# Marijuana in Wisconsin



*Research-Based Review and Recommendations for Reducing the Public Health Impact of Marijuana*

## June 2016

**Wisconsin State Council on Alcohol and Other Drug Abuse**
**Prevention Committee**
**Marijuana Ad-hoc Committee**

State of Wisconsin
State Council on Alcohol and Other Drug Abuse
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# Charge to the Marijuana Ad Hoc Committee

Over the past several years, the Wisconsin State Council on Alcohol and Other Drug Abuse (SCAODA) has issued reports that have focused on the prescription drug and heroin epidemic facing Wisconsin, as well as policy solutions aimed at these issues.

- *In 2012, the Controlled Substances Workgroup's report, Reducing Wisconsin's Prescription Drug Abuse: A Call to Action (Call to Action Report), it was recommended that SCAODA convene a workgroup to examine the use and related consequences of illicit drug use in Wisconsin, focusing on illegal opiates.*
- *In 2013, the SCAODA 911 Good Samaritan Legislation Ad hoc Committee produced a report and subsequently also recommended that a workgroup be formed and dedicated to identifying the extent of heroin use in the state of Wisconsin and examining the many facets that lead to heroin use.*
- *In 2014, the Heroin Ad hoc Committee produced the report Wisconsin's Heroin Epidemic: Strategies and Solutions (Analysis and Recommendations for Reducing Heroin Abuse in Wisconsin) providing recommendations to SCAODA regarding programming that could be implemented to prevent and reduce the harm associated with heroin use and assist communities in dealing with heroin-related public health consequences.*

During this time, SCAODA Prevention Committee members readily acknowledged the need for a Marijuana Ad hoc Committee. Throughout the research process for both the SCAODA Controlled Substances report and Heroin Epidemic report, the consistent theme heard from individuals with substance use disorders and professionals who treat them, was that they did not start with heroin or prescription drugs. More times than not it was marijuana and/or alcohol. Heightening this need is the nationwide marijuana movement, in which some states have decriminalized marijuana possession, legalized marijuana for medicinal use, as well as legalized marijuana for recreational use.

For these reasons, the Wisconsin SCAODA established the Marijuana Ad hoc Committee in October 2014. Under the guidance of the SCAODA Prevention Committee's purpose and goals, the Marijuana Ad hoc Committee was charged with researching, evaluating, and developing recommendations that best serve the public health and safety of all Wisconsin residents. Looking at the issue objectively, the committee will come to a place of offering recommendations on these issues.

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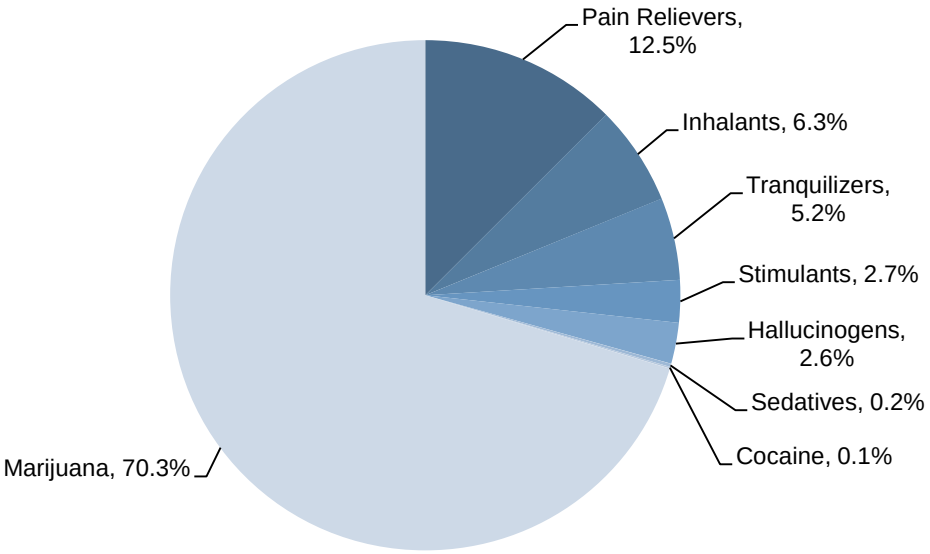
**Workgroup members listed were contributors to this report. Individual recommendations in this report are not necessarily endorsed by them, or their employers.*

# Background

The United States has a richly storied and complex history of marijuana use and subsequent regulation. Nationally, whether smoked, eaten, drank, or inhaled, marijuana is the most commonly used illicit drug (Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). According to the National Survey on Drug Use and Health (NSDUH, 2013), marijuana use has increased since 2007. In 2013, there were 19.8 million current users, or about 7.5 percent of people aged 12 or older; up from 14.5 million (5.8 percent) in 2007. Data further indicates that more than half of new illicit drug users begin with marijuana (NSDUH, 2013).

