The fat-soluble nature of THC is why a person can test THC-positive for days, and sometimes weeks, after use. This is also why blood levels of THC are not a reliable way of indicating impairment from marijuana the way blood alcohol content is used to measure impairment from alcohol.

Practically, this means there is not currently a mechanism to test marijuana impairment, which presents challenges for workplace policies and driving under the influence. Research is being done to develop devices to address this challenge.

### Overdoses

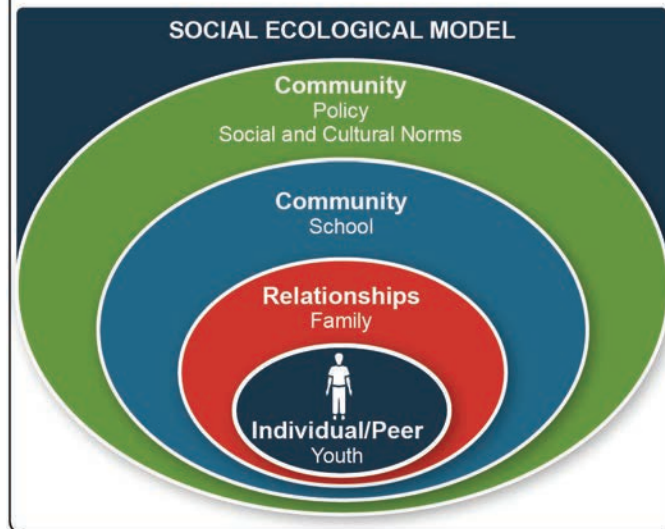
- THC does not typically shut down core bodily functions like breathing as other substances such as opioids may. With uncommon exceptions of some severe pediatric ingestions, there are no reports of fatal overdoses directly tied to marijuana use.<sup>80</sup>
- Uncomfortable side effects can result from excess consumption of edibles, use of high potency products, or accidental ingestion. These result in a variety of effects from psychosis to anxiety, and large increases in marijuana-associated emergency room visits.<sup>81-82</sup>

## Risk and Protective Factors for Youth Marijuana Use

Several factors place some youth at higher risk of initiating and continuing marijuana use, while other factors protect them from adopting this behavior. Both types of factors are present at multiple levels across the socio-ecological model (SEM), including those with a direct effect on an individual as well as indirect neighborhood and community factors. Additionally, these risk and protective factors can, and should, be considered within the context of social determinants of health, which recognize the broader social and community context of marijuana use across each of the SEM levels.<sup>83</sup>

### What is the Socio-Ecological Model?

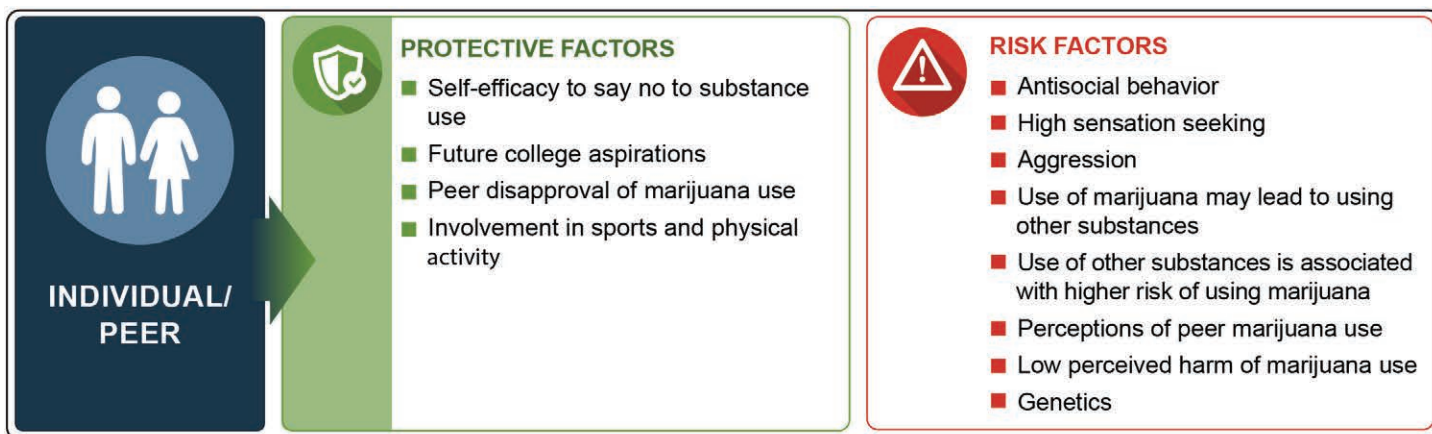
The socio-ecological model (SEM) defines the complex relationship between individual/peer, family, school, and community factors that protect or put individuals at risk.<sup>68</sup> This guide uses a version of this model to frame the discussion of risk and protective factors for marijuana use, as well as the marijuana use prevention strategies discussed in **Chapter 2**.



### Individual and Peer Risk and Protective Factors

At the individual level, risk factors include current behavior, such as sensation seeking and aggression, whereas protective factors include having college aspirations and self-confidence to say no to substances. As with other SUDs, neurobiology and genetics contribute to marijuana use and use disorders.<sup>84-85</sup> Recent studies show distinction between genetic heritability to marijuana use and developing a marijuana use disorder.<sup>86</sup> Youth thinking that their peers are using marijuana is associated with their own decisions to use. However, perceived level of peer use among students aged 12 to 17 is greater than the actual rate of use among peers.<sup>6</sup> Alternatively, peer disapproval can be a protective factor.<sup>87</sup> A large percentage of students also reported that they believe close friends would strongly disapprove or somewhat disapprove of trying marijuana (78 percent) or using marijuana once a month or more (79 percent).<sup>6, 7</sup>

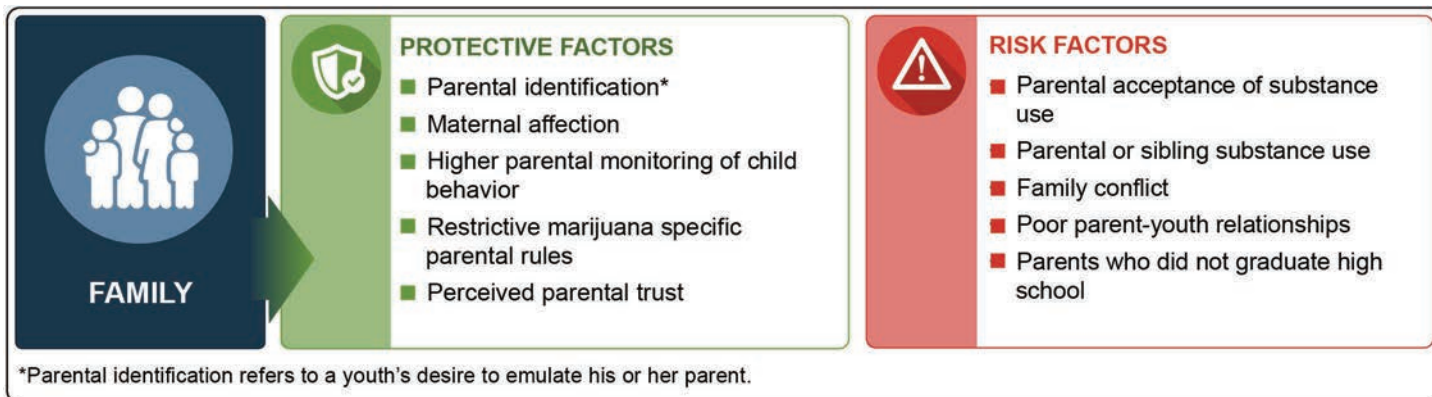




## Family Risk and Protective Factors

Family factors associated with increased risk of youth marijuana use include home environments characterized by family conflict and poor relationships with parents/caregivers.<sup>88-89</sup> Parental use and beliefs about marijuana use also strongly influence youth behavior; youth whose parents have ever used marijuana are about three times more likely to use marijuana than youth whose parents have never used marijuana. Youth whose parents do not believe marijuana use is risky are 1.5 times more likely to use when compared with youth whose parents hold more negative beliefs.<sup>90-91</sup>

Conversely, families can play a protective role in preventing youth marijuana use by fostering a supportive family environment and monitoring and prohibiting youth marijuana use. Positive family factors such as identifying with one's parents/caregiver, maternal affection displayed toward child, and perceived parental trust have been found to play a protective role in preventing youth marijuana use.<sup>91-92</sup> No tolerance rules around youth marijuana use and greater parental monitoring are also associated with decreased marijuana use.<sup>93</sup>



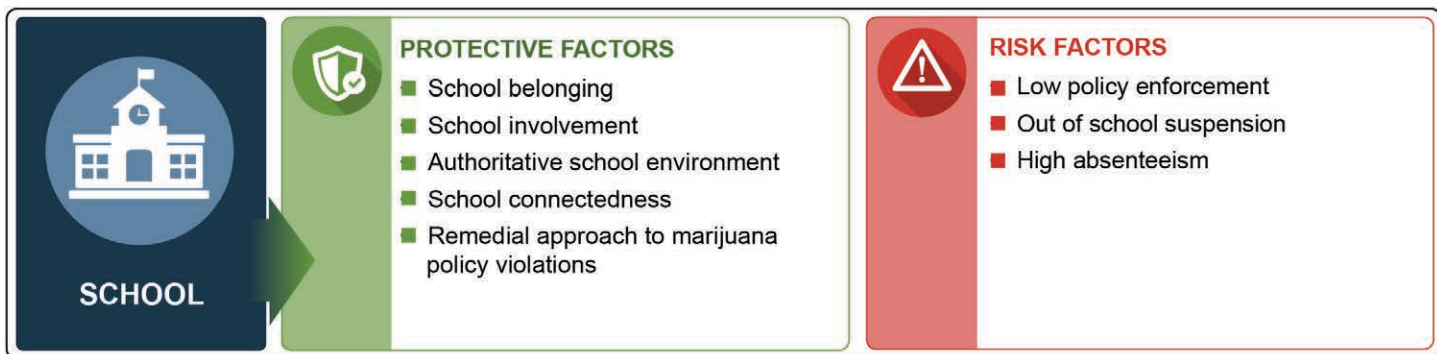
## School Risk and Protective Factors

Rates of marijuana use vary at the school level, and research has identified a variety of related factors associated with marijuana use among students.<sup>94-97</sup> Authoritative school environments characterized by fair disciplinary practices and mutual respect between teachers and students have shown lower levels of marijuana use among students.<sup>97-98</sup> Less predictable school environments where rules are not clearly articulated nor consistently enforced tend to have higher rates of use.<sup>98-99</sup> A school's substance use disciplinary

policies also influence marijuana use; more remedial approaches to violations, such as counseling, have been found to result in less marijuana use when compared with more punitive measures, such as expulsion.<sup>99</sup>

It is also important to consider students' relationships to the school environment in understanding marijuana use risk. The level of connection students feel to their school, fellow students, and academics is associated with student marijuana use.<sup>96</sup> Researchers hypothesize that greater school connectedness creates a sense of shared identity and belonging that reduces the role of marijuana



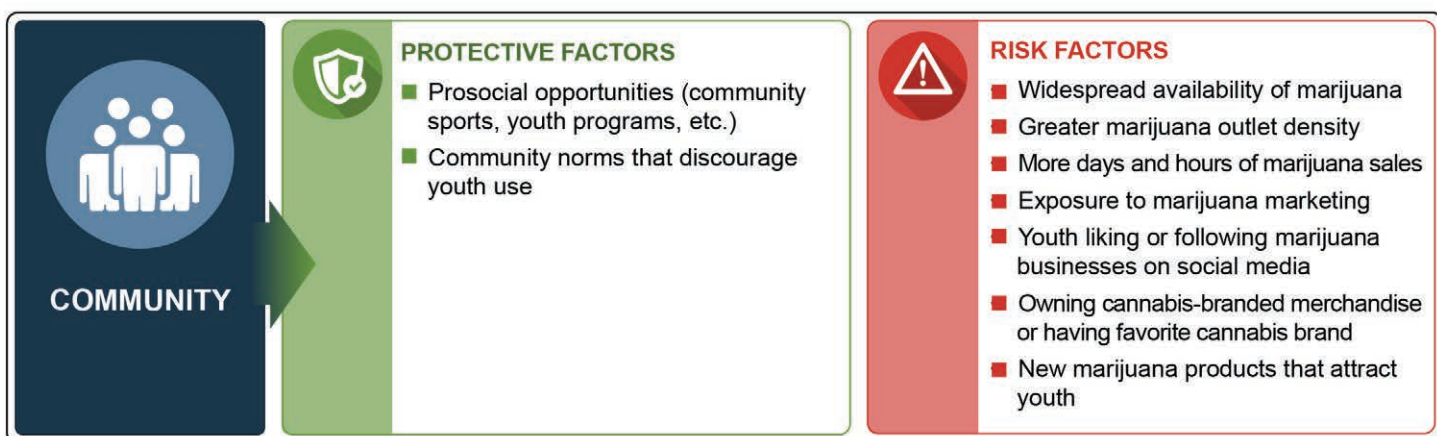


use in achieving social status, thereby decreasing students' likelihood of using marijuana.<sup>96,100</sup> A student's involvement in school activities, such as clubs and sports, also serves as a protective factor.<sup>95,101-102</sup>

### Community Risk and Protective Factors

The laws and ordinances that govern a neighborhood, city, county, state, or tribal community have a direct effect on a youth's ability to access and use substances. In the case of marijuana, community-level risk factors

include the availability of the product (either medically or illegally), product marketing (primarily relevant in states where marijuana is legal at the state or local level for non-medical or medical use), community disorganization, economic deprivation, and other social determinants of health.<sup>83,103-105</sup> For each of these risk factors, the opposite can be considered important as a protective factor that can reduce or prevent youth marijuana use.



## Challenges to Prevention Efforts

This guide focuses on prevention interventions for youth marijuana use, considering the different regulatory structures that currently exist in the country, including states where the sale of marijuana remains illegal and states where recreational or medical use is considered legal. The rapidly evolving policy landscape at the state level poses significant challenges for preventing marijuana use by youth. Greater public acceptance, declining perception of risk, increasing availability, product diversification, pervasive marketing, and other trends may contribute to an increase in youth marijuana use.

The Controlled Substances Act (CSA)<sup>104</sup> places all substances regulated under federal law into five schedules. Under the CSA, marijuana is a Schedule I substance, meaning it has a high potential for misuse.<sup>105</sup>

According to federal regulations, marijuana is considered a controlled substance, as defined by the Controlled Substances Act (CSA);<sup>106</sup> however, many state regulations vary from the CSA.<sup>107</sup> As of February 2021, legislation to allow the medical use of marijuana has been passed in 36 states plus the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin

Islands. Legislation permitting the legalized, non-medical use of marijuana for adults age 21 and older has been passed in 17 states and territories.<sup>108</sup>

As a result, legally produced marijuana is not considered a controlled substance by states that allow use for medical and/or non-medical purposes, but it remains subject to violations that may result in federal prosecution.<sup>107,109-110</sup> Many states still have penalties for possession of marijuana by youth under the legal age.

States vary widely in how they regulate legalized marijuana. Every state with some form of legalized marijuana use for non-medical purposes thus far has banned sales to persons under 21 years old. Other restrictions on legalized marijuana may include:

- Limits on the amount of marijuana an individual can purchase each day or possess
- Restrictions on advertisements, potency, or product design
- Requirements for quality standards and health warnings
- Limits on the number or types of businesses allowed to sell the product
- Restrictions on whether delivery from the retailer is allowed<sup>13</sup>

The term “legalization” is often used rather broadly. However, at the state level, marijuana can be divided into four distinct legal categories:

1. Non-medical legalization
2. Medical legalization
3. Decriminalization
4. Illegal<sup>111</sup>

The table that follows below briefly describes each of these terms.<sup>112</sup>

Even within states which have legalized, considerable local variation may exist between cities or counties that allow legal sale and those that do not.<sup>36</sup>

Despite the variation in public policy and regulation, stakeholders can implement prevention programs and strategies to reduce risk and increase protective factors associated with youth marijuana use. These activities may target the individual or community environment. The next chapter provides information on what constitutes an evidence-based intervention and provides examples of prevention programs and policies that have demonstrated decreases in substance use, and, specifically, marijuana initiation and use among youth.



Non-Medical Legalization	Medical Legalization	Decriminalized	Illegal
The possession of marijuana is permitted for both medical and/or non-medical purposes by the state. Non-medical use is limited to adults aged 21 and older. Also referred to as “recreational and adult use.”	The possession of marijuana is permitted by the state when recommended for medical purposes only.	Decriminalization can be full or partial and means that lesser marijuana violations, such as possession of small amounts, will typically be civil infractions or misdemeanors and will not result in imprisonment.	The possession of marijuana is not permitted for any purpose and is subject to both state and federal prosecution.
It is important to note that these categories may not be mutually exclusive in every state. For example, a state may have decriminalized marijuana while it is still illegal.			

## Professional Organization Statements on Marijuana and Youth



**American Academy of Pediatrics (AAP):** “In states that have legalized marijuana for recreational purposes, the AAP strongly recommends strict enforcement of rules and regulations that limit access and marketing and advertising to youth... Although the AAP does not condone state laws that allow the sale of marijuana products, in states where recreational marijuana is currently legal, pediatricians should advocate that states regulate the product as closely as possible to tobacco and alcohol, with a minimum age of 21 years for purchase. Revenue from this regulation should be used to support research on the health risks and benefits of marijuana.”<sup>3</sup>



**American Academy of Child and Adolescent Psychiatry (AACAP):** “Marijuana-related policy changes, including legalization, may have significant unintended consequences for children and adolescents. AACAP supports (a) initiatives to increase awareness of marijuana’s harmful effects on adolescents, (b) improved access to evidence-based treatment for adolescents with marijuana-related problems, and (c) careful monitoring of the effects of marijuana-related policy changes on child and adolescent mental health. Finally, AACAP strongly advocates for the involvement of the medical and research community in these critical and highly impactful policy-related discussions.”<sup>8</sup>



**American Society of Addiction Medicine:** “Public health efforts through evidence-based prevention programs should be strengthened to discourage people from using cannabis products due to their known potential harms. Given the particular risks to children and adolescents, cannabis products should not be distributed to anyone under the age of 21... States or jurisdictions that decide to legalize cannabis production, distribution, or sale should only do so within a strong public health-based regulatory framework that minimizes the harms related to legalization. These should include best public health practices established for tobacco control, and components which have been identified as important for minimizing harmful use of tobacco or alcohol.”<sup>11</sup>



**American Public Health Association:** “With more states legalizing retail sales of marijuana and a dearth of national research on cannabis policy, [APHA] recommends state and local governments that regulate cannabis to develop and enforce policies that control access and use by youth and other vulnerable populations. Calls on all lawmakers to develop funding and monitoring mechanisms to expunge cannabis-related records, decrease arrests, support community re-entry and community development. Encourages state and local governments to work with health departments to prevent and treat cannabis abuse and dependence. Urges agencies to develop and expand the evidence base on the health effects of cannabis, as well as on the public health and safety outcomes related to its commercial regulation.”<sup>13</sup>



# Reference List

- <sup>1</sup> National Institute on Drug Abuse. (2019). *Marijuana DrugFacts*. <https://www.drugabuse.gov/publications/drugfacts/marijuana>
- <sup>2</sup> National Academies of Sciences, Engineering, and Medicine. (2017). *The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research*. National Academies Press. <https://doi.org/10.17226/24625>
- <sup>3</sup> Mikos, R. A., & Kam, C. D. (2019). Has the “M” word been framed? Marijuana, cannabis, and public opinion. *PLoS One*, 14(10). <https://doi.org/10.1371/journal.pone.0224289>
- <sup>4</sup> National Hispanic Caucus of State Legislators. (2017). *Providing a legal framework when jurisdictions decide to decriminalize, commercialize and tax cannabis*. <https://nhcsl.org/resources/resolutions/2017/2017-12/>
- <sup>5</sup> Ammerman, S., Ryan, S., & Adelman, W. P. (2015). The impact of marijuana policies on youth: Clinical, research, and legal update. *Pediatrics*, 135(3), e769-e785. <https://doi.org/10.1542/peds.2014-4147>
- <sup>6</sup> Substance Abuse and Mental Health Services Administration. (2020). *Key substance use and mental health indicators in the United States: Results from the 2019 National Survey on Drug Use and Health*. <https://www.samhsa.gov/data/sites/default/files/reports/rpt29393/2019NSDUHFFRPDFWHTML/2019NSDUHFFR090120.htm>
- <sup>7</sup> Center for Behavioral Health Statistics and Quality. (2020). *Results from the 2019 National Survey on Drug Use and Health: Detailed tables*. <https://www.samhsa.gov/data/sites/default/files/reports/rpt29394/NSDUHDetailedTabs2019/NSDUHDetailedTabs2019.pdf>
- <sup>8</sup> American Academy of Child and Adolescent Psychiatry. (2017). *Marijuana legalization*. [https://www.aacap.org/AACAP/Policy\\_Statements/2014/aacap\\_marijuana\\_legalization\\_policy.aspx](https://www.aacap.org/AACAP/Policy_Statements/2014/aacap_marijuana_legalization_policy.aspx)
- <sup>9</sup> Casadio, P., Fernandes, C., Murray, R. M., & Di Forti, M. (2011). Cannabis use in young people: The risk for schizophrenia. *Neuroscience & Biobehavioral Reviews*, 35(8), 1779-1787. <https://doi.org/10.1016/j.neubiorev.2011.04.007>
- <sup>10</sup> Price, C., Hemmingsson, T., Lewis, G., Zammit, S., & Allebeck, P. (2009). Cannabis and suicide: Longitudinal study. *Br J Psychiatry*, 195(6), 492-497. <https://doi.org/10.1192/bjp.bp.109.065227>
- <sup>11</sup> American Society of Addiction Medicine. (2020). *Public policy statement on cannabis*. <https://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2020/10/13/cannabis>
- <sup>12</sup> Lisdahl, K. M., Wright, N. E., Medina-Kirchner, C., Maple, K. E., & Shollenbarger, S. (2014). Considering cannabis: The effects of regular cannabis use on neurocognition in adolescents and young adults. *Current Addiction Reports*, 1(2), 144-156. <https://dx.doi.org/10.1007%2Fs40429-014-0019-6>
- <sup>13</sup> American Public Health Association. (2020, October 25). *New public health policy statements adopted at APHA 2020*. <https://www.apha.org/news-and-media/news-releases/apha-news-releases/2020/2020-apha-policy-statements>
- <sup>14</sup> Hsiao, P., & Clavijo, R. I. (2018). Adverse effects of cannabis on male reproduction. *Eur Urol Focus*, 4(3), 324-328. <https://doi.org/10.1016/j.euf.2018.08.006>
- <sup>15</sup> Payne, K. S., Mazur, D. J., Hotaling, J. M., & Pastuszak, A. W. (2019) Cannabis and Male Fertility: A Systematic Review. *J Urol*, 202(4), 674-681. <https://doi.org/10.1097/ju.0000000000000248>
- <sup>16</sup> Miech, R. A., Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2021). *Monitoring the Future national survey results on drug use, 1975–2020: Volume I, secondary school students*. [http://www.monitoringthefuture.org/pubs/monographs/mtf-vol1\\_2020.pdf](http://www.monitoringthefuture.org/pubs/monographs/mtf-vol1_2020.pdf)
- <sup>17</sup> National Institute on Drug Abuse. (2019, December 18). *Monitoring the Future 2019 survey results: Overall findings*. <https://www.drugabuse.gov/drug-topics/trends-statistics/infographics/monitoring-future-2019-survey-results-overall-findings>
- <sup>18</sup> Levar, N., Francis, A. N., Smith, M. J., Ho, W. C., & Gilman, J. M. (2018). Verbal memory performance and reduced cortical thickness of brain regions along the uncinate fasciculus in young adult cannabis users. *Cannabis Cannabinoid Res*, 3(1), 56-65. <https://dx.doi.org/10.1089%2Fcan.2017.0030>