**Figure 1: First Specific Drug Associated with Initiation of Illicit Drug Use, United States, 2013**

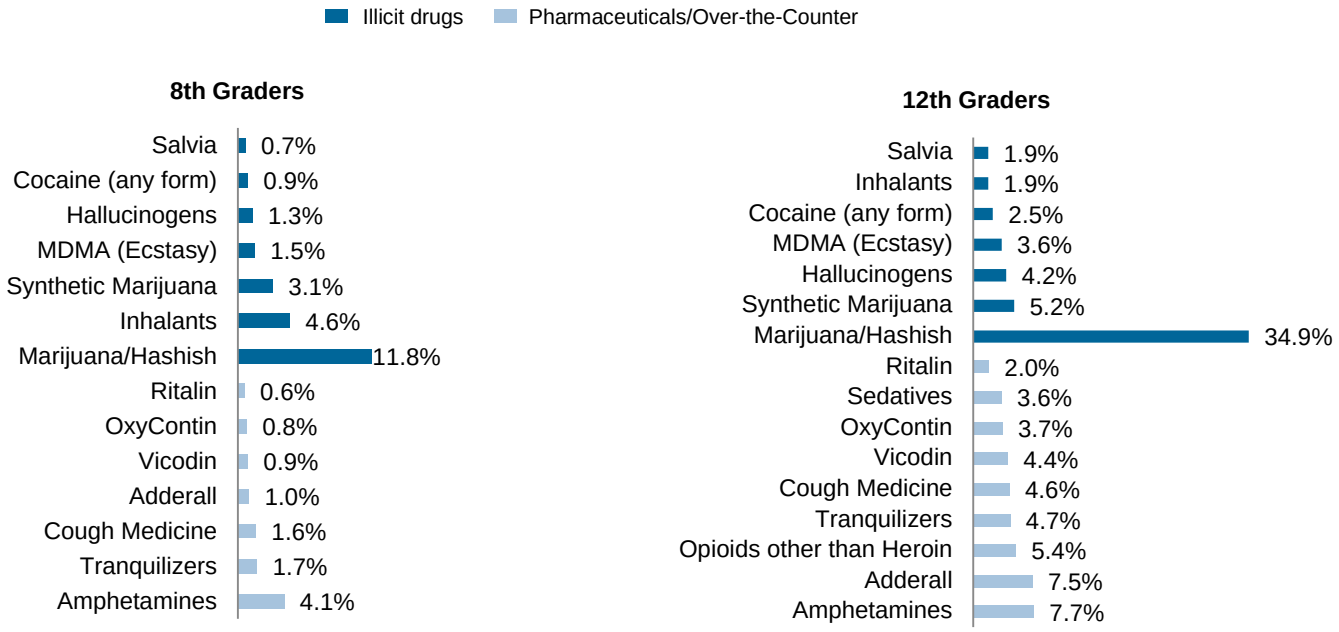



Source: NSDUH, 2013.

The NSDUH (2013) notes that marijuana use is widespread among young people and is favored most by those 18-20 years old. While a yearly survey of middle and high school students reveals rates of marijuana use have leveled after several years of increase, the number of young people who believe marijuana use is risky is decreasing (Johnston, 2014).

Concurrently, University of Michigan's 2015 Monitoring the Future Study collected similar findings after surveying drug use and attitudes among American 8th, 10th, and 12th graders. The data highlighted encouraging news about youth drug use including no increase in use of marijuana and a general decline over the last two decades in the use of illicit drugs. However, the survey called attention to concerning and growing trends; namely, decreases in perceived harm and disapproval of marijuana use (Monitoring the Future, 2015).

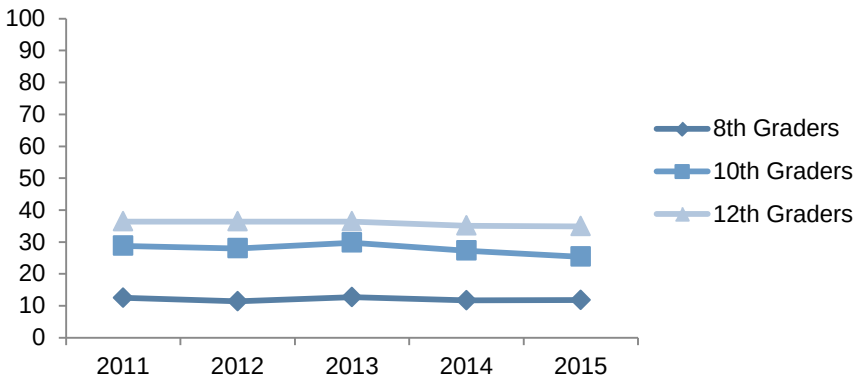
**Figure 2: Percentage of 8th and 12th Graders Who Have Used Prescription/Over-the-Counter versus Illicit Drugs in the Past Year, United States, 2015**




Source: 2015 Monitoring the Future Study, University of Michigan.
Note: Only 12th graders were asked about opioids other than heroin and sedative use in the past year.

Among youth, marijuana use remained stable in 2015, even though the percentage of youth perceiving the drug as harmful went down. In all grade levels (8th, 10th and 12th), past 30-day use remained constant. Data shows that 8th graders stayed at 6.5 percent, 10th graders at 14.8 percent, and 12th graders at 21.3 percent. Amongst 12th graders, nearly 6 percent report daily use of marijuana. In other words, one in every 16 or 17 high school seniors is smoking marijuana daily or near daily. In addition, 79.5 percent of 12th graders reported that the drug is easy to obtain.