- 19 Sagar, K. A., & Gruber, S. A. (2018). Marijuana matters: reviewing the impact of marijuana on cognition, brain structure and function, & exploring policy implications and barriers to research. *Int Rev Psychiatry*, 30(3), 251-267. <https://dx.doi.org/10.1080/09638237.2018.1460334>
- 20 U.S. Food and Drug Administration. (2020). *FDA and cannabis: Research and drug approval process*. <https://www.fda.gov/news-events/public-health-focus/fda-and-cannabis-research-and-drug-approval-process>
- 21 Spaderna, M., Addy, P. H., & D'Souza, D. C. (2013). Spicing things up: Synthetic cannabinoids. *Psychopharmacology*, 228(4), 525-540. <https://doi.org/10.1007/s00213-013-3188-4>
- 22 National Institute on Drug Abuse. (2020). *DrugFacts: Synthetic cannabinoids (K2/Spice)*. <https://www.drugabuse.gov/publications/drugfacts/synthetic-cannabinoids-k2spice>
- 23 Cash, M. C., Cunnane, K., Fan, C., & Romero-Sandoval, E. A. (2020). Mapping cannabis potency in medical and recreational programs in the United States. *PLoS One*, 15(3), e0230167. <https://doi.org/10.1371/journal.pone.0230167>
- 24 National Institute on Drug Abuse. (2020). *Marijuana research report: How does marijuana produce its effects?* <https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-produce-its-effects>
- 25 Smart, R., Caulkins, J. P., Kilmer, B., Davenport, S., & Midgette, G. (2017). Variation in cannabis potency and prices in a newly legal market: Evidence from 30 million cannabis sales in Washington state. *Addiction*, 112(12), 2167-2177. <https://doi.org/10.1111/add.13886>
- 26 Burgdorf, J. R., Kilmer, B., & Pacula, R. L. (2011). Heterogeneity in the composition of marijuana seized in California. *Drug Alcohol Depend*, 7(1), 59-61. <https://dx.doi.org/10.1016%2Fj.drugalcdep.2010.11.031>
- 27 ElSohly, M., Chandra, S., Radwan, M., Majumdar, C., & Church, J. (2021). A comprehensive review of cannabis potency in the United States in the last decade. *Biol Psychiatry Cogn Neurosci Neuroimaging*, 6(6), 603-606. <https://doi.org/10.1016/j.bpsc.2020.12.016>
- 28 Van der Pol, P., Liebrechts, N., Brunt, T., Van Amsterdam, J., De Graaf, R., Korf, D. J., Van den Brink, W., & Can Laar, M. (2014). Cross-sectional and prospective relation of cannabis potency, dosing and smoking behaviour with cannabis dependence: An ecological study. *Addiction*, 109(7), 1101-1109. <https://doi.org/10.1111/add.12508>
- 29 Di Forti, M., Quattrone, D., Freeman, T. P., Tripoli, G., Gayer-Anderson, C., Quigley, H., Rodriguez, V., Jongsma, H. E., Ferraro, L., La Cascia, C., La Barbera, D., Tarricone, I., Berardi, D., Szöke, A., Arango, C., Tortelli, A., Velthorst, E., Bernardo, M., Del-Ben, C. M.,... Murray, R. M. (2019). The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): A multicentre case-control study. *The Lancet Psychiatry* 6(5), 427-436. [https://doi.org/10.1016/s2215-0366\(19\)30048-3](https://doi.org/10.1016/s2215-0366(19)30048-3)
- 30 Volkow, N., & Sharpless, N. (2021, May 10). *Establishing 5mg of THC as the standard unit for research*. National Institute on Drug Abuse. <https://www.drugabuse.gov/about-nida/noras-blog/2021/05/establishing-5mg-thc-standard-unit-research>
- 31 Seaman, E. L., Stanton, C. A., Edwards, K. C., & Halenar, M. J. (2020). Use of tobacco products/devices for marijuana consumption and association with substance use problems among U.S. young adults (2015–2016). *Addictive Behaviors*, 102, 106133. <https://doi.org/10.1016/j.addbeh.2019.106133>
- 32 Patrick, M. E., Miech, R. A., Kloska, D. D., Wagner, A. C., & Johnston, L. D. (2020). Trends in marijuana vaping and edible consumption from 2015 to 2018 among adolescents in the US. *JAMA Pediatrics*, 174(9), 900-902. <https://doi.org/10.1001/jamapediatrics.2020.0175>
- 33 O'Connor, S., Méndez, S., Bess, J., Cooper, B., Cordova-Sanchez, A., Harris, D., & Jeong, C. (2016). *Concerning cannabis-infused edibles: Factors that attract children to foods*. Cannabis Law & Policy Project, University of Washington School of Law. <https://lcb.wa.gov/publications/Marijuana/Concerning-MJ-Infused-Edibles-Factors-That-Attract-Children.pdf>
- 34 Metzner, C., & Kraus, L. (2008). The impact of alcopops on adolescent drinking: A literature review. *Alcohol & Alcoholism*, 43(2), 230-239. <https://doi.org/10.1093/alcalc/agm148>
- 35 Grotenhermen, F. (2003). Pharmacokinetics and pharmacodynamics of cannabinoids. *Clin Pharmacokinet*, 42(4), 327-360. <https://doi.org/10.2165/00003088-200342040-00003>
- 36 Silver, L. D., Naprawa, A. Z., & Padon, A. A. (2020). Assessment of incorporation of lessons from tobacco control in city and county laws regulating legal marijuana in California. *JAMA Network Open*, 3(6), e208393-e208393. <https://doi.org/10.1001/jamanetworkopen.2020.8393>

- 37 Ramamurthi, D., Chau, C., & Jackler, R. K. (2018). JUUL and other stealth vaporisers: Hiding the habit from parents and teachers. *Tob Control*. <https://doi.org/10.1136/tobaccocontrol-2018-054455>
- 38 Liu J., Ramamurthi, D., & Halpern-Felsher, B. (2021). Inside the adolescent voice: A qualitative analysis of the appeal of different tobacco products. *Tobacco Induced Diseases*, 19(February), 15. <https://doi.org/10.18332/tid/132856>
- 39 Ambrose, B. K., Day, H. R., Rostron, B., Conway, K. P., Borek, N., Hyland, A., & Villanti, A. C. (2015). Flavored tobacco product use among US youth aged 12-17 years, 2013-2014. *Journal of the American Medical Association*, 314(17), 1871-1873. <https://doi.org/10.1001/jama.2015.13802>
- 40 Villanti, A. C., Johnson, A. L., Ambrose, B. K., Cummings, K. M., Stanton, C. A., Rose, S. W., Feirman, S. P., Tworek, C., Glasser, A. M., Pearson, J. L., Cohn, A. M., Conway, K. P., Niaura, R. S., Bansal-Travers, M., & Hyland, A. (2017). Flavored tobacco product use in youth and adults: Findings from the first wave of the PATH study (2013-2014). *American Journal of Preventive Medicine*, 52(2), 139-151. <https://doi.org/10.1016/j.amepre.2017.01.026>
- 41 Berg, C. J. (2016). Preferred flavors and reasons for e-cigarette use and discontinued use among never, current, and former smokers. *International Journal of Public Health*, 61(2), 225-236. <https://doi.org/10.1007%2Fs00038-015-0764-x>
- 42 Marshal, M. P., Friedman, M. S., Stall, R., King, K. M., Miles, J., Gold, M. A., Bukstein, O. G., & Morse, J. Q. (2008). Sexual orientation and adolescent substance use: A meta-analysis and methodological review. *Addiction*, 103(4), 546-556. <https://doi.org/10.1111/j.1360-0443.2008.02149.x>
- 43 Day, J. K., Fish, J. N., Perez-Brumer, A., Hatzenbuehler, M. L., & Russell, S. T. (2017). Transgender youth substance use disparities: Results from a population-based sample. *Journal of Adolescent Health*, 61(6), 729-735. <https://doi.org/10.1016/j.jadohealth.2017.06.024>
- 44 Krueger, E. A., Fish, J. N., & Upchurch, D. M. (2020). Sexual orientation disparities in substance use: Investigating social stress mechanisms in a national sample. *Am J Prev Med*, 58(1), 59-68. <https://doi.org/10.1016/j.amepre.2019.08.034>
- 45 Katz-Wise S. L., Sarda, V., Austin, S. B., & Harris, S. K. (2021). Longitudinal effects of gender minority stressors on substance use and related risk and protective factors among gender minority adolescents. *PLoS One*, 16(6). <https://doi.org/10.1371/journal.pone.0250500>
- 46 Watson, R. J., Fish, J. N., McKay, T., Allen, S. H., Eaton, L., & Puhl, R. M. (2020). Substance use among a national sample of sexual and gender minority adolescents: Intersections of sex assigned at birth and gender identity. *LGBT Health*, 7(1), 37-46. <https://dx.doi.org/10.1089%2Ffgbt.2019.0066>
- 47 Jacobus, J., & Tapert, S. F. (2014). Effects of cannabis on the adolescent brain. *Current Pharmaceutical Design*, 20(13), 2186-2193.
- 48 D'Souza, D. C., Sewell, R. A., & Ranganathan, M. (2009). Cannabis and psychosis/schizophrenia: Human studies. *European Archives of Psychiatry and Clinical Neuroscience*, 259(7), 413-431. <https://doi.org/10.1007/s00406-009-0024-2>
- 49 U.S. Department of Health and Human Services. (2019). *U.S. Surgeon General's advisory: Marijuana use and the developing brain*. <https://www.hhs.gov/surgeongeneral/reports-and-publications/addiction-and-substance-misuse/advisory-on-marijuana-use-and-developing-brain/index.html>
- 50 Albaugh, M. D., Ottino-Gonzalez, J., Sidwell, A., Lepage, C., Juliano, A., Owens, M. M., Chaarani, B., Spechler, P., Fontaine, N., Rioux, P., Lewis, L., Jeon, S., Evans, A., D'Souza, D., Radhakrishnan, R., Banaschewski, T., Bokde, A. L. W., Quinlan, E. B., Conrod, P.,... Garavan, H. (2021). Association of cannabis use during adolescence with neurodevelopment. *JAMA Psychiatry*, e211258. <https://doi.org/10.1001/jamapsychiatry.2021.1258>
- 51 D'Souza, D. C., Radhakrishnan, R., Naganawa, M., Ganesh, S., Nabulsi, N., Najafzadeh, S., Ropchan, J., Ranganathan, M., Cortes-Briones, J., Huang, Y., Carson, R. E., & Skosnik, P. (2020). Preliminary in vivo evidence of lower hippocampal synaptic density in cannabis use disorder. *Mol Psychiatry*. <https://doi.org/10.1038/s41380-020-00891-4>
- 52 Panlilio, L. V., & Justinova, Z. (2018). Preclinical studies of cannabinoid reward, treatments for cannabis use disorder, and addiction-related effects of cannabinoid exposure. *Neuropsychopharmacology*, 43(1), 116-141. <https://doi.org/10.1038/npp.2017.193>
- 53 Freeman, T., & Winstock, A. (2015). Examining the profile of high-potency cannabis and its association with severity of cannabis dependence. *Psychological medicine*, 45(15), 3181-3189. <https://doi.org/10.1017/s0033291715001178>
- 54 Galli, J. A., Sawaya, R. A., & Friedenber, F. K. (2011). Cannabinoid Hyperemesis Syndrome. *Curr Drug Abuse Rev*, 4(4), 241-249. <https://doi.org/10.2174/1874473711104040241>

- 55 Ferner, R. (2018). Disposition of toxic drugs and chemicals in man 11th edition. *Clinical Toxicology*, 56(3), 234. <https://doi.org/10.1080/15563650.2017.1388920>
- 56 Tu, A. W., Ratner, P. A., & Johnson, J. L. (2008). Gender differences in the correlates of adolescents' cannabis use. *Substance Use and Misuse*, 43(10), 1438-1463. <https://dx.doi.org/10.1080%2F10826080802238140>
- 57 Henry, K. L., Thornberry, T. P., & Huizinga, D. H. (2009). A discrete-time survival analysis of the relationship between truancy and the onset of marijuana use. *Journal of Studies on Alcohol and Drugs*, 70(1), 5-15. <https://doi.org/10.15288/jsad.2009.70.5>
- 58 Marmorstein, N. R., White, H. R., Loeber, R., & Stouthamer-Loeber, M. (2010). Anxiety as a predictor of age at first use of substances and progression to substance use problems among boys. *Journal of Abnormal Child Psychology*, 38(2), 211-224. <https://dx.doi.org/10.1007%2Fs10802-009-9360-y>
- 59 Carvalho, A. F., Stubbs, B., Vancampfort, D., Kloiber, S., Maes, M., Firth, J., Kurdyak, P. A., Stein, D. J., Rehm, J., & Koyanagi, A. (2019). Cannabis use and suicide attempts among 86,254 adolescents aged 12–15 years from 21 low-and middle-income countries. *European Psychiatry*, 56(1), 8-13. <https://doi.org/10.1016/j.eurpsy.2018.10.006>
- 60 Hall, W. (2014). What has research over the past two decades revealed about the adverse health effects of recreational cannabis use? *Addiction*, 110(1), 19-35. <https://doi.org/10.1111/add.12703>
- 61 Paul, S. E., Hatoum, A. S., & Fine, J. D. (2020). Associations between prenatal cannabis exposure and childhood outcomes. *JAMA Psychiatry*, 78(1), 64-76. <https://doi.org/10.1001/jamapsychiatry.2020.2902>
- 62 Winters, K. C., & Lee, C.-Y. S. (2008). Likelihood of developing an alcohol and cannabis use disorder during youth: Association with recent use and age. *Drug and Alcohol Dependence*, 92(1-3), 239-247. <https://dx.doi.org/10.1016%2Fj.drugalcdep.2007.08.005>
- 63 Hasin, D. S., Saha, T. D., Kerridge, B. T., Goldstein, R. B., Chou, S. P., Zhang, H., Jung, J., Pickering, R. P., Ruan, W. J., Smith, S. M., Huang, B., & Grant, B. F. (2015). Prevalence of marijuana use disorders in the United States between 2001-2002 and 2012-2013. *JAMA Psychiatry*, 72(12), 1235-1242. <https://doi.org/10.1001/jamapsychiatry.2015.1858>
- 64 Budney, A. J., & Hughes, J. R. (2006). The cannabis withdrawal syndrome. *Curr Opin Psychiatry*, 19(3), 233-238. <https://doi.org/10.1097/01.yco.0000218592.00689.e5>
- 65 Allsop, D. J., Copeland, J., Norberg, M. M., Fu, S., Molnar, A., Lewis, J., & Budney, A. J. (2012). Quantifying the clinical significance of cannabis withdrawal. *PLoS One*, 7(9), e44864. <https://doi.org/10.1371/journal.pone.0044864>
- 66 Hughes, J. R., Naud, S., Budney, A. J., Fingar, J. R., & Callas, P. W. (2016). Attempts to stop or reduce daily cannabis use: An intensive natural history study. *Psychol Addict Behav*, 30(3), 389-397. <https://doi.org/10.1037/adb0000155>
- 67 Budney, A. J., Roffman, R., Stephens, R. S., & Walker, D. (2007). Marijuana dependence and its treatment. *Addict Sci Clin Pract*, 4(1), 4-16. <https://dx.doi.org/10.1151%2Fascp07414>
- 68 White, W. (2012). *Recovery/remission from substance use disorders: An analysis of reported outcomes in 415 scientific reports, 1868-2011*. Philadelphia Department of Behavioral Health and Intellectual disAbility Services, Great Lakes Addiction Technology Transfer Center. [https://www.naadac.org/assets/2416/whitewl2012\\_recoveryremission\\_from\\_substance\\_abuse\\_disorders.pdf](https://www.naadac.org/assets/2416/whitewl2012_recoveryremission_from_substance_abuse_disorders.pdf)
- 69 Large, M., & Sharma, S. (2011). Cannabis use and earlier onset of psychosis: A systematic meta-analysis. *Arch Gen Psychiatry*, 68(6), 555-561. <https://doi.org/10.1001/archgenpsychiatry.2011.5>
- 70 Kuepper, R., Van Os, J., Lieb, R., Wittchen, H., Höfler, M., & Henquet, C. (2011). Continued cannabis use and risk of incidence and persistence of psychotic symptoms: 10 year follow-up cohort study. *BMJ*, 342, d738. <https://doi.org/10.1136/bmj.d738>
- 71 Silins, E., Horwood, L. J., Patton, G. C., Fergusson, D. M., Olsson, C. A., Hutchinson, D. M., Spry, E., Toumbourou, J. W., Degenhardt, L., Swift, W., Cofey, C., Tait, R. J., Letcher, P. Copeland, J., & Mattick, R. P. (2014). Young adult sequelae of adolescent cannabis use: An integrative analysis. *The Lancet Psychiatry*, 1(4), 286-293. [https://doi.org/10.1016/s2215-0366\(14\)70307-4](https://doi.org/10.1016/s2215-0366(14)70307-4)
- 72 Fergusson, D. M., & Boden, J. M. (2008). Cannabis use and later life outcomes. *Addiction*, 103(6), 969-976. <https://doi.org/10.1111/j.1360-0443.2008.02221.x>



- 73 Cerdá, M., Moffitt, T. E., Meier, M. H., Harrington, H., Houts, R., Ramrakha, S., Hogan, S., Poulton, R., & Caspi, A. (2016). Persistent cannabis dependence and alcohol dependence represent risks for midlife economic and social problems: A longitudinal cohort study. *Clinical Psychological Science*, 4(6), 1028-1046. <https://doi.org/10.1177/2167702616630958>
- 74 Esposito, M. H., Lee, H., Hicken, M. T., Porter, L. C., & Herting, J. R. (2017). The consequences of contact with the criminal justice system for health in the transition to adulthood. *Longit Life Course Stud*, 8(1), 57-74. <https://doi.org/10.14301/lcls.v8i1.405>
- 75 Gobbi, G., Atkin, T., Zytynski, T., Wang, S., Askari, S., Boruff, J., Ware, M., Marmorstein, N., Cipriani, A., Dendukuri, N., & Mayo, N. (2019). Association of cannabis use in adolescence and risk of depression, anxiety, and suicidality in young adulthood: A systematic review and meta-analysis. *JAMA Psychiatry*, 76(4), 426-434. <https://doi.org/10.1001/jamapsychiatry.2018.4500>
- 76 Fontanella, C. A., Steelesmith, D. L., Brock, G., Bridge, J. A., Campo, J. V., & Fristad, M. A. (2021). Association of cannabis use with self-harm and mortality risk among youths with mood disorders. *JAMA Pediatrics*, 175(4), 377-384. <https://doi.org/10.1001/jamapediatrics.2020.5494>
- 77 Han, B., Compton, W. M., Einstein, E. B., & Volkow, N. D. (2021). Associations of suicidality trends with cannabis use as a function of sex and depression status. *JAMA Network Open*, 4(6), e2113025. <https://dx.doi.org/10.1001%2Fjamanetworkopen.2021.13025>
- 78 Wadekar, A. S. (2020). Understanding opioid use disorder (OUD) using tree-based classifiers. *Drug and Alcohol Dependence*, 208, 107839. <https://doi.org/10.1016/j.drugalcdep.2020.107839>
- 79 Montoya, Z., Conroy, M., Vanden Heuvel, B., Pauli, C. S., & Park, S.-H. (2020). Cannabis contaminants limit pharmacological use of cannabidiol. *Frontiers in Psychiatry*, 11, 571832. <https://dx.doi.org/10.3389%2Ffphar.2020.571832>
- 80 Calabria, B., Degenhardt, L., Hall, W., & Lynskey, M. (2010). Does cannabis use increase the risk of death? Systematic review of epidemiological evidence on adverse effects of cannabis use. *Drug Alcohol Depend*, 29(3), 318-330. <https://doi.org/10.1111/j.1465-3362.2009.00149.x>
- 81 Crane, N. A., Schuster, R. M., Fusar-Poli, P., & Gonzalez, R. (2013). Effects of cannabis on neurocognitive functioning: Recent advances, neurodevelopmental influences, and sex differences. *Neuropsychol Rev*, 23(2), 117-137. <https://doi.org/10.1007/s11065-012-9222-1>
- 82 Monte, A. A., Shelton, S. K., Mills, E., Saben, J., Hopkinson, A., Sonn, B., Devivo, M., Chang, T., Fox, J., Brevik, C., Williamson, K., & Abbott, D. (2019). Acute illness associated with cannabis use, by route of exposure: An observational study. *Annals of Internal Medicine*, 170(8), 531-537. <https://doi.org/10.7326/m18-2809>
- 83 Hyshka, E. (2013). Applying a social determinants of health perspective to early adolescent cannabis use—An overview. *Drugs: Education, Prevention and Policy*, 20(2), 110-119. <https://doi.org/10.3109/09687637.2012.752434>
- 84 Hindocha, C., Freeman, T. P., Schafer, G., Gardner, C., Bloomfield, M. A. P., Bramon, E., Morgan, C. J. A., & Curran, H. V. (2020). Acute effects of cannabinoids on addiction endophenotypes are moderated by genes encoding the CB1 receptor and FAAH enzyme. *Addiction Biology*, 25(3), e12762. <https://doi.org/10.1111/adb.12762>
- 85 Burgdorf, C. E., Jing, D., Yang, R., Huang, C., Hill, M. N., Mackie, K., Milner, T. A., Pickel, V. M., Lee, F. S., & Rajadhyaksha, A. M. (2020). Endocannabinoid genetic variation enhances vulnerability to THC reward in adolescent female mice. *Science Advances*, 6(7). <https://doi.org/10.1126/sciadv.aay1502>
- 86 Johnson, E. C., Demontis, D., Thorgeirsson, T. E., Walters, R. K., Polimanti, R., Hatoum, A. S., Sanchez-Roige, S., Paul, S. E., Wendt, F. R., Clark, T., Lai, D., Reginsson, G. W., Zhou, H., He, J., Baranger, D. A. A., Gudbjartsson, D. F., Wedow, R., Adkins, D. E., Adkins, A. E.,... Agrawal, A. (2020). A large-scale genome-wide association study meta-analysis of cannabis use disorder. *Lancet Psychiatry*, 7(12), 1032-1045. [https://doi.org/10.1016/s2215-0366\(20\)30339-4](https://doi.org/10.1016/s2215-0366(20)30339-4)
- 87 Stephens, P. C., Sloboda, Z., Stephens, R. C., Teasdale, B., Grey, S. F., Hawthorne, R. D., & Williams, J. (2009). Universal school-based substance abuse prevention programs: Modeling targeted mediators and outcomes for adolescent cigarette, alcohol and marijuana use. *Drug and Alcohol Dependence*, 102(1-3), 19-29. <https://doi.org/10.1016/j.drugalcdep.2008.12.016>
- 88 Hollist, D. R., & McBroom, W. H. (2006). Family structure, family tension, and self-reported marijuana use: A research finding of risky behavior among youths. *Journal of Drug Issues*, 36(4), 975-998.
- 89 Rusby, J. C., Light, J. M., Crowley, R., & Westling, E. (2018). Influence of parent–youth relationship, parental monitoring, and parent substance use on adolescent substance use onset. *Journal of Family Psychology*, 32(3), 310-320. <https://dx.doi.org/10.1037%2Ffam0000350>