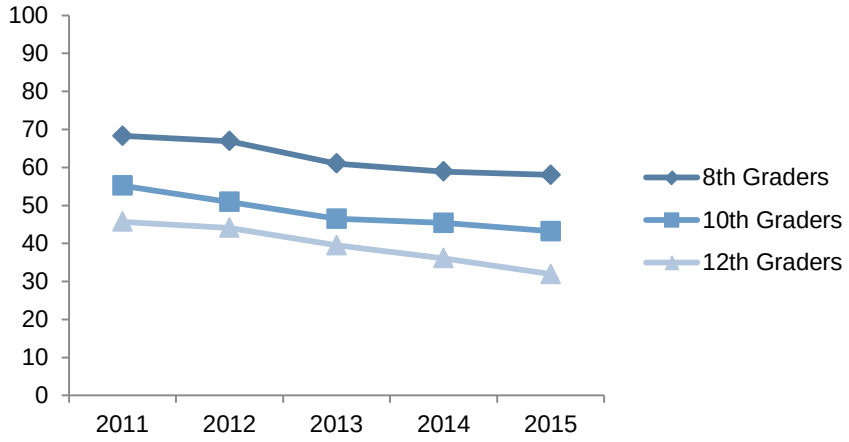
**Figure 3: Percent of Students Reporting Use of Marijuana in Past Year, United States, 2011-2015**




Source: Monitoring the Future, 2015.

Although rates of use among youth have remained comparatively stagnant over the past several years, a notable shift of teens' attitudes about marijuana's perceived risks endures. Among high school seniors, the majority do not believe smoking marijuana occasionally is harmful. Over a recent five-year period, the perception that regular use of marijuana puts the user at great risk has also seen a steep decline. In 2010, 46.8 percent of 12th graders believed regular use posed a great risk to the user. In 2014, this number dropped to 36.1 percent and again to 31.9 percent in 2015. Conversely, 68.1 percent of seniors do not view regular marijuana smoking as harmful but 71 percent say they disapprove of regular marijuana smoking (Monitoring the Future, 2015).

**Figure 4: Percent of Students Perceiving Great Risk of Smoking Marijuana Regularly, United States, 2011-2015**




Source: Monitoring the Future, 2015.

Moreover, marijuana use continues to exceed cigarette use in all three grade levels. In 2015, 21.3 percent of high school seniors had used marijuana in the past 30 days, whereas only 11.4 percent had smoked cigarettes (Monitoring the Future, 2015).

Rates of actual and perceived marijuana use among youth and adults, alike, is important as it causes physical and mental health consequences, including marked short- and long-term effects on the brain. While it is more likely to happen with daily use, or if started at a young age, addiction can develop. Altogether, marijuana can cause problems with memory, learning and behavior; consequences that are compounded with increasing amounts of delta-9-tetrahydrocannabinol (THC) found in present-day marijuana.

# Executive Summary

For 12 months, the Marijuana Ad hoc Committee examined the scope of marijuana use and problems associated with use that face Wisconsin and its citizens. The committee developed recommendations to reduce the public health and safety consequences related to marijuana use.

In researching this broad topic, the committee quickly recognized the need to not only focus on prevention efforts by reducing the initiation of marijuana use, but also how marijuana use affects individuals, families, and larger systems within the general public. It was agreed upon by committee members to break into workgroups to capture all of these issues, including identification of vulnerable members of the population. The workgroups included:

1) **Cannabinoid Research**
2) **Legalities and Regulations**
3) **Prevention**
4) **Treatment and Recovery**

This report provides recommendations specific to each of the four workgroup sections. The recommendations include comprehensive approaches for addressing the prevention of marijuana use and other substance use disorders at the individual, family, organizational, community, municipality, county, tribal, and state levels.

**The Marijuana Ad Hoc Committee would like to thank the following individuals and organizations for their assistance, guidance, and expertise in developing these recommendations: Norman Briggs (ARC), Derek Iverson (Marshfield Police Department), Andrea Jacobson (Wisconsin Department of Health Services), Robert Kovar (Marshfield Clinic Center for Community Outreach), Lucas Moore (Wisconsin Department of Health Services), and Nick Oleszak (Constructive Analytics).**

# Cannabinoid Research

## Basis for the Use of Cannabinoids in Medicine

Throughout most of human history cannabis has been used as a therapeutic agent with no real understanding of how it affects the body and on what basis it produces its effects. It was not until 1964 that the psychoactive component of cannabis, delta-9-tetrahydrocannabinol (THC), was discovered and later synthesized (Gaoni & Mechoulam, 1964). It was also around this time that smoked cannabis began to gain popularity and individuals began to experiment with smoked cannabis as a delivery vehicle for its perceived therapeutic benefits. Because of a lack of technology required to truly understand the active components of cannabis, it has only been in the past three decades that cannabinoids and their respective bodily systems have begun to be understood. The age of modern cannabinoid therapeutics has now started and a brief literature search yields an abundance of current research into potential and real therapeutic benefits of the active ingredients of cannabis.

It is important to make some distinctions in nomenclature for the purposes of distinguishing plant-based extracts (whole dried cannabis, oil extracts of cannabis, etc.) from pharmaceutical grade compounds (a distinct chemical entity produced in a reproducible fashion via specific laboratory methods to a known degree of purity, dose, and chemical structure). **Throughout the rest of this section, the term(s) cannabis or marijuana will denote non-pharmaceutical grade extracts of one or more of the cannabis plant species or parts of the whole plant itself, whereas the term cannabinoids will be utilized to denote specific chemical entities (whether natural or synthetic) that have been discovered and/or produced by the exacting standards of laboratory science via reproducible methods.** It is this latter group of pharmaceutical grade compounds that have permitted clinicians and scientists to begin to study and understand the exact mechanism by which this family of chemicals produces their physiological effects on the human body.

### Difference between Folk Remedies and Modern Medicine

**Plant-based Extract (Folk Remedies)**

- Use plant products whose composition is uncertain and unregulated.
- Treat poorly defined illnesses or symptoms with unknown basis.
- Are based on little understanding on the pathophysiology of the disorders being treated.
- Are based on little understanding of the role of “medicine” in the therapy.
- Are used in inconsistent and hard-to-quantify amounts.

**Pharmaceutical Grade Chemicals (Modern Medicine)**

- Use highly purified or defined medications, often compromising chemicals synthesized in a laboratory.
- Treat specific diseases (FDA approved for specific indications at specific dosages).
- Elucidate the nature of the illness.
- Use medicines that have a recognized effect on pathological processes; often understand the mechanism of action.
- Are administered in controlled doses; delivery systems provide predictable doses over a defined period of time.

Through the study of these cannabinoid entities, by the late 1980s and early 1990s scientists began to discover the intricate neural networks that comprise the endocannabinoid system in the human body. While the endocannabinoid system is still not fully understood, it has become clear that the cannabinoid receptors (to which THC and other cannabinoid compounds attach to produce their effects) are found in nearly every system of the body. As such, the endocannabinoid system appears to play a crucial role in the body’s normal physiology. Please see Appendix A for an in-depth look at the endocannabinoid system.

The following subsections will focus primarily on evidence derived from well-controlled, scientifically sound clinical trials to determine current knowledge of clinical indications, routes of administration, and dosing for cannabinoid therapeutics; investigational or theoretical therapeutic indications; and well-described adverse effects.

## Current Research and Specific Indications for the Use of Cannabinoids in Medicine

One of the most common rationalizations provided by advocates for the legalization of cannabis, cannabis extracts, and cannabinoid pharmaceuticals is that the Drug Enforcement Agency's (DEA's) schedule 1 designation, which creates an illegal status for herbal cannabis and certain specific cannabinoids, hampers research into the potential therapeutic potential of cannabinoid pharmaceuticals. In fact, as is evident by the accumulating research noted in this section, *this is not the case*. In Wisconsin, for example, Wis. Stat. § 961.335, titled Special Use Authorization, delineates specific guidelines for obtaining a permit for use of controlled substances (including Schedule 1 substances, such as cannabis) for research purposes (Wisconsin Legislature, 2015). In addition, synthetic THC, dronabinol (Marinol®), which is chemically indistinguishable from THC, extracted from the cannabis plant and, in an oral formulation, is currently available by prescription. Dronabinol is FDA approved for the treatment of chemotherapy-associated nausea/vomiting for patients who have failed to respond to conventional antiemetics as well as AIDS-associated anorexia and wasting syndrome. Of note, as with other pharmaceuticals approved by the FDA, once approved for an indication, the medication is available for off-label prescription by a licensed provider and for research purposes for any number of other evidence-based indications.

Research into the effects of individual cannabinoids for specific indications and the optimal balance of different cannabinoid combinations (and there are thousands of possible permutations) is definitely warranted, but the composition and purity of these preparations must be well described so that studies can be replicated. Furthermore, exact dosing information for the primary cannabinoids (e.g., THC and cannabidiol [CBD]) is necessary and readers should be alerted to the fact that typical "recreational" and "medicinal" marijuana available at dispensaries in states where marijuana has been legalized vary substantially in their THC and CBD levels. Still, on average, they contain up to 10 times the dose of THC (10-15% or 10-15 mg) used in clinical trials (1.3-5 mg), which may actually result in worsening of symptoms over time. Such refined medications are already in development and at least one, nabiximols (Sativex®) is currently in phase 3 clinical trials in the United States for use in multiple sclerosis to control spasticity (GW Pharmaceuticals, 2014) and for chronic, refractory pain in patients with cancer (GW Pharmaceuticals, 2012).

Appendix A details the extensive progress that has been made into understanding the complex physiological interactions of the endocannabinoid system in the body. Appendix B provides a thorough review of the current research into the potential therapeutic applications of cannabis and cannabinoids for treatment of specific diseases including: glaucoma, nausea, spasticity in multiple sclerosis, epilepsy, chronic pain, inflammation, AIDS-associated anorexia and wasting syndrome, and post-traumatic stress disorder (PTSD).

## Concerns Regarding Cannabinoids Use as Medicine

Cannabis and cannabis extracts produce the majority of their physiological effects as a result of their cannabinoid content (some of the pesticide residue may also be contributing to some unwanted side effects [Wilkinson & D'Souza, 2014]), and it is for this reason that **pharmaceutical grade cannabinoids** are now in full production and development. Both cannabis/cannabis extracts and cannabinoid

pharmaceuticals produce significant physiological effects on the body, some potentially beneficial, but other less desirable effects are also common as is the case with any substance that is ingested.