- <sup>90</sup> Kandel, D. B. (2001). *Parental influences on adolescent marijuana use and the baby boom generation: Findings from the 1979-1996 national household surveys on drug abuse*. U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration. <https://files.eric.ed.gov/fulltext/ED466906.pdf>
- <sup>91</sup> Brook, J. S., Brook, D. W., Arencibia-mireles, O., Richter, L., & Whiteman, M. (2001). Risk factors for adolescent marijuana use across cultures and across time. *The Journal of Genetic Psychology*, 162(3), 357-374. <https://doi.org/10.1080/00221320109597489>
- <sup>92</sup> Borawski, E. A., Ievers-Landis, C. E., Lovegreen, L. D., & Trapl, E. S. (2003). Parental monitoring, negotiated unsupervised time, and parental trust: the role of perceived parenting practices in adolescent health risk behaviors. *Journal of Adolescent Health*, 33(2), 60-70. [https://doi.org/10.1016/s1054-139x\(03\)00100-9](https://doi.org/10.1016/s1054-139x(03)00100-9)
- <sup>93</sup> Vermeulen-Smit, E., Verdurmen, J., Engels, R., & Vollebergh, W. (2015). The role of general parenting and cannabis-specific parenting practices in adolescent cannabis and other illicit drug use. *Drug and Alcohol Dependence*, 147, 222-228. <https://doi.org/10.1016/j.drugalcdep.2014.11.014>
- <sup>94</sup> Schaps, E., & Solomon, D. (2003). The role of the school's social environment in preventing student drug use. *The Journal of Primary Prevention*, 23(3), 299-328. <https://doi.org/10.1023/A:1021393724832>
- <sup>95</sup> Ethier, K. A., Harper, C. R., & Dittus, P. J. (2018). School environment is related to lower health and safety risks among sexual minority middle and high school students. *Journal of Adolescent Health*, 62(2), 143-148. <https://doi.org/10.1016/j.jadohealth.2017.08.024>
- <sup>96</sup> Vogel, M., Rees, C. E., McCuddy, T., & Carson, D. C. (2015). The highs that bind: School context, social status and marijuana use. *Journal of Youth and Adolescence*, 44(5), 1153-1164. <https://doi.org/10.1007/s10964-015-0254-8>
- <sup>97</sup> Cornell, D., & Huang, F. (2016). Authoritative school climate and high school student risk behavior: A cross-sectional multi-level analysis of student self-reports. *Journal of Youth and Adolescence*, 45(11), 2246-2259. <https://doi.org/10.1007/s10964-016-0424-3>
- <sup>98</sup> Sznitman, S. R., & Romer, D. (2014). Student drug testing and positive school climates: Testing the relation between two school characteristics and drug use behavior in a longitudinal study. *Journal of Studies on Alcohol and Drugs*, 75(1), 65-73. <https://doi.org/10.15288/jsad.2014.75.65>
- <sup>99</sup> Evans-Whipp, T. J., Plenty, S. M., Catalano, R. F., Herrenkohl, T. I., & Toumbourou, J. W. (2015). Longitudinal effects of school drug policies on student marijuana use in Washington state and Victoria, Australia. *American Journal of Public Health*, 105(5), 994-1000. <https://dx.doi.org/10.2105%2FAJPH.2014.302421>
- <sup>100</sup> Mulla, M. M., Bogen, K. W., & Orchowski, L. M. (2020). The mediating role of school connectedness in the associations between dating and sexual violence victimization and substance use among high school students. *Prev Med*, 139, 106197. <https://doi.org/10.1016/j.ypmed.2020.106197>
- <sup>101</sup> U.S. Department of Justice. (2000). *Promising strategies to reduce substance abuse: An OJP Issues and Practices Report*. <https://www.ojp.gov/pdffiles1/ojp/183152.pdf>
- <sup>102</sup> Fletcher, A., Bonell, C., Sorhaindo, A., & Rhodes, T. (2009). Cannabis use and 'safe' identities in an inner-city school risk environment. *International Journal of Drug Policy*, 20(3), 244-250. <https://doi.org/10.1016/j.drugpo.2008.08.006>
- <sup>103</sup> Education Development Center. (2017). *CAPT decision-support tools: Preventing youth marijuana use: Factors associated with use - using prevention research to guide prevention practice*. Substance Abuse and Mental Health Services Administration. <http://www.ca-cpi.org/docs/Resources/SAMHSA/Preventing-Youth-Marijuana-Use.pdf>
- <sup>104</sup> Van den Bee, M. B. M., & Pickworth, W. B. (2005). Risk factors predicting changes in marijuana involvement in teenagers. *JAMA Psychiatry*, 62(3), 311-319. <https://doi.org/10.1001/archpsyc.62.3.311>
- <sup>105</sup> Thornton, R. L., Glover, C. M., Cené, C. W., Glik, D. C., Henderson, J. A., & Williams, D. R. (2016). Evaluating strategies for reducing health disparities by addressing the social determinants of health. *Health Affairs*, 35(8), 1416-1423. <https://doi.org/10.1377/hlthaff.2015.1357>
- <sup>106</sup> National Conference of State Legislators. (2020, April 16). *State industrial hemp statutes*. <https://www.ncsl.org/research/agriculture-and-rural-development/state-industrial-hemp-statutes.aspx>
- <sup>107</sup> Cole, J. M. (2013, August 29). *Memorandum for all United States attorneys: Guidance regarding marijuana enforcement*. U.S. Department of Justice. <https://www.justice.gov/iso/opa/resources/3052013829132756857467.pdf>
- <sup>108</sup> National Conference of State Legislators. (2021, August 23). *State medical marijuana laws*. <https://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx>

- <sup>109</sup> Ogden, D. W. (2009, October 19). *Memorandum for selected United States attorneys: Investigations and prosecutions in states authorizing the medical use of marijuana*. U.S. Department of Justice Archives. <https://www.justice.gov/archives/opa/blog/memorandum-selected-united-state-attorneys-investigations-and-prosecutions-states>
- <sup>110</sup> Lampe, J. R. (2019, October 9). *The Controlled Substance Act (CSA): A legal overview for the 116th Congress*. Congressional Research Service. <https://sgp.fas.org/crs/misc/R45948.pdf>
- <sup>111</sup> Maxwell, J. C., & Mendelson, B. (2016). What do we know about the impact of the laws related to marijuana? *Journal of Addiction Medicine*, 10(1), 3-12. <https://dx.doi.org/10.1097%2FADM.0000000000000188>
- <sup>112</sup> Svrakic, D. M., Lustman, P. J., Mallya, A., Lynn, T. A., Finney, R., & Svrakic, N. M. (2012). Legalization, decriminalization & medicinal use of cannabis: A scientific and public health perspective. *MO Med*, 109(2), 90-98. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6181739/>



## What Research Tells Us

Substance use prevention programs seek to promote positive youth development and build social-emotional, refusal, self-efficacy, and other skills to reduce marijuana initiation and use. Environmental strategies aim to change or influence community conditions, systems, and policies. The interventions included in this chapter should not be considered in isolation. Prevention interventions are most effective when they are coordinated to complement and reinforce one another over time.<sup>1</sup>

The programs and strategies included were selected after conducting a comprehensive environmental scan and in collaboration with subject matter experts. Eligible programs and policies were required to meet the following criteria:

- Be clearly defined and replicable
- Address the target outcome of reduction or prevention of marijuana use among youth (middle and high school students)
- Be currently in use
- Have accessible implementation supports

This chapter presents substance use prevention programs that show promise in reducing youth marijuana use or that are effective in reducing substance use in general. A table of prevention programs, with information on their intent, target populations, and key outcomes, is included. The chapter also discusses community interventions and environmental strategies. Although the environmental strategies presented are grounded in the tobacco and/or

alcohol literature, some may also be effective in helping reduce youth marijuana use. States like New York, California, and Colorado are already in the early stages of implementing some of the interventions discussed.

## Comprehensive Approaches to Prevention

Prevention is most effective when interventions are matched to the target population's level of risk and needs. To determine risk and needs, community coalitions and prevention organizations conduct a community needs assessment using available data to identify gaps in preventive efforts and the risk and protective factors that influence substance use. Prevention interventions fall into three broad categories:<sup>2</sup>

1. **Universal prevention interventions** take the broadest approach and are designed to reach all individuals within a particular population by reducing risk factors and promoting protective factors. Universal prevention interventions may include policies/environmental strategies and programs that target individuals in schools, whole communities, or workplaces. Universal prevention interventions are likely to have the broadest impact in affecting populations of varied risk levels at once.<sup>3</sup>
2. **Selective prevention interventions** target biological, psychological, or social risk factors that are more prominent among groups at high



risk than among the wider population. They may also seek to increase protective factors. The audience for these interventions is often families, parents, or young people, or some combination. Examples include prevention education for youth groups or peer support groups for young adults with a family history of SUD.

3. **Indicated prevention interventions** target individuals who are already involved in risky behavior, such as substance use, that puts them at risk for SUD. These interventions include referrals to support services for youth who screen positive for substance use or violate substance use policies, or screening and consultation for families of youth admitted to hospitals with potential alcohol-related injuries.

Community coalitions can be essential partners active in selecting and implementing interventions within each of these categories. A strong prevention plan for a community combines programs and environmental strategies across the three categories to reach people with different risk levels and ensure a comprehensive prevention approach.

## Research Opportunity

This evidence review identified research studies for alcohol, tobacco, and marijuana. Although the body of research around youth prevention with marijuana-related outcomes is growing, clinicians continue to face the challenge of limited evidence, particularly from well-designed randomized controlled trials (RCTs), when selecting programs to address youth marijuana use. The field would benefit from more research on youth marijuana use, prevention programs and environmental strategies, and the effectiveness of those strategies among diverse populations (inclusive of race, ethnicity, age, and sex).

## Youth Substance Use Prevention Programs With Marijuana-Related Outcomes

There is an extensive body of literature demonstrating the effectiveness of substance use prevention programs for reducing youth tobacco, alcohol, and other drug use. Many of these interventions focus on positive youth development and building social-emotional, refusal, self-efficacy, and similar skills. The evidence behind these interventions has been reviewed extensively, including in the [\*Blueprints for Healthy Youth Development\*](#) and the [\*Surgeon General's Report on Alcohol, Drugs, and Health\*](#).

Programs with a strong evidence base were further evaluated on whether they had been replicated, included fidelity supports, were in use or had been recently updated, and were not prohibitively expensive. These criteria were selected to ensure that diverse stakeholders across a variety of settings could feasibly implement the programs included in this guide. These programs are potential options for families, schools, and communities seeking to prevent youth substance use.

Although some programs are designed to reduce youth marijuana use specifically, most are designed to address substance use in general. The programs listed in the table that are specifically designed to prevent marijuana use currently have limited research available; however, they may be promising in specifically preventing marijuana use among youth.



Promising Marijuana Use Prevention Interventions	Description	Primary Age and/or Grades	Expected Outcomes
<a href="#">Teen Marijuana Check-Up</a>	A brief motivational enhancement intervention publicized as a non-pressured and confidential opportunity for the teen marijuana smoker to “take stock” of his/her use. The intervention is designed for in-school implementation and intended to elicit the teen’s voluntary participation.  Cost: It is estimated that the program costs approximately \$100 per participant.	Grades 9 to 12	Reductions in quantity and frequency of marijuana use. <sup>4</sup>
<a href="#">Cannabis/Marijuana Awareness and Prevention Toolkit</a>	A theory-based and evidence-informed curriculum designed to be implemented by educators, parents, and/or community-based organizations. The curriculum is aimed at preventing middle and high school students from using marijuana.  Cost: This program is available for free.	Middle and High School Students	Prevention of marijuana use (studies currently in progress).
<a href="#">SPORT</a>	A single-session screening and brief intervention designed to promote positive healthy behaviors, such as engaging in physical exercise, while also preventing substance use. The creators of SPORT recently developed a new program “Marijuana Prevention Plus Wellness.” This program is adopted from the original evidence-based SPORT program and is designed specifically to prevent marijuana use. <sup>5</sup>  Cost: The module costs \$499 per program (separate programs for high school, middle school, adolescent).	Ages 8 to 18; Elementary, Middle, and High School Students <sup>5</sup>	Prevention of marijuana use and promotion of healthy behaviors, such as engaging in physical activity. <sup>5</sup>

Broader substance use prevention programs may also have an impact on marijuana use in youth, either by addressing common risk and protective factors for marijuana or other substance use, or because they have a component of their larger program addressing marijuana use.

Each of the programs listed in the table below has demonstrated an impact on broader substance use-related outcomes and may have components that address marijuana specifically.

Additional detail on the evidence behind each of these programs can be found in the [Surgeon General’s Report on Alcohol, Drugs, and Health](#).



Substance Use Prevention Interventions	Description	Primary Age and/or Grades	Expected Outcomes
Family-Focused			
<a href="#"><u>Familias Unidas</u></a>	<p>A program designed for Hispanic youth and families that targets risk factors, such as poor adolescent communication, and protective factors, such as parental involvement.<sup>6</sup></p> <p>Cost: The Implementation Package costs \$50,000 to train 10 participants. There are additional costs for more trainees.</p>	Ages 12 to 18; Middle and High School Students <sup>6</sup>	Prevent substance use and risky sexual behaviors. <sup>6</sup>
<a href="#"><u>Guiding Good Choices</u></a>	<p>A five-session curriculum that supports parents in reducing the risk that their child will engage in substance use. Children attend one session that teaches substance use resistance skills. Parents attend the remaining four sessions and learn skills needed to reduce the risk that their child will engage in substance use.<sup>7</sup></p> <p>Cost: A one-time group leader training is required. A 3-day on-site training for up to 12 participants is \$4,200 plus travel. The Core Program Kit costs \$881. Family Guides cost \$13.99 per family.</p>	Ages 11 to 14; Middle School Students <sup>7</sup>	Reduce drug use and related behavioral problems. <sup>7</sup> Reduction in use and related behavioral problems, as found in a study with schools blocked on school size and a proportion of students in lower income households. <sup>7</sup>
<a href="#"><u>Strengthening Families Program</u></a>	<p>A program that reduces substance use and behavior problems among youth by engaging youth and their families in skills training sessions. Sessions are designed to enhance protective factors, such as family relationships, parenting skills, and youth social and emotional skills.<sup>8</sup></p> <p>Cost: Estimates for the total program for one course of 10 families is \$13,800, plus an additional \$2,200 for 6 and 12 month boosters.</p>	Ages 10 to 14; Middle and High School Students <sup>8</sup>	Reduce risk factors for later alcohol and drug use, mental health problems, and delinquency. <sup>8</sup>
School-Focused			
<a href="#"><u>All Stars</u></a>	<p>A student-centered program designed to delay the onset of risky behaviors among youth. The curriculum includes group activities, games, art projects, video making, small group discussions, partner work, and a parent component.<sup>9</sup></p> <p>Cost: A package ranges from \$4-10 per student; teachers' manuals are \$100 each.</p>	Ages 10 to 19; Elementary, Middle, and High School Students <sup>9</sup>	<p>Delay the onset of risky behaviors.</p> <p>Specific behaviors targeted by the program include use of tobacco, marijuana, opioids, and inhalants, fighting and bullying, and early sexual activity.<sup>9</sup></p>



Substance Use Prevention Interventions	Description	Primary Age and/or Grades	Expected Outcomes
<a href="#"><u>Keepin' It Real</u></a>	<p>A substance use prevention and social and emotional competency enhancing program, in which lessons are based on real stories of adolescents and designed to be highly interactive. There are three versions of the program: multicultural, rural, and Spanish.<sup>10</sup></p> <p>Cost: It is \$300 to purchase the program, plus \$7 per student.</p>	Ages 11 to 19; Middle and High School Students <sup>10</sup>	<p>Prevent substance use.</p> <p>Enhance social and emotional competencies.<sup>10</sup></p>
<a href="#"><u>LifeSkills Training</u></a>	<p>A classroom-based universal prevention program that teaches personal self-management, social, and information and resistance skills related to drug use.<sup>11</sup></p> <p>Cost: Full curriculum sets range from \$265-\$645 for one teacher's manual and 30 student guides depending on grade level.</p>	Ages 9 to 19; Elementary, Middle, and High School Students. <sup>11</sup>	Prevent substance use and violent behaviors. <sup>11</sup>
<a href="#"><u>Good Behavior Game</u></a>	<p>Also called the PAX Good Behavior Game, this program is a set of strategies to help students learn important self-management skills while collaborating to make their classroom a peaceful and productive learning environment.<sup>12</sup></p> <p>Cost: Each staff person implementing the program is required to purchase the standard kit (\$199 per kit) or the PLUS kit (\$249 per kit). Training ranges from \$2,500-\$13,000 depending on number of training days needed.</p>	Ages 5 to 11; Elementary School Students <sup>12</sup>	<p>Increase capacity for self-regulation.</p> <p>Improve academic performance.</p> <p>Reduce alcohol and other illicit drug use.</p> <p>Improvement in health outcomes.<sup>13</sup></p>
<a href="#"><u>PreVenture</u></a>	<p>Prevents substance use among at-risk youth by introducing motivational pathways and coping skills tailored to each youth's personality profile.<sup>14</sup></p> <p>Cost: There is no cost to participate, but facilitators must be trained (\$780) and their certification renewed each year (\$120).</p>	Ages 13 to 19; High School Students <sup>14</sup>	Promote positive mental health outcomes and prevent substance use, including delayed initiation and reduced frequency of marijuana use. <sup>14</sup>
<a href="#"><u>Project Alert</u></a>	<p>Designed to instill negative attitudes and beliefs about drug use, while also equipping youth with the skills needed to say no to drugs. The program curriculum takes the form of short, fast-paced lessons that can be easily incorporated into the school day.<sup>15</sup></p> <p>Cost: This program is available for free.</p>	Ages 11 to 14; Middle School Students <sup>15</sup>	<p>Reduce substance use.</p> <p>Foster anti-drug attitudes and beliefs.</p> <p>Improve drug resistance skills.<sup>15</sup></p>

Substance Use Prevention Interventions	Description	Primary Age and/or Grades	Expected Outcomes
<a href="#"><u>Project Towards No Drug Abuse</u></a>	<p>A drug prevention program designed for at-risk youth, providing instruction in motivation activities to not use drugs, skills in self-control, communication, and resource acquisition, and decision-making strategies.<sup>16</sup></p> <p>Cost: Initial training and technical assistance costs \$2,100 plus trainer travel costs for a two-day training for up to 25 teachers. An additional \$200 per teacher's manual and \$12 per student workbook.</p>	Ages 14 to 19; High School Students <sup>16</sup>	Prevent problem behaviors, including alcohol, tobacco, and other drug use by positively affecting youth's decision-making, motivational factors, and skills such as social self-control. <sup>16</sup>
Community-Focused			
<a href="#"><u>Communities that Care*</u></a>	<p>A program that guides communities through a five-stage process, beginning with catalyzing community members and assessing a community's risks and strengths. The goals of the program are to promote healthy youth development, improve youth outcomes, and reduce problem behaviors.<sup>17</sup></p> <p>Cost: Estimated costs for the first year of the program are \$127,000 and include training and technical assistance, a coordinator, and a youth survey.</p>	Ages 10 to 17; Middle and High School Students <sup>17</sup>	Prevent problem behaviors, including substance use and delinquency. <sup>17</sup>
<a href="#"><u>PROSPER*</u></a> <i>PROMoting Partnerships to Enhance Resilience</i>	<p>An evidence-based delivery system designed to strengthen families, build youth skills, and reduce youth substance use, as well as other problem behaviors. Community teams composed of representatives from community service agencies, parents, youth, and other community members implement the system.<sup>18</sup></p> <p>Cost: Estimated costs for the first year of the program are \$149,000 and include implementation plans, trainings, staff, access to the data system, and data collection.</p>	Ages 10 to 14; Middle School Students <sup>18</sup>	<p>Prevent problem behaviors, including substance use.</p> <p>Promote positive youth development and strong families.<sup>18</sup></p>
<p>*Note that these programs can be considered processes for selecting and implementing the most appropriate substance use interventions for specific communities. They are often defined as frameworks to support the successful implementation of prevention programs in communities.</p>			

## Community-Level Interventions/ Environmental Strategies

Community-level interventions focus on the entire population or a specific population segment within a country, state, county, or city. Environmental strategies attempt to change social norms and attitudes, systems, and economic conditions to influence behavior and reduce marijuana use.