Adverse effects associated with cannabis, cannabis extracts, and cannabinoid pharmaceuticals vary depending on a number of factors including: the exact cannabinoid composition/purity of the substance or pharmaceutical in question; the dose of the active cannabinoid compounds in the preparation; genetic variability of the end user; the age of first use of the end user; and the duration and frequency of use.

As a general rule, smoked cannabis tends to have more adverse effects than vaporized cannabis and vaporized cannabis tends to have more adverse effects than pharmaceutical grade pure cannabinoid preparations, which are usually administered via oral or sublingual routes in controlled doses. In addition, herbal cannabis and cannabis extracts tend to be less predictable with respect to their side effects than pharmaceutical grade cannabinoid products because their exact composition and likeness cannot be fully guaranteed prior to ingestion.

In essence, individuals who use smoked cannabis or cannabis extract for therapeutic purposes are receiving an unquantifiable amount of cannabinoids, typically in unknown proportions. As a result, it is quite difficult to study the effects of cannabis or cannabis extract because the exact composition of each "dose" cannot be known by the investigator or the patient. In contrast, pharmaceutical grade products, by their nature, have well-established chemical compositions with known purity levels at exact doses.

Pharmaceutical grade products are produced in highly reproducible dosages and purity, which allows their administration in very controlled and measurable quantities. It is for this reason that modern medicine has chosen to focus study on these "pure" chemicals rather than the uncertain herbal products that are sold in cannabis dispensaries that can vary in active cannabinoids from batch to batch, even within the same species of plant (Hemphill, Turner, & Mahlber, 1980; Mahlberg & Hemphill, 1983; Tipparat, Natakankitkul, Chamnivkaipong, & Chutiwat, 2011).

The following provides a detailed review of adverse effects associated with cannabis and cannabis extract. Detailed information on additional adverse effects (cardiovascular, pulmonary, renal, hepatobiliary and gastrointestinal, and violence potential) can be found in Appendix C.

**PSYCHIATRIC ADVERSE EFFECTS—**The use of cannabinoids at high doses (and with increasing frequency) or the use of high potency cannabinoids (such as the synthetic drugs K2 and Spice) is associated with a significantly increased risk of psychotic reactions and paranoia. While no study has been able to definitively identify a cause and effect relationship between cannabis use and psychotic reactions or schizophrenia, the relationship between the two demonstrates a strong positive correlation and meets most of the "criteria for causality" (Radhakrishnan, Wilkinson, & D'Souza, 2014). It is clear, therefore, that the use of cannabinoids, particularly those with higher potency (such as K2 and spice) or higher doses of lower potency cannabinoids (including THC) is associated with an increased risk of psychotic reactions (Volkow, Baler, Compton, & Weiss, 2014); and at least one study has demonstrated a shorter time to onset of schizophrenia (measured by first psychotic episode) in a cohort of patients with higher dose cannabis consumption of up to six years (Di Forte et al., 2014).

In addition to psychotic reactions, the literature also describes a relationship between cannabis and anxiety/panic disorder, particularly in naïve users (Volkow, Baler, Compton, & Weiss, 2014). It is not clear how common these types of reactions actually are and causality has not been established. However, at least one longitudinal study found that teen marijuana users were more likely than nonusers to develop an anxiety disorder (Degenhardt et al., 2013). It is also clear that there is a significant positive correlation

between panic disorder/anxiety and long-term cannabis use or cannabis use disorder (CUD) as described by a meta-analysis published in 2014 (Kedzior & Laeber, 2014).

Studies also suggest a high comorbidity between adolescent cannabis use and mood disorders, such as major depressive disorder (MDD) and bipolar disorder (BD). In fact, many longitudinal studies suggest that early cannabis use may predispose teenagers to subsequent anxiety and mood disorders in late adolescence and adulthood. For example, a large three-year longitudinal study of adolescents and adults found that cannabis use at baseline predicted an increase in MDD and BD. Long-term use of cannabis has also been associated with the development of depression, primarily when use begins at a young age (Patton et al., 2002; Chadwick, Miller, & Hurd, 2013). Therefore, converging lines of evidence suggest that chronic, regular use of recreational marijuana in youth is associated with increased risk for psychotic episodes, increased severity of psychotic disorders, and increased risk for anxiety and mood disorders.

**MOTOR VEHICLE ACCIDENTS (DRUGGED DRIVING)—**Given the widespread distribution of cannabinoid receptors throughout the brain and body, it is not surprising that cannabis and cannabinoids have acute effects on neurocognitive and physiological function. With acute ingestion, cannabis and THC produce dose-dependent impaired motor coordination, decreases in reflex time, impaired attention, and impaired tracking ability (Ramaekers, Berghaus, van Laar, & OH., 2004; Solowij, 1998). As a result of the impaired motor coordination, investigations have demonstrated an increased risk of motor vehicle accidents. In Colorado, where marijuana was legalized in 2014, the number of motor vehicle accidents in which marijuana use is implicated increased by 100% at the same time that motor vehicle accidents due to alcohol decreased (Salomonsen-Sautel, Min, Sakai, Thurstone, & Hopfer, 2014).

As a result of this data, drugged driving laws have begun to be enacted in a number of states, though uncertainty remains regarding at what level of THC a driver should be considered intoxicated. In Colorado, the current level deemed to be legal proof of intoxication is a blood level of 5 ng per milliliter, which is at the higher end of the levels deemed to produce substantial driving impairment (Hartman & Huestis, 2013).