States considering legalizing marijuana may want to establish a minimum purchasing and use age of at least 21, comparable to the legal age to purchase alcohol and tobacco. This is of particular importance when considering that marijuana remains illegal at the federal level and research continues to demonstrate its negative impacts on the developing brain.

Laws, policies, and ordinances are examples of community-level, environmental interventions. There are several evidence-based prevention policies stakeholders can consider for preventing marijuana use in states where non-medical or medical marijuana use is legal. Given the increasing number of states that have legalized marijuana for adult use, many local and state governments are grappling with how to best regulate a newly legal marijuana market. Stakeholders can implement each of the environmental strategies discussed in this chapter at the state and/or local level, depending on the specific laws of each state. Community coalitions and state and local public health officials should be involved in determining which environmental strategies are most appropriate and supporting the implementation of those strategies.

This chapter provides insight into some of the options communities are implementing to prevent and reduce youth marijuana use. It draws on evidence from alcohol and tobacco use prevention efforts and examples from states implementing these strategies as part of their marijuana retail system. When available, the guide separately presents the evidence related to marijuana.

Currently, evidence on the impact of these environmental strategies to prevent youth marijuana use is limited because legalization of marijuana is relatively new.

States and localities are only recently able to regulate marijuana's sale, purchase, and marketing.

The environmental strategies discussed here are a sample of evidence-based approaches that may reduce youth marijuana use. Many are based on evidence from alcohol and tobacco studies showing that reducing access to and the availability of substances significantly impacts youth use of those substances. The policies described in this guide include regulating the price, number and characteristics of retail outlets that sell marijuana, specific products permitted to be sold, and content and placement of marijuana marketing.

Environmental strategies in this guide are summarized in the table below.





Strategy	Characteristics	Expected Outcomes
<b>Regulation of the price of marijuana</b>	<ul style="list-style-type: none"> <li>Increasing taxes (either by weight, THC content, or price).</li> <li>Banning price promotions (such as coupons, two for one deals, and happy hours).</li> </ul>	<ul style="list-style-type: none"> <li>Decrease in youth marijuana use.</li> <li>Decrease in use of high potency marijuana products.<sup>19</sup> This study uses administrative records from the Washington State Liquor and Cannabis Board.<sup>19</sup></li> </ul>
<b>Regulation of marijuana retail outlets</b>	<ul style="list-style-type: none"> <li>Limiting number and locations of retailers through licensing or zoning.</li> <li>Limiting hours/days of sale.</li> <li>Banning those under the age of 21 in dispensaries.</li> <li>Regulating where marijuana and related products can be sold.</li> </ul>	<ul style="list-style-type: none"> <li>Decrease in youth marijuana use, as reported in a study that includes data from a cross-section of 6<sup>th</sup>, 8<sup>th</sup>, and 11<sup>th</sup> graders in 35 Oregon counties.<sup>20</sup></li> </ul>
<b>Regulation of marijuana product manufacturing and packaging</b>	<ul style="list-style-type: none"> <li>Banning marijuana products with added synthetic flavors and odors.</li> <li>Banning THC-infused edibles likely to attract children and youth, such as candies, cookies, and beverages.</li> <li>Banning THC-infused alcohol and tobacco products.</li> <li>Requiring plain product packaging.</li> <li>Requiring transparency on product labels, including THC and CBD content and ingredients.</li> <li>Require prominent graphic marijuana warning labels with varied and rotating messaging.</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in youth marijuana initiation.</li> <li>Reduction in youth marijuana use and use disorder.</li> <li>Reduction in use of flavored edibles.</li> <li>Increased health knowledge.</li> <li>Increased motivation to quit.</li> <li>Reduced brand awareness and identification.</li> <li>Reduction in product appeal.</li> <li>Increase in understanding of the risks of marijuana.<sup>21-23</sup></li> </ul>
<b>Limitations on marijuana advertising and marketing</b>	<ul style="list-style-type: none"> <li>Banning marijuana advertising on television, radio, billboards, and social media.</li> <li>If not banned, limiting advertising with youth audiences.</li> <li>Removing marketing, promotion, and advertising dollars from admissible business expenses for state income tax calculations.</li> <li>Funding public health media campaigns.</li> <li>Prohibiting health and therapeutic claims.</li> </ul>	<ul style="list-style-type: none"> <li>Increase in understanding the risks of marijuana.</li> <li>Reduction in positive perceptions of marijuana use.</li> <li>Decrease in youth marijuana use.</li> <li>Reduction in advertising by marijuana retailers.<sup>24-25</sup> The Davis study uses data from 6<sup>th</sup> through 12<sup>th</sup> graders in seven communities.<sup>25</sup></li> </ul>

## Price and Taxation of Marijuana

Like alcohol and tobacco, the cost of marijuana can be controlled by raising the price of the product through taxes and establishing a price floor (i.e., minimum price). Youth and young adults are particularly responsive to tax increases because they generally have limited disposable income; therefore, high prices deter purchase and use.<sup>26-28</sup> Based on studies about youth alcohol and tobacco use, increasing the cost of marijuana products by taxing them may be an effective marijuana use prevention and reduction intervention,<sup>29-30</sup> though research on the effects of marijuana taxes on youth use are not currently available.<sup>31</sup>

Raising alcohol and tobacco taxes is recommended as one of the best ways to reduce use, particularly among youth.<sup>32-33</sup> For example, increasing the price of cigarettes by 10 percent reduces adult smoking by only 2 percent, young adult (ages 20 to 25) smoking by 4 percent, and youth (ages 12 to 17) smoking by approximately 7 percent.<sup>34</sup> Data from 43 states found that for every dollar increase in the cigarette tax, there was a 2 percent reduction in smoking among 14- and 15-year-olds.<sup>35</sup> This study uses data from the 1999-2013 Youth Risk Behavior Surveys.<sup>35</sup> Similarly, a 10 percent increase in alcohol prices would be expected to result in a 3 to 10 percent decrease in alcohol consumption across the population.<sup>36 32-33</sup>

Revenue from increasing marijuana taxes may be earmarked specifically for prevention, treatment, counter-marketing, and research and evaluation to help continue efforts to protect the health and safety of youth. This revenue should supplement the funds that are already earmarked for these activities. For example:

- California uses tax revenue for a youth prevention, education, and treatment fund, as well as childcare and community reinvestment.
- Colorado uses tax revenue for education programs.
- Massachusetts uses tax revenue for public safety programs.
- Oregon uses tax revenue for drug misuse prevention and treatment programs.
- Maine plans to use its tax revenues for public health and public safety programs.<sup>37</sup>

Importantly, any price strategy implemented should automatically account for inflation each year for the tax to not lose value over time.

In addition to taxation, banning price promotions, such as buy one get one free deals, happy hours, bulk purchases, or gifting marijuana products when non-marijuana products are sold and vice versa, can also help reduce youth marijuana use. This strategy has been shown effective in preventing use and misuse of alcohol and tobacco. For example, youth who live in counties with more coupons and price promotions are more likely to be current smokers than youth who live in counties with fewer coupons and price promotions.<sup>38-39</sup> The Kim study uses data from a representative sample of licensed tobacco retailers in New York.<sup>39</sup>

### Implementation Examples

- California has established a separate tax per ounce on marijuana flowers and leaves.<sup>40</sup>
- Illinois<sup>41</sup> and New York<sup>42</sup> tax marijuana based on level of THC content.
- Washington has implemented a 37 percent excise tax on retail price, and bans discounts on marijuana, including coupons and sale/clearance products.<sup>43</sup>

## Regulation of Retail Outlets Through Licensing and/or Zoning

There are two primary ways a jurisdiction or state can potentially limit the number and location of marijuana retailers: licensing and zoning.<sup>44</sup>

Licensing regulates and affords certain rights to businesses and can be used to limit the number of marijuana establishments. Zoning rules are legal guides that determine where businesses can operate and determine where marijuana establishments can be located.<sup>44</sup>

Licensing and zoning authority generally depends on the regulatory structure of the state and localities; and licensing can often be controlled through a public health entity, such as a local or state public health department. A state's regulatory structure, specifically the state's marijuana laws, will likely dictate how much authority localities have in passing licensing, zoning, or other ordinances. Licensing is often done at the state level but can also be combined with local licensing. Zoning is one of the strategies most frequently implemented by local city and county governments to regulate access to marijuana in response to their specific local data.

These policies should be considered in tandem. For example, pairing a zoning ordinance with density caps on retailers can help avoid clustering of numerous outlets within one small area, which has shown adverse effects for youth alcohol use,<sup>45-46</sup> and can help prevent marijuana establishments from being disproportionately located in low income areas.<sup>47</sup> For marijuana outlets, a government-controlled distribution system may have the greatest potential to protect public health, as is the case for alcohol in 17 states and several other jurisdictions.<sup>48-49</sup>

### **Implementation Examples**

- Washington<sup>50</sup> and Oregon<sup>51</sup> do not allow marijuana outlets within 1,000 feet of any school or other sensitive areas.
- Nevada limits retail licensing based on population size at the county level. For example, a county with a population between 100,000 and 699,999 may have up to 20 licensed retailers, whereas counties with 55,000 to 99,999 people may have four, and counties with populations of less than 55,000 may license two retailers.<sup>52</sup>



### **Restricting Youth Access to Marijuana in Retail Establishments**

States and jurisdictions can limit marijuana retailer hours and the manner of marijuana delivery to reduce youth access. The Community Preventive Services Task Force<sup>a</sup> recommends limiting the hours of alcohol sale in on-premise settings based on evidence that it reduces excessive alcohol consumption and related harms.<sup>29, 53</sup> Local and state governments can take a similar approach in regulating marijuana and some have already done so.

Additionally, allowing youth into marijuana establishments may create numerous challenges, including requiring age verification at the point of sale in addition to the point of entry, and normalizing marijuana use for youth. Allowing access to marijuana establishment only to people 21 and older can help prevent these challenges.

Relatedly, states have reduced youth exposure to marijuana products by mandating that only marijuana is sold in explicitly licensed dispensaries and establishments; other products, such as sodas, snacks, alcohol, or tobacco are not to be sold in these establishments. Similarly, prohibiting marijuana sales in grocery stores and other retail establishments will decrease availability of, and youth access to, the product.

### **Implementation Examples**

- Colorado has restricted the hours that marijuana retailers can be open from 8 a.m. to midnight.<sup>54</sup>
- All states currently require anyone entering marijuana establishments to be at least 21 years old, except for those with a medical recommendation.

### **Banning Products and Packaging That Attract Youth**

Marijuana products with added synthetic flavors and odors (such as fruit and candy) may be particularly attractive to youth. These products, typically flavored for inhalation, include vapes and flavored wrappers for combusted products like blunts. Additionally, strains and products may be named as if they were flavored (e.g., mango vapes, Cherry Pie, Pineapple Haze, Peanut Butter Cup) even if they are not, which may be just as effective at attracting youth. THC-infused foods and beverages, such as candies, cookies, sodas, and teas may also have packaging that mimics existing food or beverage products commonly marketed to youth. States that have legalized non-medical marijuana have considered banning these products. Products attractive to youth should be prohibited using clear, detailed, and enforceable regulations.

<sup>a</sup> The Community Preventive Services Task Force is an independent panel of public health and prevention experts who come together to provide evidence-based findings and recommendations on community-based health promotion and disease prevention interventions.





Additionally, marijuana products with high potency pose increased health risk to youth,<sup>55-56</sup> including increase in frequency of use, likelihood of marijuana dependence, and risk of an anxiety disorder and psychosis.<sup>57-58</sup> Regulating the products that are sold and how they are packaged may help prevent youth initiation or reduce current use. Research on flavored tobacco bans found a decrease in adolescent tobacco use after passage of this policy, including reductions in the probability of being a smoker and the number of cigarettes smoked.<sup>59</sup>

### Implementation Examples

- Contra Costa County, California has prohibited flavored marijuana products for combustion or inhalation and banned vaping products to protect youth.<sup>60</sup> Michigan, Oregon,<sup>61</sup> and four California cities have banned THC-infused beverages.<sup>61</sup>
- Connecticut limits flower potency to 30 percent THC and concentrates to 60 percent, and prohibits the addition of flavors, terpenes, and other additives to marijuana unless pre-approved.<sup>62</sup>

## Regulating Marijuana Packaging

Marijuana product packaging with cartoon images or imagery appeals to youth. For example, children are drawn to food packaging that includes color, novel shapes, products that smell sweet, fruity, or like candy, and cartoons or promotional characters.<sup>63</sup> The imagery on products serves as brand identification for youth and as marketing at in-store displays.<sup>22</sup> Efforts to reduce youth-appealing marketing and the implementation of plain packaging laws for tobacco products have led to reductions in youth tobacco use.<sup>64-65</sup>

The Dunlop study used data from adult smokers in New South Wales, Australia.<sup>64</sup> Packaging can be regulated to reduce youth access by requiring it to be tamper-resistant, child-resistant, opaque, and resealable. They can be made less attractive to children and youth by restricting names, flavors, images of people, animals, cartoon figures, bright colors, logos, and branding,<sup>66</sup> and prohibiting products and packaging that imitate non-marijuana products (such as candy, chips, or granola bars).<sup>22</sup>

Additionally, marijuana packaging, particularly on edibles, can be mandated to include nutrition facts and serving sizes, ingredient lists, expiration dates, and lot numbers. Regulations can explicitly prohibit false statements or health claims on packaging labels.

Finally, clear and large warning labels identifying the harms of marijuana use should be placed on the marijuana packaging, as is done with both tobacco and alcohol products.

### Implementation Examples

- Alaska and Massachusetts have mandated opaque, plain packaging for marijuana products.<sup>67-68</sup> Hawaii has done the same for medical marijuana.<sup>69</sup>
- Indiana, Utah, Texas, and Florida require a QR code that allows consumers to look up batch numbers, potency, and other ingredients.<sup>70-73</sup>
- Canada requires prominent rotating warning labels on a yellow background. For example: “WARNING: Adolescents and young adults are at greater risk of harms from cannabis. Daily or near-daily use over a prolonged period of time can harm brain development and function.”<sup>74</sup>
- California requires that all marijuana products include a warning label. The label must read: “WARNING: This product can expose you to marijuana smoke, which is known to the state of California to cause cancer, birth defects, and other reproductive harm.”<sup>75</sup>

## Limiting Marijuana Advertising and Marketing

There is a substantial body of literature that shows that increased exposure to alcohol and tobacco marketing leads to increases in youth use of these products;<sup>76-78</sup> similar findings are emerging in marijuana marketing, as well.<sup>79</sup>

A recent report found that 69 percent of U.S. consumers do not understand the difference between THC and CBD.<sup>65</sup> Additionally, technical names for THC analogs (e.g., Delta-8, Delta-10, and THC-O acetate) can further confuse consumers. Transparency on marijuana product labels can help consumers distinguish between CBD products that do and do not have THC elements, preventing potentially harmful levels of THC in the bloodstream, particularly among youth.<sup>64-65</sup>

Reducing youth exposure to marijuana marketing may help prevent or reduce marijuana use among youth and young adults. Strategies include banning advertising on television, radio, billboards, and social media, and limiting advertising with youth audiences, such as advertising on billboards or other forms of media. For example, advertising can be prohibited in venues where more than 10 or 15 percent of the audience are youth between the ages of 12 and 20.<sup>80-81</sup>

Additional strategies include reducing misleading information about the harmfulness of marijuana products by prohibiting health-related claims on any marijuana advertisements, and removing marijuana marketing, promotion, and advertising dollars from admissible business expenses for tax purposes.

### Implementation Examples

- Colorado has instituted a policy that retail marijuana establishments cannot advertise on television, radio, print media, or websites where more than 30 percent of the audience is under the age of 21.<sup>82</sup> Other states may consider lower thresholds, such as 10 to 15 percent.
- Mono County and the city of Palm Springs in California do not allow health or therapeutic claims on marijuana products or their marketing.

## Funding Public Health Media Campaigns

To counteract the marketing and advertising campaigns of the marijuana industry, states and communities can develop public health media campaigns to promote science-based messages about youth marijuana use, leading to reductions in youth use and shifts away from positive attitudes.

These campaigns are most effective when used in conjunction with other environmental strategies, such as taxes.<sup>21</sup> Public health prevention campaigns, such as the Truth Campaign, that discuss the harms of certain products have been effective in preventing and reducing youth substance use.<sup>25</sup>

## SOCIAL MEDIA

While paid advertisements for marijuana products are prohibited on social media platforms, such as Facebook, Instagram, and Twitter, there is still substantial marijuana marketing through other channels, such as social media influencers sharing posts of the product. Influencers are people who have built a reputation for their knowledge on a specific product or lifestyle, and who will often share brands or products with their followers, encouraging them to purchase those products. Studies have found that pro-marijuana content is prevalent on social media frequently seen by youth and young adults.<sup>83</sup> One in three youth in states with legal recreational marijuana have been found to engage (such as liking or following) with marijuana brands on social media.<sup>84</sup> This engagement poses a challenge to parents, communities, and stakeholders, as exposure to marijuana marketing is linked with increased use.<sup>85</sup>

The role of state and local governments in regulating advertising on social media is challenging. States such as Rhode Island have taken innovative approaches to reduce marijuana marketing by third parties on social media, requiring that if any third party uses a marijuana brand's trademark, brand, name, location, or other characteristics on social media, the company must notify the Department of Business Regulation. The marijuana company must also send a cease-and-desist notice to the third party.<sup>86</sup>

Additionally, parents and community coalitions can work directly with social media platforms to discourage marketing of these products by third parties.

# Reference List

- <sup>1</sup> McMorris, B. J., Hemphill, S. A., Toumbourou, J. W., Catalano, R. F., & Patton, G. C. (2007). Prevalence of substance use and delinquent behavior in adolescents from Victoria, Australia and Washington State, United States. *Health Educ Behav*, 34(4), 634-650. <https://doi.org/10.1177%2F1090198106286272>
- <sup>2</sup> Institute of Medicine. (1994). *Reducing risks for mental disorder: Frontiers for preventive intervention research* (P. J. Mrazek, & R. J. Haggerty, Eds.). The National Academic Press. <https://pubmed.ncbi.nlm.nih.gov/25144015/>
- <sup>3</sup> Frieden, T. R. (2010). A framework for public health action: The health impact pyramid. *American Journal of Public Health*, 100(4), 590-595. <https://dx.doi.org/10.2105%2FAJPH.2009.185652>
- <sup>4</sup> Budney, A. J., Roffman, R., Stephens, R. S., & Walker, D. (2007). Marijuana dependence and its treatment. *Addict Sci Clin Pract*, 4(1), 4-16. <https://dx.doi.org/10.1151%2Fascp07414>
- <sup>5</sup> Prevention Plus Wellness. (2021). *Marijuana prevention plus wellness*. <https://preventionpluswellness.com/products/sport-marijuana-awareness-program>
- <sup>6</sup> University of Miami Miller School of Medicine Department of Public Health. (n.d.). *Familias Unidas*. <https://familias-unidas.info/>
- <sup>7</sup> Blueprints for Healthy Youth Development. (2018). *Guiding Good Choices (GGC)*. <https://www.blueprintsprograms.org/guiding-good-choices-ggc/>
- <sup>8</sup> Kumpfer, K. (2020). *Strengthening Families Program*. <https://strengtheningfamiliesprogram.org/>
- <sup>9</sup> All Stars. (2021). *All Stars Core*. <https://www.allstarsprevention.com/all-stars-core.html>
- <sup>10</sup> Real Prevention. (n.d.). *Keepin' it real*. <https://real-prevention.com/keepin-it-real/>
- <sup>11</sup> Botvin LifeSkills Training. (n.d.). *Program Structure*. <https://www.lifeskillstraining.com/program-structure/>
- <sup>12</sup> Blueprints for Healthy Youth Development. (2021). *Good Behavior Game*. <https://www.blueprintsprograms.org/programs/20999999/good-behavior-game/>
- <sup>13</sup> PAXIS Institute. (2021). *PAX Good Behavior Game*. <https://www.paxis.org/pax-good-behavior-game>
- <sup>14</sup> Venture Lab. (n.d.). *Preventure*. <https://www.conrodventurelab.com/projects/preventure>
- <sup>15</sup> Project Alert. (2021). *Substance abuse prevention for grades 7 & 8*. <https://www.projectalert.com/>
- <sup>16</sup> University of Southern California Institute for Prevention Research. (2021). *Project Towards No Drug Abuse*. <https://tnd.usc.edu/>
- <sup>17</sup> University of Washington. (2021). *The Center for Communities that Care*. <https://www.communitiesthatcare.net/>
- <sup>18</sup> Prosper. (2021). *PROSPER Partnerships*. <http://helpingkidsprosper.org/>
- <sup>19</sup> Hansen, B., Miller, K., & Weber, C. (2017). The taxation of recreational marijuana evidence from Washington state. *NBER Working Paper Series*, 23632. [https://www.nber.org/system/files/working\\_papers/w23632/revisions/w23632.rev0.pdf](https://www.nber.org/system/files/working_papers/w23632/revisions/w23632.rev0.pdf)
- <sup>20</sup> Paschall, M. J., & Grube, J. W. (2021). Recreational marijuana availability in Oregon and use among adolescents. *Am J Prev Med*, 58(2), 63-69. <https://dx.doi.org/10.1016%2Fj.amepre.2019.09.020>
- <sup>21</sup> Wakefield, M. A., Loken, B. & Hornik, R. C. (2010). Use of mass media campaigns to change health behaviour. *The Lancet*, 376(9748), 1261-1271. [https://dx.doi.org/10.1016%2F0140-6736\(10\)60809-4](https://dx.doi.org/10.1016%2F0140-6736(10)60809-4)
- <sup>22</sup> Orenstein, D. G., & Glantz, S. A. (2018). Regulating cannabis manufacturing: Applying public health best practices from tobacco control. *Journal of Psychoactive Drugs*, 50(1), 19-32. <https://dx.doi.org/10.1080%2F02791072.2017.1422816>
- <sup>23</sup> National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. (2012). *Preventing tobacco use among youth and young adults: A report of the Surgeon General*. <https://www.ncbi.nlm.nih.gov/books/NBK99237/>
- <sup>24</sup> Jacobs, L. G. (2017). Regulating marijuana advertising and marketing to promote public health: Navigating the constitutional minefield. *Lewis & Clark Review*, 21(4), 1081-1133.



- 25 Davis, K. C., Farrelly, M. C., Messeri, P., & Duke, J. (2009). The impact of national smoking prevention campaigns on tobacco-related beliefs, intentions to smoke and smoking initiation: Results from a longitudinal survey of youth in the United States. *Int. J. Environ. Res. Public Health*, 6(2), 722-740. <https://dx.doi.org/10.3390%2Fijerph6020722>
- 26 Van Ours, J. C. (2007). Cannabis use when it's legal. *Addictive Behaviors*, 32(7), 1441-1450. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=670141](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=670141)
- 27 Pacula, R. L., & Lundberg, R. (2014). Why changes in price matter when thinking about marijuana policy: A review of the literature on the elasticity of demand. *Public Health Review*, 35(2), 1-18. <https://dx.doi.org/10.1007%2F9780391701>
- 28 Gruber, J., & Zinman, J. (2001). Youth smoking in the U.S.: Evidence and implications. In J. Gruber (Ed.), *Risky behavior among youths: An economic analysis* (pp. 69-120). University of Chicago Press. <https://www.nber.org/system/files/chapters/c10687/c10687.pdf>
- 29 Community Preventive Services Task Force. (2009). *Alcohol - Excessive consumption: Maintaining limits on hour of sale*. <https://www.thecommunityguide.org/findings/alcohol-excessive-consumption-maintaining-limits-hours-sale>.
- 30 Wagenaar, A. C., Tobler, A. L., & Komro, K. A. (2010). Effects of alcohol tax and price policies on morbidity and mortality: A systematic review. *Am J Public Health*, 100(11), 2270-2278. <https://dx.doi.org/10.2105%2FAJPH.2009.186007>
- 31 Chaloupka, F. J., Yureki, A., & Fong, G. T. (2012). Tobacco taxes as a tobacco control strategy. *Tobacco Control*, 21, 172-180. <https://doi.org/10.1136/tobaccocontrol-2011-050417>
- 32 World Health Organization. (2017). *Tobacco taxes in WHO member states*. [https://www.who.int/tobacco/global\\_report/2017/technical\\_note\\_III.pdf](https://www.who.int/tobacco/global_report/2017/technical_note_III.pdf)
- 33 Chisholm, D., Doran, C., Shibuya, K., & Rehm, J. R. (2006). Comparative cost-effectiveness of policy instruments for reducing the global burden of alcohol, tobacco and illicit drug use. *Drug and Alcohol Review*, 25, 552-563. <https://doi.org/10.1080/09595230600944487>
- 34 Chaloupka, F. J., & Warner, K. E. (1999). The Economics of Smoking. *NBER Working Paper Series*, 7047. [10.3386/w7047](https://doi.org/10.3386/w7047)
- 35 Hawkins, S. S., Bach, N., & F.Baum, C. (2016). Impact of tobacco control policies on adolescent smoking. *Journal of Adolescent Health*, 58(6), 679-685. <https://dx.doi.org/10.1016%2Fj.jadohealth.2016.02.014>
- 36 Elder, R., Lawrence, B., Aneeqah, Ferguson, Naimi, T. S., Brewer, R. D., Chattopadhyay, S. K., Toomey, T. L., & Fielding, J. E. (2010). The effectiveness of tax policy interventions for reducing excessive alcohol consumption and related harms. *Am J Prev Med*, 38(2), 217-229. <https://dx.doi.org/10.1016%2Fj.amepre.2009.11.005>
- 37 Urban Institute. (2021). *Marijuana taxes*. <https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/state-and-local-backgrounders/marijuana-taxes#:~:text=Marijuana%20purchases%20are%20also%20subject,and%20%240.35%20per%20marijuana%20seed>.
- 38 Pacula, R. L., Kilmer, B., Wagenaar, A. C., Frank J. Chaloupka, & Jonathan P. Caulkins. (2014). Developing public health regulations for marijuana: Lessons from alcohol and tobacco. *Am J Public Health*, 104(6), 1012-1028. <https://dx.doi.org/10.2105%2FAJPH.2013.301766>
- 39 Kim, A. E., Loomis, B. R., Busey, A. H., Farrelly, M. C., Willett, J. G., & Juster, H. R. (2013). Influence of retail cigarette advertising, price promotions, and retailer compliance on youth smoking-related attitudes and behaviors. *Journal of Public Health Management and Practice*, 19(6), E1-9. <https://doi.org/10.1097/phh.0b013e3182980c47>
- 40 California Department of Tax and Fee Administration. (2020). *Tax guide for cannabis businesses*. <https://www.cdtfa.ca.gov/industry/cannabis.htm>
- 41 Illinois Revenue. (n.d.). *Cannabis taxes*. <https://www2.illinois.gov/rev/research/taxinformation/other/Pages/Cannabis-Taxes.aspx>
- 42 Newman, G., & Peleg, S. (2021). Tax issues and the New York Regulation and Taxation Act. *The National Law Review*, XI(90). <https://www.natlawreview.com/article/tax-issues-and-new-york-marijuana-regulation-and-taxation-act>
- 43 Washington State Liquor and Cannabis Board. (2020). *Marijuana Tax Reporting Guide*. <https://lcb.wa.gov/taxreporting/marijuana-tax-reporting-guide>
- 44 ChangeLab Solutions and National Policy & Legal Analysis Network. (2012). *Healthy planning policies: A compendium from California general plans*. [https://www.changelabsolutions.org/sites/default/files/Healthy\\_Planning\\_Policies\\_Compendium\\_FINAL\\_%28CLS-20120530%29\\_090925.pdf](https://www.changelabsolutions.org/sites/default/files/Healthy_Planning_Policies_Compendium_FINAL_%28CLS-20120530%29_090925.pdf)
- 45 Grubestic, T. H., & Pridemore, W. A. (2011). Alcohol outlets and clusters of violence. *International Journal of Health Geographics*, 10, 30. <https://dx.doi.org/10.1186%2F1476-072X-10-30>

- 46 Reboussin, B. A., Song, E.-Y., & Wolfson, M. (2011). The impact of alcohol outlet density on the geographic clustering of underage drinking behaviors within census tracts. *Alcoholism: Clinical and Experimental Research*, 35(8), 1541-1549. <https://dx.doi.org/10.1111%2Fj.1530-0277.2011.01491.x>
- 47 Trangenstein, P. J., Sadler, R. C., Morrison, C. N., & Jernigan, D. H. (2020). Looking back and moving forward: The evolution and potential opportunities for the future of alcohol density measurement. *Addiction Research & Theory*, 29(2), 117-128. <https://doi.org/10.1080/16066359.2020.1751128>
- 48 Silver, L. D., Naprawa, A. Z., & Padon, A. A. (2020). Assessment of incorporation of lessons from tobacco control in city and county laws regulating legal marijuana in California. *JAMA Network Open*, 3(6), e208393-e208393. <https://doi.org/10.1001/jamanetworkopen.2020.8393>
- 49 Hahn, R. A., Middleton, J. C., Elder, R., Brewer, R., Fielding, J., Naimi, T. S., Toomey, T. L., Chattopadhyay, S., Lawrence, B., & Campbell, C. A. (2012). Effects of alcohol retail privatization on excessive alcohol consumption and related harms: A community guide systematic review. *Am J Prev Med*, 42(4), 418-427. <https://doi.org/10.1016/j.amepre.2012.01.002>
- 50 Municipal Research and Services Center (MRSC). (2019). *Marijuana Regulation in Washington State*. <http://mrsc.org/getdoc/8cd49386-c1bb-46f9-a3c8-2f462dcb576b/Marijuana-Regulation-in-Washington-State.aspx>
- 51 Oregon Health Authority. (n.d.) *Medical Marijuana Dispensary Directory*. <https://www.oregon.gov/oha/ph/diseasesconditions/chronicdisease/medicalmarijuanaprogram/pages/dispensary-directory.aspx>
- 52 State of Nevada. (2020). 2020 Nevada Revised Statutes, Chapter 678B- Licensing and Control of Cannabis. <https://law.justia.com/codes/nevada/2020/chapter-678b/>
- 53 Community Preventive Services Task Force. (2008). *Alcohol - Excessive consumption: Maintaining limits on days of sale*. <https://www.thecommunityguide.org/findings/alcohol-excessive-consumption-maintaining-limits-days-sale>.
- 54 State of Colorado. (n.d.). *Laws about marijuana use*. <https://www.colorado.gov/pacific/marijuana/laws-about-marijuana-use#:~:text=Limited%20hours%20of%20sale%3A,you%20head%20to%20a%20retailer>
- 55 U.S. Department of Health and Human Services. (2019). *U.S. Surgeon General's advisory: Marijuana use and the developing brain*. <https://www.hhs.gov/surgeongeneral/reports-and-publications/addiction-and-substance-misuse/advisory-on-marijuana-use-and-developing-brain/index.html>
- 56 Stuyt, E. (2018). The problem with the current high potency THC marijuana from the perspective of an addiction psychiatrist. *Missouri Medicine*, 115(6), 482-486.
- 57 Di Forti, M., Morgan, C., Dazzan, P., Pariante, C., Mondelli, V., Marques, T. R., Handley, R., Luzi, S., Russo, M., Paparelli, A., Butt, A., Stilo, S. A., Wiffen, B., Powell, J., & Murray, R. M. (2009). High-potency cannabis and the risk of psychosis. *Br J Psychiatry*, 195(6), 488-491.
- 58 Hines, L. A., Freeman, T. P., Gage, S. H., Zammit, S., Hickman, M., Cannon, M., Munafo, M., MacLeod, J., & Heron, J. (2020). Association of high-potency cannabis use with mental health and substance in adolescence *JAMA Psychiatry*, 77(10), 1044-1051. <https://dx.doi.org/10.1001%2Fjamapsychiatry.2020.1035>
- 59 Courtemanche, C. J., Palmer, M. K., & Pesko, M. F. (2017). Influence of the flavored cigarette ban on adolescent tobacco use. *Am J Prev Med*, 52(5), e139-e146. <https://dx.doi.org/10.1016%2Fj.amepre.2016.11.019>
- 60 Getting It Right From the Start. (2021). *Examples of what your neighbors are doing to protect youth, public health, and social equity*. [https://gettingitrightfromthestart.org/wp-content/uploads/2021/02/Best-Practices-in-Action-Map\\_2-2-21.pdf](https://gettingitrightfromthestart.org/wp-content/uploads/2021/02/Best-Practices-in-Action-Map_2-2-21.pdf)
- 61 Oregon Liquor Control Commission. (2020). *Non-cannabis additives in inhalable cannabinoid products: Rationale for rulemaking*. [https://www.oregon.gov/olcc/Docs/commission\\_agendas/2020/Non-Cannabis-Additives-in-Inhalable-Cannabinoid-Products.pdf](https://www.oregon.gov/olcc/Docs/commission_agendas/2020/Non-Cannabis-Additives-in-Inhalable-Cannabinoid-Products.pdf)
- 62 Visit New England. (2021). *Marijuana in Connecticut*. <https://www.visitconnecticut.com/state/marijuana-in-connecticut/>
- 63 University of Washington. (2016). Factors that might attract children to marijuana edibles. *Science Daily*. <https://www.sciencedaily.com/releases/2016/08/160825141908.htm>
- 64 Dunlop, S. M., Dobbins, T., Young, J. M., Perez, D., & Currow, D. C. (2014). Impact of Australia's introduction of tobacco plain packs on adult smokers' pack-related perceptions and responses: results from a continuous tracking survey. *BMJ Open*, 4(12), e005836. <https://dx.doi.org/10.1136%2Fbmjopen-2014-005836>

- 65 Hammond, D., Wakefield, M., & Durkin, E. B. (2013). Tobacco packaging and mass media campaigns: Research needs for Articles 11 and 12 of the WHO Framework Convention on Tobacco Control. *Nicotine Tob Res*, 15(4), 817-831. <https://doi.org/10.1093/ntr/nts202>
- 66 Story, M., & French, S. (2004). Food advertising and marketing directed at children and adolescents in the US. *Int J Behav Nutr Phys Act*, 1(1), 3. <https://doi.org/10.1186/1479-5868-1-3>
- 67 State of Alaska. (2021). Section 3 Alaska Administrative Code § 306.345 - Packaging and labeling. <https://casetext.com/regulation/alaska-administrative-code/title-3-commerce-community-and-economic-development/part-19-alcoholic-beverage-control-board/chapter-306-marijuana-control/article-3-retail-marijuana-stores/section-3-aac-306345-packaging-and-labeling>
- 68 Massachusetts Cannabis Control Commission 935 Mass. Reg. 500.150 - Edibles (2021). <https://casetext.com/regulation/code-of-massachusetts-regulations/departments-935-cmr-cannabis-control-commission/title-935-cmr-500000-adult-use-marijuana/section-500150-edibles>
- 69 Hawaii Administrative Rules, Medical Marijuana Dispensaries, Publ. L. No. 11-850-92 - Packaging and labeling for retail sale (2015). <https://health.hawaii.gov/opppd/files/2015/06/11-850.pdf>
- 70 Indiana Code § 24-4-21-4 (2018). Packaging requirements. <https://law.justia.com/codes/indiana/2018/title-24/article-4/chapter-21/section-24-4-21-4/>
- 71 Utah Publ. L. No. R68-26-5 - Label Requirements (2020). <https://ag.utah.gov/wp-content/uploads/2020/11/R68-26.pdf>
- 72 Texas Publ. L. No. §300.402 - Packaging and Labeling Requirements (2020). <https://www.law.cornell.edu/regulations/texas/25-Tex-Admin-Code-300-402>
- 73 State of Florida. (2019). Florida State Senate Bill No. CS/CS/SB 1020: State hemp program. <https://www.flsenate.gov/Session/Bill/2019/01020>
- 74 Government of Canada. (2019). Cannabis health warning messages. <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/laws-regulations/regulations-support-cannabis-act/health-warning-messages.html>
- 75 State of California. (1986) Safe Drinking Water and Toxic Enforcement Act, Proposition 65. <https://oehha.ca.gov/proposition-65>
- 76 Jernigan, D., Noel, J., Landon, J., Thornton, N., & Lobstein, T. (2017). Alcohol marketing and youth alcohol consumption: A systematic review of longitudinal studies published since 2008. *Addiction*, 12(Suppl 1), 7-20. <https://doi.org/10.1111/add.13591>
- 77 Sargent, J. D., Cukier, S., & Babor, T. F. (2020). Alcohol marketing and youth drinking: Is there a causal relationship, and why does it matter? *Journal of Studies on Alcohol and Drugs, Supplement*, Suppl 19, 5-12. <https://dx.doi.org/10.15288%2Fjsads.2020.s19.5>
- 78 Soneji, S., Barrington-Trimis, J. L., & Wills, T. A. (2017). Association between initial use of e-cigarettes and subsequent cigarette smoking among adolescents and young adults: A systematic review and meta-analysis. *JAMA Pediatrics*, 171(8), 788-797. <https://dx.doi.org/10.1001%2Fjamapediatrics.2017.1488>
- 79 Ayers, J. W., Caputi, T. L., & Leas, E. C. (2019). The need for federal regulation of marijuana marketing. *JAMA*, 321(22), 2163-2164. <https://doi.org/10.1001/jama.2019.4432>
- 80 Jernigan, D. H. (2011). Framing a public health debate over alcohol advertising: The Center on Alcohol Marketing and Youth 2002–2008. *Journal of Public Health Policy*, 32, 165-179. <https://doi.org/10.1057/jphp.2011.5>
- 81 U.S. Department of Health and Human Services. (2015). *E-cigarette use among youth and young adults: A report of the Surgeon General*. [https://e-cigarettes.surgeongeneral.gov/documents/2016\\_SGR\\_Full\\_Report\\_non-508.pdf](https://e-cigarettes.surgeongeneral.gov/documents/2016_SGR_Full_Report_non-508.pdf)
- 82 Colorado Marijuana Rules, Publ. L. No. 1 CCR 212-3 (2020). <https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=9303&fileName=1%20CCR%20212-3>
- 83 Moreno, M. A. (2019) Study: Higher Social Media Engagement with Marijuana Marketing Linked to Higher Rates of Use. *School of Medicine and Public Health University of Wisconsin-Madison*. <https://www.med.wisc.edu/news-and-events/2019/october/megan-moreno-marijuana-marketing-and-usage/>
- 84 Cavazos-Rehg, P., Krauss, M., & Bierut, L. J. (2016) Marijuana-Related Posts on Instagram *Prevention Science*, 17, 710-720. <https://pubmed.ncbi.nlm.nih.gov/27262456/>
- 85 Krauss, M., Sowles, S. J., Sehi, A., et al. (2017) Marijuana advertising exposure among current marijuana users in the U.S. *Drug and Alcohol Dependence*, 174, 192-200. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5436304/>
- 86 State of Rhode Island and Providence Plantations. (2020). Office of Cannabis Regulation - Advertising Guide. Department of Business Regulation, State of Rhode Island. [https://dbr.ri.gov/documents/news/medical\\_marijuana/Advertising.pdf](https://dbr.ri.gov/documents/news/medical_marijuana/Advertising.pdf)



## Guidance for Selecting and Implementing Evidence-Based Policies and Programs

Before a state, community, school, or organization selects an intervention to prevent marijuana use among youth, it is important to assess its appropriateness for the setting and context in which it will be implemented. This chapter provides a framework to use when implementing prevention interventions and includes recommendations for addressing implementation challenges for the policies and programs described in Chapters 2 and 4.

### Using the Strategic Prevention Framework

Several frameworks and guidelines provide insight into how to plan for, select, and implement programs and policies that will meet prevention needs and produce desired outcomes. SAMHSA's Strategic Prevention Framework ([SPF](#)) provides a comprehensive, five-step approach for understanding and addressing youth marijuana use prevention within states and communities:

1. **Assessment** - Identify prevention needs using qualitative and quantitative data, such as incidence and prevalence of marijuana use among youth and factors that influence marijuana use.
2. **Capacity** - Determine what resources the state, community, or implementing organization has and what is needed to prevent and reduce marijuana use among youth (i.e., the human, organizational, state, community, or financial resources available).



3. **Planning** - Develop a comprehensive implementation plan that includes goals, objectives, strategies, programs, and policies to address the marijuana prevention priorities identified in steps 1 and 2.
4. **Implementation** - Implement programs and policies, using available guides and manuals for the interventions selected in step 3.
5. **Evaluation** - Evaluate the implementation process and assess whether the program or policy is having the intended effect (see more in Chapter 5).

A guiding principle underlying this framework is cultural competence, including using a population-based definition of community that lets the community define itself, engaging culturally competent evaluators, and including the target population in all aspects of prevention planning. Additionally, sustainability is a guiding principle: sustaining funding, processes that have engaged members of the target population, and the overall programs or strategies that improve the specified outcomes for the target population.

States and communities should continually assess their needs, which is especially necessary with a rapidly evolving issue like marijuana use. The population engaged in marijuana use may change over time, as may the marijuana products young people use, or the amount and types of marijuana advertisements and retail establishments. Regular needs assessments will ensure communities are implementing the best possible interventions for their specific circumstances and are not overly relying on previously implemented programs and policies. As laws related to legalization, decriminalization, and regulation continue to evolve, marijuana use will change in response to these policy changes. Marijuana use is also likely to be influenced by the marijuana industry's marketing strategies.<sup>1-2</sup> By conducting regular needs assessments, states and communities can ensure they are implementing the most appropriate interventions and can make revisions, adaptations, or changes, as needed.

An overarching consideration when selecting and implementing policies to prevent marijuana use among young people is that, despite it being illegal, youth are at increased risk of marijuana use as these products become increasingly accessible in states that have legalized or decriminalized adult use. Given decades of research showing the direct effects adult markets have on youth, this chapter includes discussion on the challenges of and strategies for regulating marijuana use in the adult market.<sup>3</sup>



## Key Considerations for Prevention Program and Policy Implementation

### Stakeholder Engagement

#### Challenge

- Gaining support from school administrators, school district officials, health administrators, healthcare professionals, child advocacy groups, parent associations, and city or county officials to implement a marijuana prevention policy or program is critical to success. Every intervention needs one or more champions.

#### Strategy

- Identify the most relevant champions for each community. Champions may include parents, educators, community members, and youth themselves, who can all educate policy and decision makers about evidence-based prevention strategies. These stakeholders should be engaged in the process early and often for the best effect. Appeals to stakeholders and potential champions should include a mix of current data, ideally from the local community, on marijuana use in the community or schools, along with personal stories from youth and parents who have been affected by marijuana use and its associated harms.



## Financing

### Challenge

- Obtaining and sustaining program funding for materials, training resources, and staff efforts is a common challenge. Often, limited funding is available for prevention efforts and resources are stretched thin. Environmental and regulatory strategies may have the advantage of being low cost, or even of generating revenue in the case of taxes.

### Strategies

- From the very beginning of any intervention planning, it is important to estimate costs and develop a budget, being sure to include time and costs related to relationship development, capacity building, staff training, evaluation, and other necessary implementation components. A comprehensive plan should address and allocate resources to implement, maintain, and evaluate the program over time.
- When implementing environmental strategies, it is important to estimate the costs associated with educating relevant stakeholders on the specific policy change. This education may involve the city, county, or state needing to purchase new signage, provide information packets or educational outreach to marijuana producers or retailers on changes, or develop new enforcement organizations.



## Key Considerations for Implementing Programs to Prevent Marijuana Use Among Youth

Once a state, community, or organization has selected a program or policy to address marijuana use, stakeholders can use several strategies to support implementation efforts and address potential challenges and barriers.

### Tailoring Interventions

#### Challenge

- Given the scarcity of data on marijuana-specific prevention programs, the effectiveness of these interventions among various populations or among individuals with different demographic characteristics is limited. Since marijuana use rates vary in communities by demographics, such as age, race/ethnicity, and sexual orientation, programs may require some adaptation to have the intended impact.