Another vexing issue regarding regulation of drugged driving is the fact that the metabolism of cannabis is not as straight forward as it is for alcohol. Because cannabis is stored in fat cells, an individual may have detectable levels of THC in their urine for up to two weeks (particularly with chronic use) even if s/he has not used cannabis products in the past week. As a result, patients who test positive on a urine test for THC (at any level) may not have ingested it recently, and the effects of long-term use on driving ability are less clear due to the development of some tolerance.

New methods are currently under development to be able to distinguish acute ingestion from chronic use using saliva samples but these methods are not yet available for widespread use and have not been adequately validated for use as a “drugged driving” test in the same way that we currently utilize a breathalyzer for alcohol intoxication (Lee et al., 2013). It is for this reason that in states where cannabis is now legal, it has been challenging to mitigate the effects of drugged driving. It is also not clear whether there is a differential effect on younger drivers than on more experienced drivers. Further research into the public health risks of cannabis drugged driving is necessary before widespread legalization ensues.

**NEUROPSYCHOLOGICAL DECLINE—**The effects of chronic marijuana use appear to depend on quantity (dose), frequency, duration, and age-of-onset of cannabis use. Importantly, studies show that earlier age of regular cannabis use onset (CUO) is associated with more severe cognitive consequences; for example, individuals with an adolescent CUO (before age 15-18 depending on the study) were more likely to demonstrate cognitive problems, including lowered IQ, poorer attention, verbal memory, visual search, verbal fluency, and executive function and greater abnormalities in brain function and structure.

This is thought to be due to disruption of healthy neurodevelopment of gray and white matter, which continues into the mid-20s. For example, one recent longitudinal study following youth from age 13 to 38 found that use of cannabis on a regular basis before the age of 18 predicted significant long-term cognitive deficits that do not appear to completely reverse even when use stops in adulthood (Meier et al., 2012). These changes included a significant decline in IQ, as well as reductions in the domains of executive function, memory, and processing speed (Meier et al., 2012).

Cross-sectional studies in adolescent and emerging adult cannabis users (ages 15-25) have demonstrated cognitive deficits (generally small to medium in size) in complex attention, verbal memory, working memory, processing speed, and executive functioning compared to healthy non-using youth. With few exceptions, studies have reported brain structural abnormalities in regular cannabis-using youth in areas that underlie executive function, memory, emotional control, reward processing, and psychomotor speed. For example, in a recent study published in *The Journal of Neuroscience*, regular cannabis use in young adults was quantitatively associated with abnormalities in the brain. Specifically in structures (nucleus accumbens and amygdala) involved in the development of addiction, as well as areas integral in decision making, emotional regulation, and executive functioning (Gilman et al., 2014).

Other studies have also shown that cannabis use may affect the integrity of the white matter fiber tracts in the prefrontal region of the brain (the white matter is where the nervous system houses the “wires” that connect one nerve cell to others and allows them to communicate) (Gruber & Yurgelun-Todd, 2005). One study found reduced white matter quality in areas that connect the prefrontal cortex to the limbic regions, and this reduced white matter integrity was linked with increased depressive and apathy symptoms in young adult marijuana users (Shollenbarger, Price, Wieser, & Lisdahl, 2015). These neuroanatomical and neurocognitive abnormalities may account to some extent to study findings that link heavy marijuana use with lower income, greater need for socioeconomic assistance, unemployment, and lower satisfaction with life (Fergusson & Boden, 2008; Brook, Lee, Finch, Seltzer, & Brook, 2013). These studies also highlight the critical need to prevent regular marijuana exposure (especially high potency THC) in adolescents and young adults (ages 13-25).

**ADDICTION POTENTIAL—**The risk of addiction to cannabis depends on the same factors as the effects on neurocognitive side effects and includes quantity (dose), frequency, duration, age-of-onset of cannabis use, but also relies on host genetic factors that include susceptibility to addiction (e.g., family history of substance use). Despite a widespread belief by the public that cannabis is not addictive, scientific data clearly demonstrates that 9% of the general population will develop addiction to cannabis (Volkow, Baler, Compton, & Weiss, 2014). The risk of addiction is greatest for individuals who first use cannabis as teenagers (up to 16%) and for those individuals who use marijuana on a daily basis (as high as 50%), (Hall & Degenhardt, 2009). Investigators have even described a very distinct cannabis withdrawal syndrome, lending further support to the development of physical dependence, one of the diagnostic criteria for substance use disorders (Gorelick et al., 2012). Withdrawal can make it difficult for an individual using cannabis to cease use. Data also point to an up to four-fold increase in symptoms of cannabis dependence within two years in individuals who begin use of cannabis in adolescence (Chen, Storr, & Anthony, 2009).