#### Strategy

- The U.S. Department of Health and Human Services has developed National Standards for Culturally and Linguistically Appropriate Services ([CLAS](#)).<sup>4</sup> The principal standard of CLAS is to “provide effective, equitable, understandable, and respectful quality care and services that are responsive to diverse cultural health beliefs and practices, preferred languages, health literacy, and other communication needs.” CLAS includes 15 standards that should each be evaluated when selecting and implementing an intervention.<sup>4</sup> Communities should review and implement the CLAS principles when tailoring prevention programs, and be sure to rigorously evaluate how the revisions may have affected intended program outcomes.

### Adaptation vs. Fidelity

#### Challenge

- As communities consider implementing programs or policies, stakeholders may have questions about how to adapt the model to their specific circumstances, while still maintaining fidelity to the core elements of the intervention. Fidelity is the degree to which a program delivers an intervention as intended and must be maintained for desired outcomes.



## Strategies

- There is a large body of implementation science research that examines the tension between adaptation and fidelity, and the importance of balancing the two.<sup>5-6</sup> One approach is to develop intervention-specific descriptors for the components essential for fidelity, and what adaptations may be allowed.<sup>5</sup> Another approach is to develop hybrid prevention programs that include adaptation from the beginning, while also working to maximize fidelity of the intervention.<sup>6</sup>
- SAMHSA recommends all programs conduct the following steps when considering adaptation:
  1. Identify and understand the theory of the program.
  2. Obtain or conduct a core components analysis of the program.
  3. Assess fidelity adaptation concerns for the implementation site.
  4. Consult with the program developer, as needed.
  5. Consult with the organization or community where the intervention will be implemented.
  6. Develop an overall implementation plan based on steps one through five.<sup>7</sup>
- To ensure adapted programs or policies are implemented with their core elements upheld, program implementers need to collect rigorous data to assess the adapted intervention for fidelity to the program. When the implemented program is not able to maintain fidelity to the established program, a rigorous evaluation of the adapted intervention provides evidence for the field on the impact of the intervention for reducing marijuana use among youth and young adults.

## Staff Training

### Challenge

- It is vital that staff are properly trained for successful program implementation and to build program capacity. However, this may be difficult to achieve due to staff turnover and limited time for existing staff to become familiar with the program.

## Strategy

- When preparing to implement an intervention, organizations and communities must ensure staff have access to ongoing support and training on the program. Additionally, it is valuable to know broader marijuana regulatory and policy context to understand the environment in which the program is operating. Throughout the life of the program, additional staff training may be necessary to ensure continued program success.

## Key Considerations for Implementing Policies to Address Marijuana Use Among Youth

Getting a policy enacted and passed takes political will, persistence, and knowledge of the policy process. Key stakeholders include the local, state, or federal agencies that will be responsible for regulating and reporting requirements, the elected officials who will vote on the policy, and any public officials or state/local board members and engaged community members who will implement the new policy.

Additionally, when developing a policy, community members should be empowered to provide leadership and help drive policy change. It is critical to engage a host of partners, such as public health and policy/legislative experts, parents, educators, law enforcement, and youth. These individuals can help craft not only the policy language, but also determine the best communications and media strategies to promote political will and raise public awareness. When working with a government to implement a policy, whether it is at the city, county, state, or federal level, there are three important activities to keep in mind:

1. **Public Awareness** - Any rule change will require educating the public and/or the specific organizations affected. For example, if a city prohibits the sale of flavored marijuana products, city officials must inform marijuana retailers and the broader public about this change.
2. **Regulations** - If a new policy affects existing structures or systems, new procedures will need to be established. In the example of implementing zoning laws, policy makers will need to determine how licenses will be tracked



and how often new licenses will be provided to those who apply for them. In the state of Washington, the Washington State Liquor and Cannabis Board ([WSLCB](#)) administers licenses and enforces zoning regulations. Prior to granting a marijuana license, WSLCB is required to notify local authorities when an entity applies for a marijuana license within their jurisdiction. Upon notification, the locality has 20 days to respond with an approval, objection, or no response to the licensing request. WSLCB also provides [guidance documents](#) that may help those seeking a marijuana license to comply with local zoning regulations.<sup>8</sup>

3. **Enforcement** - Nearly all policies require some level of monitoring or enforcement. Cities that pass ordinances limiting what and where marijuana products may be sold will need to ensure retailers have the correct license and will need to maintain consistent enforcement of that new policy. The Commonwealth of Massachusetts created the Cannabis Control Commission ([CCC](#)), a five-member organization assigned with ensuring the marijuana industry is safe, responsible, and successful. The CCC monitors and enforces marijuana policy through inspections, audits, and issuance of fines and penalties.<sup>9</sup>

In addition to these common factors, there are several challenges that must be considered when implementing policies to prevent marijuana use among youth and young adults. Some of these challenges, and strategies to address them, are discussed below.

## State Preemption

### Challenge

- Currently, most states that have legalized marijuana for adult use provide localities the authority to implement their own policies on marijuana sales that may be more restrictive than state requirements. Localities may even opt out of state laws and ban marijuana operations within their localities completely.<sup>10</sup> However, the legislative landscape around marijuana is rapidly evolving, and state and local policy makers should remain aware of the larger state and federal regulatory environments in which they operate.

### Strategies

- If needed, legal experts on marijuana policy can help a jurisdiction better understand potential preemption issues (i.e., when cities and counties are banned from passing marijuana control policies that are stronger than the state policy equivalent) and existing nuances or gray areas in

the law, as well as encourage lawmakers to enact policies to protect from preemption. The ability for jurisdictions to pass more restrictive policies that are responsive to their local needs is critical, and numerous entities, including the Centers for Disease Control and Prevention (CDC), Healthy People 2030, the National Association of County and City Health Officials, and the U.S. Surgeon General, have noted that preemption laws do not advance public health priorities.

- The [Alcohol Policy Information System](#) maintains an updated list of whether localities have authority to regulate adult marijuana sales within each state.

## Evolving Community Needs

### Challenge

- The marijuana landscape is continually evolving, and the most appropriate program or policy for the state or community may change over time.

### Strategy

- Regularly collecting and analyzing data on youth marijuana use behavior will help determine what products are being used, where they are obtaining their products, and if certain subgroups are using marijuana at higher rates than others. Stakeholders engaged in prevention efforts, including parents and youth, can also provide first-hand information about marijuana use patterns and behaviors within the state/community. Regularly assessing these data will ensure the state/community is implementing the best interventions for their specific needs.

## Marijuana Product Diversity

### Challenge

- There is a wide variety of marijuana products currently available in states with legal adult use, and new products are rapidly being developed and marketed. From marijuana-infused drinks, such as colas and fruit punches, to pill-like marijuana “capsules,” there are many ways to consume marijuana.<sup>11</sup> Hemp-derived psychoactive cannabinoids, such as Delta 8-THC, are also increasingly available on the market. Policies focused only on the prevention of smoking of marijuana, such as smoke-free laws, may exclude these other products, and, therefore, may neglect to prevent marijuana use in a large portion of a state or by the community’s youth.

### Strategy

- Communities can work with public health and legal experts to determine if the policies being considered should explicitly include all products, or only those that are most used by youth, such as edibles. Continuous monitoring of the evolving product market is critical to determine what products youth are using most, and if and how they should be regulated.

## Industry Influence

### Challenges

- As the marijuana industry is continually growing, favorable legislation and strong lobbying are leading to a boom in the commercialization of marijuana products. The marijuana industry spent a record \$4 million on federal lobbying in 2020.<sup>12,13</sup> By 2025, the legal marijuana market is projected to double to \$41.5 billion.<sup>14</sup>
- Increasing commercialization of substances can lead to greater youth exposure and use. The marijuana industry marketing their products as “wellness” products and “fun” edibles, such as marijuana gummies and chocolates, introduces additional challenges in reducing youth use.<sup>15-16</sup>

### Strategies

- As state and community leaders, parents, and other stakeholders collaborate to pass and implement policies to prevent marijuana use, they must be aware of industry strategies and messaging, and prepare counter messaging to gain support for public health policies.
- A vast majority of Americans agree that youth should not be exposed to marijuana products.<sup>17</sup> Those focusing on the prevention of marijuana use among youth can use this belief to engage diverse stakeholders and implement policies to restrict marketing to youth and thwart the portrayal of marijuana as a wellness product. A comprehensive prevention strategy should also include media campaigns that promote messages to counter industry influence and reach youth who are most susceptible to industry advertising.



# Implementation Guides and Manuals

Policy implementation is complex, but detailed guidance for implementing policies is limited, especially in comparison to family, classroom, or community-based programs, which often have prescribed curricula. Below are several tools and resources to help stakeholders implement the strategies described in Chapter 2, with specific implementation guides provided where possible. Overarching guidance is also included, as many of the recommendations and suggestions are similar across all programs and policies.

## Interventions

### Programs

- [Cannabis/Marijuana Awareness and Prevention Toolkit](#) resources
- [SPORT](#) step-by-step implementation directions
- [Strengthening Families Program](#) training opportunities
- [All Stars](#) teaching manual
- [Keepin' It Real](#) teaching manual
- LifeSkills Training [planning workbook](#), [fidelity checklist](#), and [curriculum alignment tools](#)
- [Good Behavior Game](#) manual
- Training and resources for [PreVenture](#) facilitators
- Project Alert [Implementation Tips](#) and [Teen Leader Trainer's Manual](#)
- [Project Towards No Drug Abuse](#) implementation manual
- [Communities that Care](#) implementation guide
- [PROSPER training](#) for state partners through Iowa State University

### Regulating Marijuana Prices

- Overview of [marijuana taxes](#) by the Urban Institute, including what the options are and how states have implemented tax policies
- A briefing book on [how marijuana taxes work](#) from the Urban Institute and the Brookings Institution

### Regulating Marijuana Retailers

- [Tobacco Retailer Density](#), a guide from ChangeLab Solutions on implementing place-based strategies
- [Strategizer 55: Regulating Alcohol Outlet Density](#) by the Community Anti-Drug Coalitions of America (CADCA) and the Center on Alcohol Marketing and Youth is an action guide on how to regulate outlets; though not specific to marijuana, many of the strategies and activities are similar
- A [guide](#) on options to regulate marijuana, originally developed by for California to reduce youth use, written by Alcohol Policy Consultations

### Regulating Marijuana Marketing

- “[Model Ordinance](#) Regulating Local Cannabis Retail Sales and Marketing in California” from the Public Health Institute

### Regulating Marijuana Products

- Numerous states have specific packaging and labeling policies, including [Massachusetts](#), [Oregon](#), [Michigan](#), and [Washington](#)

### Tools to Support Policy Interventions

- Information on [policy communication and the legislative process](#) by CADCA
- Resources developed by the National Conference of State Legislatures that outline [state legislative processes](#) and the marijuana policies in effect in different states
- The Campaign for Tobacco-Free Kids has developed [guides](#) for media and policy campaigns; toolkits can be utilized by state or local governments
- The [Network for Public Health Law](#) helps identify policy approaches that will advance the goals of an organization or community and has a series of resources on preventing substance use and making healthier communities
- The [Prevention Technology Transfer Center Network](#) has an abundance of substance use prevention resources and tools, including webinars and trainings

# Reference List

- <sup>1</sup> D’Amico, E. J., Miles, J. N., & Tucker, J. S. (2015). Gateway to curiosity: Medical marijuana ads and intention and use during middle school. *Psychology of Addictive Behaviors*, 29(3), 613-619. <https://dx.doi.org/10.1037%2Fadb0000094>
- <sup>2</sup> Fiala, S. C., Dilley, J. A., Firth, C. L., & Maher, J. E. (2018). Exposure to marijuana marketing after legalization of retail sales: Oregonians’ experiences, 2015–2016. *American Journal of Public Health*, 108(1), 120-127. <https://doi.org/10.2105/aaph.2017.304136>
- <sup>3</sup> Jernigan, D., Noel, J., Landon, J., Thornton, N., & Lobstein, T. (2008). Alcohol marketing and youth alcohol consumption: A systematic review of longitudinal studies published since 2008. *Addiction*, 112(Suppl 1), 7-20. <https://doi.org/10.1111/add.13591>
- <sup>4</sup> Department of Health and Human Services. (n.d.). *National CLAS Standards*. <https://thinkculturalhealth.hhs.gov/clas>
- <sup>5</sup> Pérez, D., Stuyft, P. V., Zabala, M. D. C., Castro, M., & Lefèvre, P. (2016). A modified theoretical framework to assess implementation fidelity of adaptive public health interventions. *Implementation Science*, 11(91). <https://doi.org/10.1186/s13012-016-0457-8>
- <sup>6</sup> Castro, F. G., Barrera Jr., M., & Martinez Jr., C. R. (2004). The cultural adaptation of prevention interventions: Resolving tensions between fidelity and fit. *Prev Sci*, 5(1), 41-45. <https://doi.org/10.1023/b:prev.0000013980.12412.cd>
- <sup>7</sup> Substance Abuse and Mental Health Services Administration. (2019). *A guide to SAMHSA’s Strategic Prevention Framework*. <https://www.samhsa.gov/sites/default/files/20190620-samhsa-strategic-prevention-framework-guide.pdf>
- <sup>8</sup> Washington State Liquor and Cannabis Board. (2020). *Washington State Liquor and Cannabis Board*. <https://lcb.wa.gov/>
- <sup>9</sup> Cannabis Control Commission. (2021). *Cannabis Control Commission*. <https://mass-cannabis-control.com/>
- <sup>10</sup> Alcohol Policy Information System (APIS). (n.d.). *Alcohol Policy Information System (APIS)*. <https://alcoholpolicy.niaaa.nih.gov/>
- <sup>11</sup> Pierre, J. (2018). *Coca, Cola, and Cannabis: Psychoactive Drugs as Beverages*. <https://www.psychologytoday.com/za/blog/psych-unseen/201810/coca-cola-and-cannabis-psychoactive-drugs-beverages>
- <sup>12</sup> Open Secrets Center for Responsive Politics. (2021). *Marijuana: Lobbying, 2020*. <https://www.opensecrets.org/federal-lobbying/industries/summary?cycle=2021&id=N09>
- <sup>13</sup> Mulcahy, S. (2020, April 6). The cannabis industry spent more on lobbying than ever before in 2019. What’s next is unclear. *Cannabis Wire*. <https://cannabiswire.com/2020/04/06/the-cannabis-industry-spent-more-on-lobbying-than-ever-before-in-2019-whats-next-is-unclear/>
- <sup>14</sup> Montoya, Z., Conroy, M., Vanden Heuvel, B., Pauli, C. S., & Park, S.-H. (2020). Cannabis contaminants limit pharmacological use of cannabidiol. *Frontiers in Psychiatry*, 11, 571832. <https://dx.doi.org/10.3389%2Ffphar.2020.571832>
- <sup>15</sup> Frieze, B. (2017). “Is marijuana even a drug?” A qualitative study of how teens view marijuana use and why they use it. *Journal of Psychoactive Drugs*, 49(3), 209-216. <https://dx.doi.org/10.1080%2F02791072.2017.1290854>
- <sup>16</sup> Krauss, M. J., Sowles, S. J., Stelzer-Monahan, H. E., Bierut, T., & Cavazos-Rehg, P. A. (2017). “It takes longer, but when it hits you it hits you!”: Videos about marijuana edibles on YouTube. *Substance Use & Misuse*, 52(6), 709-716. <https://doi.org/10.1080/10826084.2016.1253749>
- <sup>17</sup> Larkin, P. (2018). Marijuana edibles and “gummy bears”. *Buffalo Law Review*, 66(2), 313-383.



## Examples of Interventions for Prevention of Marijuana Use Among Youth

This chapter highlights efforts made in three communities to prevent marijuana use among youth:

- Ventura County, California
- Boulder County, Colorado
- Indian River County, Florida

These case examples describe practical applications of programs and policies as part of comprehensive community-based strategies to prevent youth marijuana use across the social-ecological model (SEM) (e.g., individual, school, and community levels). The environmental strategies and programs to prevent marijuana use build on, or are expansions of, long-standing tobacco and alcohol control efforts. Understanding the context in which communities are implementing marijuana use prevention strategies is critical to comprehend the broader, multi-level prevention strategies affecting youth in each county and state regulatory structure.

To be included in this chapter, examples had to meet the following criteria:

- Involve the implementation of one or more of the policies or programs included in Chapter 2
- Have evidence of causal impact on reducing marijuana use or be based on an established program or theory of change
- Be implemented as part of a comprehensive prevention strategy

Specific information about the programs and environmental strategies featured in this chapter was gathered from experts and through an environmental scan, including a review of published journal articles, state policies and regulations, and resources and publications from state and federal government agencies and nonprofit organizations.

### Environmental Strategies and Programs Described in Chapter 2:

- Cannabis/Marijuana Awareness and Prevention Toolkit ([CAPT](#))
- [Communities That Care](#)
- [LifeSkills Training](#)
- [Project ALERT](#)
- [SPORT](#)
- [Strengthening Families Program](#)
- Price policies
- Licensing and zoning policies



# CALIFORNIA

## Prevention Strategies in Ventura County, California

### Background

California was the first state to legalize medical marijuana in 1996 and one of the first states to legalize marijuana for non-medical adult use in 2016. Prior to the legalization of marijuana for non-medical adult use, local communities had taken steps to regulate medical marijuana to protect the health, welfare, and safety of all residents.<sup>1</sup> These early local community efforts provided an opportunity to build regulatory and monitoring infrastructures that reduced challenges that arose later from legalization of marijuana for non-medical adult use. California has a growing portfolio of prevention programming in place because of statewide policy requiring that a portion of the marijuana tax revenue be used to promote youth prevention efforts at state and local levels.

**Community Featured:** Ventura County, California

**Prevention Programs:** Project ALERT; Project Towards No Drug Abuse (TND), Cannabis/Marijuana Awareness and Prevention Toolkit (CAPT)

**Environmental Strategies:** Regulation of marijuana products, price policies, regulation of retail outlets, limiting marijuana marketing, zoning ordinances

Ventura County, located in Southern California, is home to 846,249 residents, 23 percent of whom are under the age of 18.<sup>2</sup> In Ventura County, officials engaged local stakeholders and experts to strategically advance public health and safety measures in response to the changing marijuana policy landscape.<sup>1</sup>

According to data from the California Healthy Kids Survey ([CHKS](#)), current state and local marijuana use trends among youth have remained unchanged since legalization, despite a decline observed prior to legalization.

Grade Level	Past 30-Day Marijuana Use			
	California		Ventura County	
	2016	2019	2016	2019
7th Graders	2%	4%	3%	4%
9th Graders	10%	10%	8%	10%
11th Graders	16%	16%	16%	15%



### Preventing Marijuana Use Among Youth

Examples of Interventions for Prevention of Marijuana Use Among Youth

## At A Glance California Marijuana Policies

**Non-Medical Adult Use:** Legal

**Medical Use:** Legal

**Decriminalized:** Yes

The use and possession of marijuana is legal for adults aged 21 and over in California. Individuals who are between the ages of 18 and 21 are permitted to use medical marijuana, provided it is obtained through authorized channels.

**Regulatory Structure:** In California, marijuana is licensed and regulated by the Department of Food and Agriculture (cultivation), the Department of Public Health (manufacturing), and the Bureau of Cannabis Control (distribution, testing, and retailing), although in 2021 these entities are being combined into a single regulatory agency.

**Retail Policies:** Retail outlets cannot be within 600 feet of schools unless the community agrees to a smaller distance. There are no state limits on the number of retailers, although many local ones exist. Posting of health warnings is not required in dispensaries but small warnings are required on packaging (in 6-point font). There are no limits on flavored products or potency except for an edible dose of 10mg. Onsite consumption is allowed if locally authorized.

**Taxes and Pricing:** Sales taxes are imposed at the cultivation stage on products produced and transferred and an excise tax of 15 percent of the value of retail marijuana is also applied. Retail sales are subject to state (7.25 percent) and local (0 to 2.75 percent) sales taxes, depending on the community. There is no minimum price, and certain discounts (but not free product) are allowed unless locally prohibited. State tax revenue is used for administration, law enforcement, youth prevention and education, and criminal justice programming efforts, as well as for childcare.

**Local Regulations:** Local communities that do not want marijuana sold must specifically prohibit its commerce, otherwise the state recognizes it as permitted and will issue licenses. If permitted, local communities can license businesses along with state licensing, tax locally, tax based on potency, restrict products allowed for sale or marketing (such as flavored products or beverages), require additional warnings, prohibit discounts, or set other regulations. Although local communities can ban the sale of marijuana, they cannot prohibit possession or personal cultivation.

## Marijuana Prevention Initiatives in Ventura County

### Programs

Ventura County has 20 school districts serving approximately 140,000 students in kindergarten through 12<sup>th</sup> grade.<sup>3</sup> Several Ventura County school districts have implemented marijuana prevention programs, including Project Towards No Drug Abuse (TND), the Cannabis/Marijuana Awareness and Prevention Toolkit (CAPT), and Project ALERT. More detailed information on two of these programs is included below.<sup>4-5</sup>

**Project ALERT.** Project ALERT was implemented in the Simi Valley Unified School District ([SVUSD](#)). In

SVUSD, Project ALERT is taught in the required science course, with all 11 core lessons taught in 7<sup>th</sup> grade and the three booster lessons taught in 8<sup>th</sup> grade, as designed. All teachers complete a log of the lessons delivered to students. Schools within the county, including the SVUSD, are beginning to track changes in marijuana use using data from CHKS. These data can be used to support the need for continued prevention work and curriculum focused on educating students about the dangers of substance use. Every two years, the district administration and individual school principals in SVUSD collaborate with the county evaluator to review the district's data and evaluate areas of strength and needed improvement. Both these data and related discussions drive their programming.

Cannabis/Marijuana Awareness and Prevention Toolkit (CAPT). CAPT has been implemented in schools, youth groups, and after-school programs in Ventura County. CAPT consists of a free, online set of lessons and activities to teach youth about marijuana. Implementation of CAPT can vary, as schools and other educators can decide the curriculum; however, there is a three-lesson suggested curriculum. The program is free, and the toolkit developer (Stanford University) provides free training to those implementing it. Stanford also provides online/remote learning lessons, activities, and quizzes to accompany the program and will work with schools to evaluate the effectiveness of the toolkit within individual programs.