**CANNABIS WITHDRAWAL SYNDROME—**As noted previously, chronic, daily cannabis use creates neurophysiological dependence to exogenous cannabinoids. As a result of this physical dependence, individuals who are physically dependent on cannabis will experience unpleasant symptoms with discontinuation—symptoms that have been described in the past 10 years as the Cannabis Withdrawal Syndrome (CWS) (Gorelick et al., 2012). The most common symptoms of CWS include irritability, anger, or aggression; nervousness or anxiety; insomnia; decreased appetite or weight loss; restlessness;

depressed mood; and physical symptoms causing significant discomfort (stomach pains, shakiness/tremors, sweating, fevers, chills, or headache). In a study in 2011, investigators validated symptoms to develop a cannabis withdrawal scale for use in clinical practice (Allsop, Norberg, Copeland, Fu, & Budney, 2011). Unlike alcohol or sedative withdrawal, cannabis withdrawal is not fatal, but if not identified and treated early, it will lead to relapse in a large proportion of dependent cannabis users. As a result, in recent years, a number of studies have been and continue to be performed to discover safe and effective treatment options for CWS.

To date, the most effective treatments for CWS include gabapentin, an anti-epileptic drug, and dronabinol (synthetic THC) (Mason et al., 2012; Vandrey et al., 2013; Levin et al., 2011). Further research is necessary to determine if other medications are effective at reducing the signs and symptoms of cannabis withdrawal and to what extent these early interventions also assist with maintenance of sobriety from cannabis long term.

## Opportunities for Future Research

### Optimal Route of Administration

Cannabinoids can be introduced into the body via a number of different routes. From the standpoint of recreational use, however, the most common methods of administration include smoked and vaporized cannabis. Given that smoked cannabis has the potential to produce significant additional risks to an individual's health, including an increased risk of lung cancer, cardiovascular disease, chronic lung inflammation; and immunological changes in the lungs that predispose a user to develop pneumonia. **It is clear from the research that smoking cannabis is not the optimal route of administration to achieve the beneficial effects of cannabinoids with the least amount of risk**.

Oral cannabinoid preparations appear to be safe and effective, though the optimal dose and composition of these products still needs to be determined through clinical research. Sublingual administration appears to be well tolerated and safe, though only a single formulation is currently available for use through this route of administration (Sativex®). Additional research into the safety and efficacy of vaporized cannabinoid preparations (including specific vaporizers), oral preparations, additional sublingual preparations, and possible transdermal preparations needs to be undertaken.

### Appropriate Cannabinoid Doses for Specific Indications

As noted in the previous sections, cannabinoids have therapeutic potential but also carry a risk of adverse effects, all of which appear to increase in a dose-dependent fashion (Di Forte et al., 2014; Ramaekers, Berghaus, van Laar, & OH., 2004). **Recent evidence from different trials suggests that the beneficial effects of cannabinoids may occur at lower doses, thus sparing individuals the adverse effects associated with higher doses** (Wilsey et al., 2013; Roitman, Mechoulam, Cooper-Kazaz, & Shalev, 2014; Blake, Robson, Ho, Jubb, & McCabe, 2006; Cooper, Comer, & Haney, 2013). Even so, the optimal dose for treatment of specific conditions has not clearly been defined and will likely depend on the cannabinoid pharmaceutical being investigated. As the data regarding synthetic cannabinoids, which are as much as 200 times more potent than THC, is now beginning to reveal, **more is not necessarily better with cannabinoid pharmaceuticals.**

### Appropriate Ratio of THC/CBD for Extract Preparations for Specific Indications

In addition to dose, the composition of cannabinoids in a specific cannabinoid preparation must also be clearly described and understood, both in terms of efficacy and adverse effects. For example, investigators have described an "entourage effect," whereby the interaction of different cannabinoid molecules produces a more robust effect with lower side effects than an individual cannabinoid

pharmaceutical would on its own (Russo, 2011). At this point, however, the only study that has specifically tested this hypothesis has not demonstrated a benefit to whole marijuana over dronabinol (synthetic THC) for relief of experimental pain (Cooper, Comer, & Haney, 2013). It is clear, however, that CBD and THC differentially impact psychopathology symptoms and affective processing. CBD modulates the neuropsychiatric effects of THC and may allow for higher dosing of THC in combination than would be tolerated without the addition of CBD. **The exact ratio of THC: CBD for specific diseases, however, has not been clearly elucidated and the only standardized pharmaceutical containing a mixture of both cannabinoids is only available in a very stable 1:1 ratio (Sativex®)** (Potter, 2014).

It will be important to differentiate between high-THC containing cannabis and low-THC containing cannabis with respect to toxicity and adverse effects. Recent studies that demonstrate clear benefit from low concentrations of THC are in stark contrast to the ever-increasing concentrations of THC in currently available cannabis subspecies available in cannabis dispensaries in states where cannabis has been legalized (Wilsey et al., 2013; Roitman, Mechoulam, Cooper-Kazaz, & Shalev, 2014). In addition, while levels of THC are rising, levels of CBD, which has emerged as a potentially neuroprotective, antipsychotic and antianxiety agent, have remained low, between 0-1%. This is important because studies show that the dose and ratios of THC and CBD in marijuana predict neurocognition and risk for psychiatric disorders and psychiatric symptoms.

It will be important for policymakers to consider regulation of THC and/or CBD content of herbal cannabis rather than to regulate the plant itself. Given that the adverse effects of cannabinoids appear to be dose-dependent, regulating the concentration of these chemicals in cannabis only seems logical. Again, further research is necessary to determine what the ideal THC:CBD ratio is for both medicinal purposes, and to reduce the potential public health impact of legal marijuana.