### *Environmental Strategies*

Environmental strategies governing the sale and marketing of marijuana have been implemented at the county level and within individual cities. These strategies include smoke-free policies and policies related to marketing, taxes, and retailer restrictions. Ventura County has been able to implement these environmental strategies because California gives local communities the authority to establish their own marijuana regulations that are more restrictive than state policy.

In Ventura County, a measure allowing for the commercial cultivation, processing, and distribution of marijuana in pre-existing structures within unincorporated areas was passed in November 2020 and implemented on January 1, 2021. This measure opened areas of the county to the cultivation of marijuana outside of Oxnard, Port Hueneme, and Ojai (three of the ten incorporated towns in the county), increasing the amount of product produced locally. However, retail marijuana can still only be sold in storefronts in Oxnard, Port Hueneme, and Ojai, while Thousand Oaks only allows medical storefront sales.<sup>6</sup>

These cities limit hours and do not allow onsite consumption. Ojai, Oxnard, and Thousand Oaks capped the number of retailers. However, in 2020, recreational delivery was allowed in these four cities and in the unincorporated areas of the county, including medical delivery only in Oxnard, whereas six cities prohibited delivery. Thousand Oaks is the only city in the county to have banned billboards and requires the sale of medical marijuana to be by appointment.

No product restrictions, such as bans on flavored products, vaping products, or high potency products, are in place. Ventura County reflects the complicated nuances of regulation in California, with varying degrees of legalization and legal access, ranging from relatively high availability of marijuana outlets to complete bans on marijuana sales.

Studies are underway in California to examine the effects of local policy variation on marijuana use during pregnancy and by youth, including in Ventura County.



### **Lessons Learned**

**Planning and Research:** SVUSD reviews their prevention programming annually to determine fidelity (defined as the degree to which a program delivers an intervention as intended; must be maintained for desired outcomes), and administers pre- and post-tests or holds focus groups for students who have completed programming to assess for acceptability and effectiveness.

**Prevention:** Overall school-based intervention and education programs appear to be in use. Environmental, systems, and policy change approaches focused on public health protection and reducing youth use where the product is legal may be less extensively used, although a full ban continues in place in a significant part of the county. For example, although Ventura County, Oxnard, and the City of Ventura ban flavored tobacco products, no such ban exists for flavored marijuana sales or delivery where retail sale is allowed.

**Staffing:** SVUSD identifies and appoints dedicated staff to lead initiatives, including an onsite teacher at each school who is trained in the program and can serve as a leader and liaison for specific programming activities.

**Research and Data:** Exploring how price and tax policies (e.g., increasing taxes over time) can help shape the market and affect youth marijuana use is critical and relies on the collection of data to better understand the relationship between youth use, harms, and price. The natural experiment underway in California with varying degrees of legalization, taxation, and regulation across the state provides a valuable setting for future research.



# COLORADO

## Prevention Strategies in Boulder County, Colorado

### Background

In late 2012, Colorado became the first state to legalize marijuana for non-medical adult use.<sup>7-9</sup> Since then, policies and the impacts of legalized marijuana relevant to health, politics, culture, and law enforcement have been closely monitored. The state collects and frequently reports on legalization data related to public safety, public health, youth use, and other key indicators. Key findings from the most recent report, published in 2018, include:

- The rate of serious marijuana-related crimes has remained unchanged from pre-legalization levels.<sup>10</sup>
- Rates of hospitalization with possible marijuana exposures increased steadily from 2000 through 2015, from 803 hospitalizations per 100,000 before commercialization of marijuana (2000-2009) to 2,696 hospitalizations per 100,000 after commercialization (2014-2015).<sup>10</sup>
- Rates of suicide increased post-legalization, as did rates of suicide with marijuana present.<sup>10</sup>
- In the 2016-2017 school year, marijuana use was the most common reason for school expulsions and law enforcement referrals.<sup>10</sup>

**Community Featured:** Boulder County, Colorado

**Prevention Programs:** Communities That Care (CTC)

**Environmental Strategies:** Regulation of retail outlets, limiting marijuana marketing, zoning ordinances

The proportion of high school students reporting having used marijuana ever in their lifetime or in the past 30-days remained statistically unchanged from 2005 to 2017.<sup>10</sup> A more recent report on health outcomes after marijuana legalization in Colorado, published in 2021, found that the ways Colorado youth are using marijuana is changing, with an increase in the proportion of youth dabbing and vaping marijuana between 2015 and 2019, and a small decrease in smoking marijuana.<sup>11</sup> The report also noted that the rate of past 30-day marijuana use is continuing to increase among Colorado adults.<sup>11</sup>

Boulder County, Colorado, is located along the Northern Front Range and is home to 300,000 people, of whom just under 19 percent are under the age of 18. Upon legalization of marijuana in Colorado, the Boulder County Healthy Futures Coalition, a group of organizations and individuals dedicated to reducing substance use in the county, made prevention of marijuana use among youth a priority.

Grade Level	Changes in Marijuana Use Prevalence			
	Colorado <sup>11</sup>		Boulder County <sup>12-13</sup>	
	2013	2019	2013	2019
High school	20%	20%	20%	24%



### Preventing Marijuana Use Among Youth

Examples of Interventions for Prevention of Marijuana Use Among Youth

## At A Glance Colorado Marijuana Policies

**Non-Medical Adult Use:** Legal

**Medical Use:** Legal

**Decriminalized:** Yes

The use and possession of marijuana is legal for adults aged 21 and over in Colorado. Individuals who are between the ages of 18 and 21 are permitted to use medical marijuana, provided it is obtained through authorized channels.

**Regulatory Structure:** The Colorado Department of Public Health and Environment is responsible for the inspection of retail marijuana testing facilities, and the Colorado Department of Agriculture oversees the cultivation of marijuana and hemp. The Marijuana Enforcement Division of Colorado's Department of Revenue is assigned with licensing and regulating the medical and retail marijuana industries.

**Retail Policies:** Only licensed retailers can sell marijuana products. Retail dispensaries cannot be within 1,000 feet of schools unless the community agrees to a smaller distance, or an existing retailer is grandfathered in. Dispensaries can only be open between the hours of 8 a.m. and midnight. Products must be child-proof and in resealable packaging that is clearly labeled with key information, including health warnings. In June 2021 the legislature adopted new rules to respond to increasing THC potency, including serving size information on labels and restrictions on the amount of concentrates that can be purchased at one time.

**Taxes and Pricing:** Retail marijuana is subject to a 10 percent sales tax on top of the state's 2.9 percent standard tax rate. There is also a 15 percent excise tax on the wholesale price of retail marijuana between cultivators and businesses. However, these taxes do not apply to medical marijuana.

**Local Regulations:** Local communities are able, but not required, to set their own additional laws and regulations as they pertain to non-medical adult marijuana use.

## Marijuana Prevention Initiatives in Boulder County

### *Programs*

Nederland, a town located in Boulder County, Colorado, highlights challenges facing towns even in counties that have committed to substance use prevention. While Boulder County itself has made substance use prevention a priority, the town of Nederland has historically experienced challenges with and limitations in providing prevention programming. To address the need for prevention programming locally, and to align with Boulder County priorities, a local nonprofit organization, [TEENS, Inc.](#), worked with the state health department to implement Communities That Care ([CTC](#)) in Nederland.



A group of Nederland community members formed a CTC coalition to address substance use and other problem behaviors among local youth.<sup>14</sup> The Nederland coalition continues to be hosted by TEENS, Inc., which serves as the fiscal sponsor/contractor to the state, and has representation across key sectors, including local government, businesses, schools, law enforcement, faith-based organizations, media, health care, service providers, community members, parents, family, and youth.<sup>14</sup>

The CTC coalition used data from the [Healthy Kids Colorado Survey](#) to identify three primary risk and protective factors in Nederland to consider in their prevention efforts. These three risk and protective factors were: individual-level favorable attitudes toward substance use (risk); community opportunities for prosocial involvement (protective); and community laws and norms favorable to substance use (risk). Goals and strategies were set for each risk and protective factor. The coalition also implemented a series of programs intending to improve community opportunities for prosocial involvement.

### *Environmental Strategies*

Nederland has implemented a series of environmental strategies to regulate access to marijuana, namely zoning ordinances, marketing restrictions, and point of sale sign requirements. In Boulder County, marijuana regulations are determined at the city or town level in incorporated towns,<sup>15</sup> while unincorporated areas are subject to the county's marijuana policies.<sup>15</sup> For example, one county-wide regulation requires that marijuana dispensaries located in business, commercial, or transition zones be at least 500 feet away from other dispensaries in the same zone.<sup>16</sup>

Nederland requires marijuana outlets to be located within specifically zoned areas, such as neighborhood commercial, general commercial, and the central business district. Manufacturing and testing facilities have separate zoning requirements, as well. Marijuana outlets are banned only if within 100 feet of a licensed childcare facility or a school. Nederland also has specific sign requirements for marijuana outlets, including a notice that the premise is a marijuana outlet and banning signs that have flashing lights, advertise marijuana, or include pictorial representations of marijuana other than the one provided by the town.<sup>17</sup>

Since its initiation, the CTC coalition has worked on implementing additional environmental strategies in Nederland. For the goal of addressing community laws and norms that are substance use risk factors, the coalition is working to build community support for ordinances, regulations, and requirements for establishments selling alcohol or marijuana. The identification of specific risk and protective factors led to the passing of several regulations, including an ordinance capping the number of dispensary locations at the current level (four) and a resolution for the town government to opt out of allowing licenses for establishments that allow the use of marijuana onsite in the community. In addition, the work of the CTC coalition led to the creation of a public review zoning process for any marijuana-related commercial establishments.

While the work of the CTC coalition in Nederland has successfully led to the implementation of environmental strategies, there are no data available yet on the impact of these strategies on marijuana use among youth.



### **Lessons Learned**

**Advocacy:** Because CTC is about maintaining a high-capacity coalition over the long term, securing stakeholder support prior to implementing evidence-based interventions is vital for program success and sustainability.

**Collaboration:** As demonstrated in Nederland, coalitions should be composed of members representing a diverse group of stakeholders from both the public and private sectors, including government, business, education, health care, media, criminal justice, and invested community members.

**Costs and Funding Sources:** Coalitions are often funded by the county or state or by grants to form and assess their local conditions but often lack funding to implement appropriate interventions. Prioritizing how to use existing funds and identifying opportunities to secure new funds will optimize the ability of coalitions to implement evidence-based interventions. Engagement from numerous community sectors can help in identifying and obtaining new sources of funding. Coalitions may also need to seek a fiscal agent to support their work.



**Leadership:** Coalitions need strong leadership that is well-versed in the areas of prevention, local government, policy and legislation, and administration to build relationships with partners in different sectors and promote engagement.

**Planning and Research:** Coalitions or other stakeholders trying to determine the most appropriate prevention interventions should first conduct a readiness assessment. A readiness assessment will help to determine the local conditions that may facilitate implementation, subsequently minimizing potential challenges that may occur during the implementation process. Coalitions can review existing data or collect their own data as part of this initial assessment.

**Political Support:** When attempting to pass an ordinance that would prohibit marijuana retail establishments in the community, Nederland's CTC coalition found that public safety and/or public resource messaging may be more effective than public health messaging to secure support for a marijuana use prevention initiative.

**Flexibility:** Coalitions are not always driving policy change in their community and need to be agile and responsive to community activities that are also working toward the implementation of environmental strategies. Based on Nederland's experience, community coalitions need the flexibility to both lead and support substance use prevention work if it aligns with the mission and goals of their organization.





# FLORIDA

## Prevention Strategies in Indian River County, Florida

### Background

Legislation permitting the use of medical marijuana in Florida was passed in 2016. Initially, medical marijuana was legalized only for use in terminally ill patients (those with less than a year to live); however, a constitutional amendment was passed later the same year that expanded access to medical marijuana for individuals with certain chronic conditions. In 2017, legislation was passed that allowed medical marijuana only in the form of oils, pills, sprays, edibles, and other non-combustible consumption formulations. In March 2019, smokable medical marijuana became an approved route of consumption for medical marijuana.<sup>18</sup> However, recreational marijuana sale, possession, and use remain illegal in Florida.

**Community Featured:** Indian River County, Florida

**Prevention Programs:** Strengthening Families Program, LifeSkills Training, SPORT Prevention Plus Wellness

**Environmental Strategies:** Regulation of marijuana products, regulation of retail outlets, limiting marijuana marketing, zoning ordinances

Indian River County sits on the Atlantic coast of Florida and has a population of just over 130,000 people, with approximately 14 percent under the age of 18. Since the legalization of medical marijuana in Florida, the rate of youth marijuana use has increased among middle school students but remains consistent among high school students. However, the rate of synthetic marijuana use among high schoolers more than doubled, from 0.8 percent in 2016 to nearly two percent in 2020, while remaining constant at one percent statewide.<sup>19</sup>

Grade Level	Changes in Marijuana Use			
	Florida <sup>19</sup>		Indian River County <sup>19</sup>	
	2016	2020	2016	2020
High school	17%	16%	18%	17%
Middle school	3%	4%	2%	4%



### Preventing Marijuana Use Among Youth

Examples of Interventions for Prevention of Marijuana Use Among Youth

## At A Glance Florida Marijuana Policies

**Non-Medical Adult Use:** Illegal

**Medical Use:** Legal

**Decriminalized:** Not decriminalized statewide, but varies by community

Medical marijuana is legal in the state of Florida for individuals aged 18 or older with a qualifying medical condition. Individuals under the age of 18 may be permitted to use medical marijuana in a combustible form if they have a terminal condition. They must also have parental approval and a recommendation from two physicians to obtain a medical marijuana card. All patients and caregivers must have a Medical Marijuana Use Registry identification card, and only qualified physicians can order low-THC cannabis, medical marijuana, or cannabis delivery devices for their patients.

**Regulatory Structure:** The Florida Department of Health is the governing agency for medical marijuana in Florida. Specifically, the department's Office of Medical Marijuana Use oversees the statewide Medical Marijuana Use Registry, licenses Florida businesses to cultivate, process, and dispense medical marijuana to qualified patients, and certifies marijuana testing laboratories.

**Retail Policies:** Only licensed medical marijuana treatment centers are permitted to grow, process, and dispense marijuana, and patients may purchase it from only these treatment centers.

**Taxes and Pricing:** There is no excise tax or sales tax on medical marijuana or medical marijuana delivery devices.

**Local Regulations:** Local communities can ban marijuana dispensaries entirely. If communities allow dispensaries, they must be zoned no more strictly than pharmacies, and the number cannot be limited. A dispensary cannot be within 500 feet of a school (unless the community grants a special permit). Per state law, cities and/or counties are unable to set local taxes for medical marijuana or set permitting fees.

## Marijuana Prevention Initiatives in Indian River County

### Programs

Limited resources for marijuana prevention programming are available at the state level. Most of Florida's youth-focused prevention is focused on substance use in general and not on marijuana specifically. Indian River County offers both school and community-based prevention programs through the [Substance Awareness Center of Indian River County](#).<sup>20</sup> Some of the prevention programs available to youth include (but are not limited to): the Strengthening Families Program, SPORT Prevention Plus Wellness, and LifeSkills Training. More details about these three programs are included below.

[Strengthening Families Program](#). The Strengthening Families Program is offered in Indian River County through a five-agency collaborative. This program provides weekly group sessions for the entire family, free of charge, that focus on three life skills courses:

parenting skills, youth social/life skills, and family life skills.<sup>21</sup> Results from this program on marijuana outcomes in Indian River have not been published.

[LifeSkills Training](#). The LifeSkills Training (LST) prevention program is offered to approximately 5,000 Indian River County students each year in 5th, 6th, 7th, and 8th grades by five trained facilitators. During the summer months, the program is implemented through summer camps offered at the Boys and Girls Clubs and other youth organizations.<sup>22</sup>

Indian River County has implemented LST in:

- 5<sup>th</sup> grade at all 13 county elementary schools for eight weeks, partnering with local police departments
- 6<sup>th</sup> grade in two schools for 16 weeks
- 7<sup>th</sup> grade in two schools for 10 weeks
- 8<sup>th</sup> grade for five weeks in two schools
- Seven summer camps



Since implementation in 2012, over 10,000 students have received at least some LST courses, and students reported significant improvements in health knowledge, anti-drug attitudes, and life and refusal skills. Among 5<sup>th</sup> to 8<sup>th</sup> grade students, past 30-day marijuana use decreased from 12 percent in 2008 to 9 percent in 2018.<sup>22</sup>

**SPORT Prevention Plus Wellness.** SPORT Prevention Plus Wellness has been implemented in all county middle schools (6<sup>th</sup> to 8<sup>th</sup> grade). Organizations that implement SPORT Prevention Plus Wellness are provided with pretest and posttest surveys to evaluate program implementation fidelity and effectiveness; however, no statewide analysis of the program has been conducted. Anticipated outcomes of the SPORT program include reduction of favorable attitudes toward marijuana use, improved commitment to school, altered interactions with friends who use marijuana, and decreased marijuana use.

### *Environmental Strategies*

Most marijuana policy in Florida is set at the state level, although local jurisdictions were able to enact their own policies before a preemption law limiting local authority was passed in 2017. Once this law was passed, the existing community-level medical marijuana zoning regulations were made irrelevant. Ultimately, cities and counties are given the authority to permit or prohibit the presence of medical marijuana dispensaries in their community but have limited ability to implement other regulatory policies.

However, bans can be nuanced. For example, county bans apply only to unincorporated areas of the county, so incorporated cities and towns can still allow medical marijuana, as is the case in Indian River County. Any medical marijuana regulation enacted by a city or county must be equivalent to pharmacy regulations, given that medical marijuana is regulated as a medication.



## Lessons Learned

**Education:** Educating policy makers about the adverse effects of marijuana on the developing brain is essential to garner their support for regulations/statutes related to preventing marijuana use among youth.

There is also a need for national and statewide education campaigns focused specifically on preventing youth marijuana use. Such campaigns have demonstrated an ability to influence youth behavior and choices. Campaigns can also help alter existing social norms, perception of harm, and attitudes around youth marijuana use.

**Enhanced Enforcement Activities:** Communities should ensure adequate resources are available for monitoring and enforcing existing marijuana policies. Although agencies may have the authority to monitor and enforce state policy, they may not have the necessary staffing or financial support to do so. A proactive approach to monitoring and enforcement is also preferred to one that is driven by public complaints and observations.

**Planning and Research:** Collecting data on key medical marijuana use indicators, such as physicians making recommendations/referrals for medical marijuana, the types of products being recommended, patient demographics, and the number of patients who receive recommendations/referrals, allows community prevention coalitions, health departments, and prevention organizations to understand their local conditions and help policy makers determine the most effective policy solutions.

**Product Classification:** By classifying medical marijuana in the same way as prescription drugs dispensed at pharmacies, communities in Florida do not have the option of limiting the availability of marijuana without also limiting the availability of pharmacies, thus reducing access to the medications and resources available at pharmacies. Other states do not tie their classification of marijuana to other medicinal products, allowing for targeted marijuana regulation.<sup>23-24</sup>

# Reference List

- <sup>1</sup> Rae Hanstad Consulting. (2014). *Marijuana in Ventura County: A gateway for discussion*. Ventura County Behavioral Health Department. [https://www.counties.org/sites/main/files/file-attachments/ventura\\_co\\_gateway\\_for\\_discussion.pdf](https://www.counties.org/sites/main/files/file-attachments/ventura_co_gateway_for_discussion.pdf)
- <sup>2</sup> Health Matters in Ventura County. (2021). *Summary Data for County: Ventura*. <http://www.healthmattersinvc.org/demographicdata>
- <sup>3</sup> Ventura County Office of Education. (2021). *School Districts in Ventura County*. <https://www.vcoe.org/School-Districts-in-Ventura-County>
- <sup>4</sup> Goldstein, R., & Sumner, D. A. (2019). California cannabis regulation: An overview. *California Agriculture*, 73(3), 101-102. <https://doi.org/10.3733/ca.2019a0021>
- <sup>5</sup> State of California. (2018). Medicinal and Adult Use Cannabis Regulation and Safety Act, California Publ. L. No. 26000-26260. [https://leginfo.ca.gov/faces/codes\\_displayexpandedbranch.xhtml?tocCode=BPC&division=10.&title=&part=&chapter=&article=](https://leginfo.ca.gov/faces/codes_displayexpandedbranch.xhtml?tocCode=BPC&division=10.&title=&part=&chapter=&article=)
- <sup>6</sup> County of Ventura. (2021, March 24) *Cannabis in Ventura County*. <https://www.ventura.org/cannabis/>
- <sup>7</sup> Healy, J. (2019, June 30). Reefer madness or pot paradise? The surprising legacy of the place where legal weed began. *The New York Times*. <https://www.nytimes.com/2019/06/30/us/marijuana-colorado-legalization.html>
- <sup>8</sup> Coolican, J. P. (2019, March 9). A green wave of pot. *StarTribune*. <https://www.startribune.com/colorado-offers-a-picture-of-what-marijuana-legalization-might-look-like-in-minnesota/506709502/>
- <sup>9</sup> The Associated Press. (2017, August 25). Letter to Sessions: The Colorado way on pot is ‘a model for other states’. *CPR News*. <https://www.cpr.org/2017/08/25/letter-to-sessions-the-colorado-way-on-pot-is-a-model-for-other-states/>
- <sup>10</sup> Colorado Department of Public Safety. (2018). *Colorado Division of Criminal Justice publishes report on impacts of marijuana legalization in Colorado*. <https://publicsafety.colorado.gov/press-release/colorado-division-of-criminal-justice-publishes-report-on-impacts-of-marijuana>
- <sup>11</sup> Colorado Department of Public Health and Environment. (2020). *Healthy Kids Colorado Survey and Smart Source Information*. <https://cdphe.colorado.gov/hkcs>
- <sup>12</sup> Boulder County. (2013). *2013 Boulder Valley School District High School Youth Risk Behavior Survey (YRBS) Process and Data Tables*. <https://assets.bouldercounty.org/wp-content/uploads/2017/03/hkcs-2013-county-hs-tables.pdf>
- <sup>13</sup> University of Colorado. (2019). *Healthy Kids Colorado Survey: High school district level report survey results*. <https://assets.bouldercounty.org/wp-content/uploads/2020/09/hkcs-results-bvshd-high-school-2019-version-1.pdf>
- <sup>14</sup> Teens, Inc. (n.d.). *Communities That Care*. <https://teensinc.org/prevention/>
- <sup>15</sup> Boulder County. (2021). *Marijuana licensing*. <https://www.bouldercounty.org/records/licenses/marijuana-licensing/>
- <sup>16</sup> Boulder County. (2019). *Checklist for new marijuana licenses & permits*. <https://assets.bouldercounty.org/wp-content/uploads/2019/07/ml-New-Application-Checklist.pdf>
- <sup>17</sup> City of Nederland. (2020). Code of Ordinances, Chapter 18- Building Regulations, Article V- Signs. [https://library.municode.com/co/nederland/codes/code\\_of\\_ordinances?nodeId=CH18BURE\\_ARTVSI](https://library.municode.com/co/nederland/codes/code_of_ordinances?nodeId=CH18BURE_ARTVSI)
- <sup>18</sup> Florida Health Medical Quality Assurance. (n.d.). *Medical use of marijuana in a form for smoking*. <https://flhealthsource.gov/mum/>
- <sup>19</sup> Rothenbach Research and Consulting, LLC, & Florida Department of Children & Families Office of Substance Abuse & Mental Health. (2020). *2020 Florida Youth Substance Abuse Survey State Report*. <https://www.myflfamilies.com/service-programs/samh/prevention/fysas/2020/docs/2020%20Statewide%20FYSAS%20Report%20per%20Section%20C2-2.3.pdf>
- <sup>20</sup> Substance Awareness Center of Indian River County. (n.d.). *Prevention works!* <https://sacirc.org/prevention/>
- <sup>21</sup> Castletc. (2014, February 26). New dates announced for Castle’s Strengthening Families program. *TC Palm*. <https://archive.tcpalm.com/news/new-dates-announced-for-castles-strengthening-families-program-ep-350996701-341964281.html/>

- 22 Botvin LifeSkills Training. (2019, April 1). *Indian River County Florida and Botvin LifeSkills Training - Prevention is a partnership*. <https://www.lifeskillstraining.com/indian-river-county-florida-and-botvin-lifeskills-training-prevention-is-a-partnership/>
- 23 Michigan Department of Licensing and Regulatory Affairs. (2020). *Marihuana Licenses*. [https://www.michigan.gov/documents/mra/2019-67\\_LR\\_Marihuana\\_Licenses\\_694519\\_7.pdf](https://www.michigan.gov/documents/mra/2019-67_LR_Marihuana_Licenses_694519_7.pdf)
- 24 State of Pennsylvania. (2021). *Pennsylvania Medical Marijuana Program*. <https://www.health.pa.gov/topics/programs/Medical%20Marijuana/Pages/Medical%20Marijuana.aspx>



## Resources for Evaluation and Quality Improvement



The primary purposes of evaluating public health strategies are:<sup>1</sup>

1. **Assess implementation:** Was the intervention implemented as intended and what factors are influencing the intervention's success?
2. **Determine effectiveness:** Did the intervention achieve its goals and objectives and expected outcomes?
3. **Evaluate efficiency:** Were resources such as budget and timeframe used appropriately?
4. **Measure cost-effectiveness:** Did the benefits, or outcomes, resulting from the intervention exceed the costs of implementing it?
5. **Assess attribution:** Can progress on goals and objectives be attributed to the intervention, as opposed to other environmental or organizational factors?

[Program](#) and [policy](#) evaluation answers critical questions about whether an intervention is producing the intended outcomes, and why or why not. Evaluation can also show how a program or policy benefits individuals and be helpful in securing additional funding by providing evidence of program/policy effectiveness. In addition, information gathered through evaluation can be used to encourage dissemination and adoption of the intervention to other communities.

This chapter provides an overview of approaches to evaluate the implementation and outcomes of interventions to prevent marijuana use among youth and young adults. The chapter also includes information on implementing a continuous quality improvement (CQI) process, which allows for rapid evaluation to improve interventions quickly based on the results. Finally, it includes specific evaluation resources, including potential outcomes to track.

### Types of Evaluations and Study Designs

Evaluation is best planned and initiated:

- Before a program or policy is implemented to determine its feasibility ([formative evaluation](#))
- During implementation ([process evaluation](#))
- After the intervention has been delivered (short-term and long-term [outcomes and impact evaluation](#))

Each of these evaluation types is useful in judging an intervention's effectiveness in preventing marijuana use among youth and young adults. However, when considering policy evaluation, it is important to remember there is no concrete end date—the changes from a policy may not be observable for a period of years, and immediate outcomes (e.g., reductions in the number of marijuana outlets) may differ from long-term outcomes (e.g., reductions in youth marijuana use).

Both qualitative and quantitative methods, as well as community participatory approaches, are important when evaluating programs and policies.

Although it is often omitted when planning and implementing an intervention, evaluation is an integral part of the implementation process and should be considered from the start.

**Formative evaluation** assesses the readiness of an organization or community to implement the intervention, articulates a theory of change, and determines the extent to which an intervention can be evaluated in a reliable and credible fashion.

**Process (implementation) evaluation** collects data about an intervention's implementation. This evaluation enables program managers and policy makers to assess whether an intervention was implemented as planned, and whether and to what extent it reached the intended audience.

**Outcome evaluation** collects baseline data and data at defined intervals (e.g., annually) during and after full implementation of the intervention to assess short- and

long-term outcomes related to the targeted behaviors. These outcomes of interest should be collected from program participants or community members. These outcome data provide program managers and policy makers with information to assess changes or improvements in attitudes and behaviors that can be associated with the intervention.

**Impact evaluation** assesses an intervention's effectiveness in achieving its ultimate goals. Impact evaluations determine the extent to which changes in outcomes can be attributed to the newly implemented intervention. Conducting impact evaluations of policy implementation can be challenging; it often takes many years to see changes in behavior that may be associated with a specific policy. These evaluations typically require either strong data collected before policy passage to do a pre/post comparison, or data from a similar jurisdiction which has not implemented the policy to compare the two jurisdictions to each other. Stakeholders and funders should be aware that an impact evaluation of the policy may not be feasible without additional funding and resources.



## CONTINUOUS QUALITY IMPROVEMENT (CQI)

### What is CQI?

CQI involves a systematic process of assessing program or practice implementation and short-term outcomes and then involving program staff in identifying and implementing improvements in service delivery and organizational systems to achieve better treatment outcomes. CQI helps assess fidelity, the degree to which a program delivers a practice as intended.

CQI differs from process evaluation in that it involves quick assessments of program performance, timely identification of problems and potential solutions, and implementation of small improvements to enhance treatment quality. CQI is usually conducted by internal staff. Process evaluation involves longer-term assessments and is best conducted by an external evaluator.

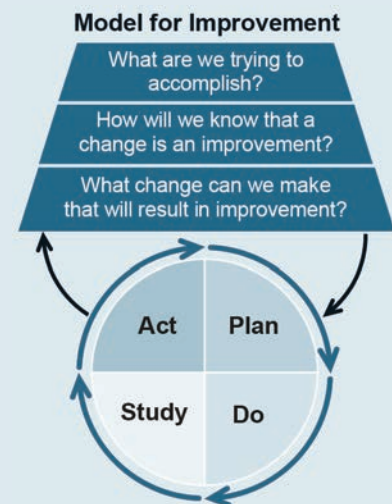
### Why use CQI?

CQI takes a broader look at the systems and environment in which programs or policies operate. Because of the pivotal role it plays in performance management, organizations or stakeholders implementing new programs or policies to prevent marijuana use among youth or young adults are encouraged to implement CQI procedures.

### What are the steps involved in CQI?

Although steps in the CQI process may vary based on objectives, typical CQI steps are:

- Identify a problem or issue needing improvement and a target improvement goal
- Analyze the problem and its root causes
- Develop an action plan to correct the root causes of the problem, including specific actions to be taken
- Implement the actions in the action plan
- Review the results to confirm that the issue and its root causes have been addressed and short- and long-term prevention outcomes have improved
- Repeat these steps to identify and address other issues as they arise



Institute for Healthcare Improvement. (n.d.). Science of improvement: Testing changes. <http://www.ihl.org/resources/Pages/HowtoImprove/ScienceofImprovementTestingChanges.aspx>

New Jersey Department of Children and Families. (n.d.). Five Stages of Continuous Quality Improvement. <https://www.nj.gov/dcf/about/divisions/opma/CQI%20framework.pdf>

NIATx National Program Office. (n.d.). What is NIATx? <https://www.niatx.net/what-is-niatx/>

U.S. Department of Health & Human Services Office of Adolescent Health. (n.d.). Continuous Quality Improvement, Part 1: Basics for Pregnancy Assistance Fund Programs. <https://www.hhs.gov/ash/oah/sites/default/files/cqi-intro.pdf>



# Outcomes

An important but often challenging step in the process of implementing programs and policies is determining whether they have yielded desired outcomes. An **outcome** is the change an intervention is intended to accomplish through the implementation of a program or policy.

Regardless of which evaluation design is best for an intervention, it may take time to realize some of the intended outcomes. **Short-term effects** of a program or policy may be seen immediately, such as changes in knowledge, beliefs, or perceptions, while long-term outcomes may take much longer.

**Long-term outcomes** include change in behavior, such as reductions in initiation and prevalence of marijuana use. Additionally, the nature of marijuana use may change over time as programs and policies are implemented, or as new marijuana products are added to the market. Collecting data on the patterns of marijuana use, including what products are being sold or

used, how they are being used, and by whom, will help communities conduct their regular needs assessments, as described in Chapter 3.

Given changing patterns of marijuana use and new regulatory policies, there are several key data elements communities need to collect to understand marijuana prevention and reduction efforts. Stakeholders working to prevent marijuana use among youth should:<sup>2</sup>

- Collect data on existing policies at the national, state, local, tribal, and territorial levels
- Examine how marijuana products are marketed in their community to understand the potential impact of future regulation
- Track patterns of marijuana sales and use in populations at high risk, such as racial/ethnic, gender identity, and sexual orientation minorities

Provided below is a list of potential outcomes, illustrative outcome indicators, and sources of survey questions that may be used to evaluate interventions to prevent marijuana use among youth.

Outcome	Illustrative Indicators	Examples of Sources of Survey Questions
<b>Short-Term Outcomes</b>		
Knowledge of the harms of marijuana use, strengthened social norms	Level of perceived harm of marijuana products among youth and young adults	<a href="#">Monitoring the Future Study</a>
Perceived social norms on marijuana use	Proportion of youth and young adults who overestimate the marijuana use rate among their peers	<a href="#">National Survey on Drug Use and Health</a>
Policy and enforcement efforts	Proportion of jurisdictions with public policies that establish a fee on each marijuana product sold	State or local policy tracking systems
	Proportion of jurisdictions with comprehensive policies that require retail licenses to sell marijuana	
	Enforcement intensity measured by citations/warnings given to retail establishments	Local or state law enforcement or licensing entities maintaining citation data
Price of marijuana products	Amount of marijuana product taxes and fees	<a href="#">NIAAA Alcohol Policy Information System</a>
Exposure to marijuana marketing	Density of stores selling marijuana products	Government bodies/organizations licensing marijuana retailers
Availability of marijuana products	Number and content of marijuana advertisements	State marijuana regulatory bodies

Outcome	Illustrative Indicators	Examples of Sources of Survey Questions
<b>Long-Term Individual- and Population-Level Outcomes and Impacts</b>		
Initiation of marijuana use	Proportion of youth and young adults who report never having tried a marijuana product	<a href="#">National Survey on Drug Use and Health</a> <a href="#">Youth Risk Behavior Surveillance Survey</a> <a href="#">Behavioral Risk Factor Surveillance System</a>
Marijuana use prevalence	Prevalence of marijuana use among youth and young adults	<a href="#">National Survey on Drug Use and Health</a> <a href="#">Youth Risk Behavior Surveillance Survey</a> <a href="#">Behavioral Risk Factor Surveillance System</a>
Sales of marijuana products	Sales of flavored products reported in a community  Percent of marijuana sales composed of high potency products	Tax data, commercial market databases, retail establishments

Several publicly available datasets that include measures on marijuana are detailed below. Communities wanting more localized data should look to see what surveillance measures their county and state public health departments are already collecting at the county or census tract levels. Communities should additionally

consider whether there is an appropriate community they can compare their data against to conduct an impact evaluation. Depending on the data available, this may be a similar city or county, or stakeholders may compare their community data to state averages.

Sources of National Data on Marijuana Use Among Youth and Young Adults						
	National Survey on Drug Use and Health (NSDUH) <sup>3</sup>	Monitoring the Future Survey (MTF) <sup>4</sup>	Youth Risk Behavior Surveillance System (YRBSS) <sup>5</sup>	Behavioral Risk Factor Surveillance System (BRFSS) <sup>6</sup>	Population Assessment of Tobacco and Health (PATH) <sup>7</sup>	National Health and Nutrition Examination Survey (NHANES) <sup>8</sup>
<b>Sponsoring Agency or Organization</b>	Substance Abuse and Mental Health Services Administration	National Institute on Drug Abuse	Centers for Disease Control and Prevention	Centers for Disease Control and Prevention	Food and Drug Administration; National Institutes of Health	Centers for Disease Control and Prevention
<b>Type of Survey</b>	Cross-sectional	Cross-sectional and longitudinal	Cross-sectional	Cross-sectional	Longitudinal	Cross-sectional
<b>Mode of Survey Administration</b>	Audio, computer-assisted self-interview	School-based, self-administered questionnaire	School-based, self-administered questionnaire	Telephone surveys	Home-based interview	Interviews and physical examinations
<b>Ages/Grades</b>	≥12 years	8 <sup>th</sup> and 10 <sup>th</sup> grades (since 1991) and 12 <sup>th</sup> grade (since 1975); college students; young adults	9 <sup>th</sup> to 12 <sup>th</sup> grades	≥18 years	≥12 years	All ages
<b>Level of Data Available</b>	National, state, sub-state regions	National, regional	National, state, district	National and state, as well as counties and metropolitan/micropolitan areas for some data	National, state, census region	National

**Qualitative Data:** Throughout an evaluation, it is important to engage those implementing the program or policy and those affected by it. Hearing the voices of key stakeholders through qualitative data collection, such as interviews or focus groups, provides necessary context, and allows evaluators to gain a deeper understanding of the story behind the quantitative data collected.

Qualitative data may be collected from youth who use marijuana to better understand attitudes and perceptions of marijuana, such as why they use the product and how, and during and after an intervention has been implemented to learn their perspectives on what is and is not working. Interviews can also be conducted with those who implement the intervention to understand

what is going well and what may need to be changed in future versions. If survey data show that an increase in tax policy is affecting one demographic group differently than others, focus groups may help stakeholders understand why these differences are occurring.

Qualitative data collection efforts should be considered at the beginning of any evaluation, and reconsidered at the end, to help provide context for quantitative study findings.<sup>9</sup>

As findings from the evaluation emerge, corrections should be made, as needed, to improve the intervention and initiatives to prevent youth marijuana use. Results should also be shared with stakeholders and the broader



community. Disseminating the findings will contribute to the growing body of evidence on effective strategies to prevent marijuana use among youth and young adults, allowing other organizations and communities to benefit from knowledge gained during the evaluation.

## Evaluation Resources

- Overarching Policy Evaluation Guidance
  - SAMHSA’s [Strategic Prevention Framework](#) and [Selecting the Best Fit](#) guidance includes assistance on how coalitions and prevention planners can evaluate programs and environmental strategies.
  - A guide on the [Introduction to Process Evaluation](#) developed by CDC, which focuses on Tobacco Use Prevention and Control, defines process evaluation, and describes the rationale, benefits, key data collection components, and program evaluation management procedures.
  - [CADCA’s Evaluation Primer](#): Setting the Context for a Community Anti-Drug Coalition Evaluation specifically addresses coalition evaluation.
  - The National Institutes [webpage on evaluation of Health](#) provides guidance on qualitative evaluation methods.
- Overarching Program Evaluation Guidance
  - [A Framework for Program Evaluation](#) from the Program Guide on the [Introduction to Program Evaluation for Public Health Programs](#), developed by CDC, is intended to assist managers and staff of public, private, and community public health programs plan, design, implement, and use comprehensive evaluations.
  - [Examples of evaluation measures](#) was developed by the Rural Health Information Hub includes process and outcome measures meant to keep a project team working towards the same goal.
  - [The Performance and Evaluation Office \(PPEO\)](#) at CDC framework summarizes essential elements of program evaluation.
  - [Introduction to Program Evaluation for Public Health Programs](#) is a self-study guide from CDC that includes worksheets and checklists for implementing the steps in CDC’s Framework for Program Evaluation.
- Quality Improvement and Continuous Performance Monitoring
  - [Roadmap to a Culture of Quality Improvement](#) is a guide to the quality improvement process for local health departments developed by the National Association of County & City Health Officials (NACCHO).
  - The National Network of Public Health Institutes developed a [webinar](#) on “CQI: Building a Performance Management System to Strengthen Quality Improvement,” with speakers from the Macomb County Health Department.

## Reference List

- <sup>1</sup> Centers for Disease Control and Prevention. (2012). *Introduction to program evaluation for public health programs: A self study guide*. <https://www.cdc.gov/eval/guide/index.htm>
- <sup>2</sup> Illinois Department of Human Services. (2019). *Marijuana prevention strategies resource guide*. [http://www.dhs.state.il.us/OneNetLibrary/27896/documents/Cannabis\\_Prevention\\_Strategies.pdf](http://www.dhs.state.il.us/OneNetLibrary/27896/documents/Cannabis_Prevention_Strategies.pdf)
- <sup>3</sup> Substance Abuse and Mental Health Services Administration. (2020). *Key substance use and mental health indicators in the United States: Results from the 2019 National Survey on Drug Use and Health*. <https://www.samhsa.gov/data/sites/default/files/reports/rpt29393/2019NSDUHFFRPDFWHTML/2019NSDUHFFR090120.htm>
- <sup>4</sup> National Institute on Drug Abuse. (2019, December 18). *Monitoring the Future 2019 survey results: Overall findings*. <https://www.drugabuse.gov/drug-topics/trends-statistics/infographics/monitoring-future-2019-survey-results-overall-findings>
- <sup>5</sup> Centers for Disease Control and Prevention. (2020). *Youth Risk Behavior Surveillance—United States, 2019*. <https://www.cdc.gov/mmwr/volumes/69/su/pdfs/su6901-H.pdf>
- <sup>6</sup> Centers for Disease Control and Prevention. (2019). *Behavioral Risk Factor Surveillance System (BRFSS)*. <https://www.cdc.gov/brfss/>
- <sup>7</sup> National Institutes of Health. (2020). *PATH Population Assessment of Tobacco and Health*. <https://pathstudyinfo.nih.gov/>
- <sup>8</sup> Centers for Disease Control and Prevention. (2021). *National Health and Nutrition Examination Survey*. <https://www.cdc.gov/nchs/nhanes/index.htm>
- <sup>9</sup> Commonwealth of Massachusetts. (2021). *Massachusetts Cannabis Control Commission 935 Mass. Reg. 500.150 - Edibles*. <https://casetext.com/regulation/code-of-massachusetts-regulations/department-935-cmr-cannabis-control-commission/title-935-cmr-500000-adult-use-marijuana/section-500150-edibles>

# Appendix: Acknowledgments

This publication was developed with a significant contribution from Alicia Sparks, PhD, MPH and Lynn Silver, MD, MPH, FAAP. This guidance is based on the thoughtful input of SAMHSA staff and the Technical Expert Panel on Reducing Marijuana Use Among Youth from October 2020 through June 2021. A series of guide development meetings was held virtually over a period of several months. Three expert panel meetings were convened during this time.

## SAMHSA Staff

**Aida Balsano, PhD** Center for Substance Abuse Prevention\*

**Christine Cichetti** National Mental Health and Substance Use Policy Laboratory\*

**Thomas Clarke, PhD** National Mental Health and Substance Use Policy Laboratory

**Tanya Geiger, PhD, MPH** National Mental Health and Substance Use Policy Laboratory\*

**Donelle Johnson, PhD, MHSA** National Mental Health and Substance Use Policy Laboratory\*

**Nelia Nadal, MPH** Center for Substance Abuse Prevention\*

**Krishnan Radhakrishnan, MD, PhD, MPH** National Mental Health and Substance Use Policy Laboratory

## Technical Expert Panel

**Debbie Berndt** Parent Movement 2.0

**Jessica Cotto, MPH** National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH)

**Deepak Cyril D'Souza, MD** Yale University School of Medicine, VA Connecticut Healthcare System (VACHS)

**Amy B. Goldstein, PhD** National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH)

**Sion Kim Harris, PhD, CPH** Center for Adolescent Behavioral Health Research (CABHRe), Boston Children's Hospital, Harvard Medical School

**Kristin M. Holland, PhD, MPH** Centers for Disease Control and Prevention

**Katia Howlett, PhD, MPP, MBA** National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH)

**David Jernigan, PhD** Boston University School of Public Health, CityHealth

**Rich Lucey** Drug Enforcement Administration

**LaTrice Montgomery, PhD** University of Cincinnati College of Medicine

**Rosalie Liccardo Pacula, PhD** University of Southern California Sol Price School of Public Policy

**Rebecca Ramirez, MPH** Public Health Consultant

**Gillian Schauer, PhD, MPH** Alcohol and Drug Abuse Institute (ADAI)

**Lynn Silver, MD, MPH, FAAP** Public Health Institute and University of California San Francisco\*

**Ryan Treffers, JD** Pacific Institute for Research and Evaluation

**Ryan Vandrey, PhD** Johns Hopkins University School of Medicine

## Contract Staff

**Amy Berninger, MPH** Abt Associates

**Anna Garner** Abt Associates

**Margaret Gwaltney, MBA** Abt Associates\*

**Caroline Kupersmith** Abt Associates

**Daniel Jefferson Smith** Abt Associates

**Alicia C. Sparks, PhD, MPH** Abt Associates\*

**Sarah Steverman, PhD, MSW** Abt Associates\*

**Korrin L. Bishop** Korrin Bishop Writing & Editing

\*Members of Guide Planning Team



Photos are for illustrative purposes only.  
Any person depicted in a photo is a model.

Publication No. PEP21-06-01-001



SAMHSA's mission is to reduce the impact of substance abuse and mental illness on America's communities.  
1-877-SAMHSA -7 (1-877-726-4727) • 1-800-487-4889 (TDD) • [www.samhsa.gov](http://www.samhsa.gov)