### Age-Related Concerns (Effects on Neurocognitive Development)

**As is the case with most chemicals that produce neuropsychiatric effects, including tobacco products and alcohol, the adverse effects of cannabinoids on the developing brain of children and adolescents has now been well described in numerous studies** (Brook, Lee, Finch, Seltzer, & Brook, 2013; Chadwick, Miller, & Hurd, 2013; Fergusson & Boden, 2008; Carroll, 2015). These chemicals produce a differential side effect profile depending on age of first use with younger individuals at higher risk to develop worse and more permanent adverse effects. **The adverse effects of cannabinoids in children, adolescents, and young adults is now well described and includes neuropsychological decline,** (Meier et al., 2012) **an increased incidence of addiction to cannabinoid pharmaceuticals, and an increased risk of psychiatric disorders (including psychotic disorders and depression) (Chadwick, Miller, & Hurd, 2013; Patton, et al., 2002).** As a result, and similar to alcohol and tobacco products, cannabis and cannabinoids should not be permitted to be marketed, sold, or used by individuals younger than 21 years of age except as approved for use for specific indications by the Food and Drug Administration (FDA) after rigorous investigation through the FDA drug approval process and the long-term effects of in-utero exposure to cannabinoids still require significant investigative efforts.

## Cannabinoid Research Recommendations

**Recommendation 1: Cannabis, cannabinoid pharmaceuticals and cannabis/cannabinoid delivery systems should be subject to the same rigorous standards for approval that are applicable to other prescription medications and medical devices and should not be available for use by patients until such a time as they have been approved by the Food and Drug Administration (FDA).**

**Recommendation 2: The state and federal government should encourage and promote further research and development focused on the study of specific pharmaceutical-grade cannabinoid compounds and preparations (including whole plant preparations) for various clinical applications.**

After clinical trial studies are conducted to determine the benefits and long-term side effects of marijuana use on health, laws should only be considered that:

- Are limited in scope to individuals with identified conditions shown through research to benefit from the medicinal properties of marijuana plant extracts.
- Provide clear guidelines for dosing amounts.
- Provide consistent quality control testing of the cannabinoid dosing and additives.
- Identify restrictions on packaging and distribution that are equivalent to any other prescribed medication.

**Recommendation 3: Smoked cannabis is not a safe delivery system for cannabinoids, and should not be legalized in any form since it appears to have similar clinical efficacy via inhalation (vaporized route), sublingual, and oral routes which are safer, and that may have decreased abuse potential.**

**Recommendation 4: Non-pharmaceutical grade oral formulations ("edibles") and oral formulations are not approved by the FDA and should not be permitted. There is significant variability in dosing between samples, inconsistent distribution of cannabinoids and there are current FDA-approved oral cannabinoids by prescription, in the form of Dronabinol (Marinol®) and Nabilone (Cesament®).**

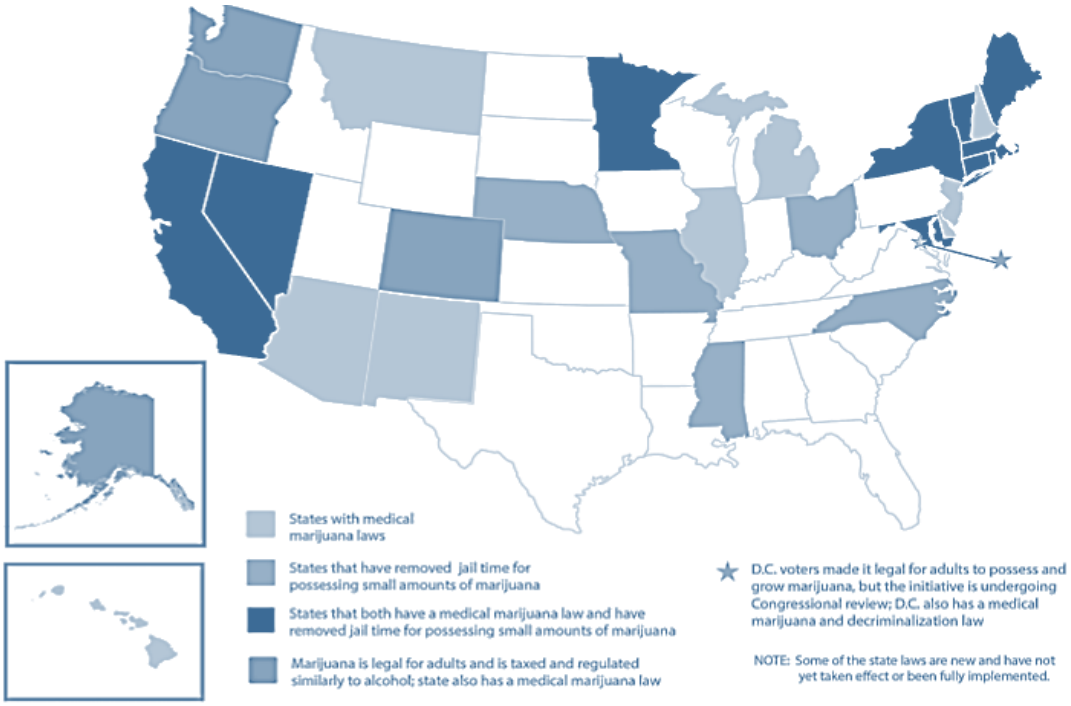
**Recommendation 5: Cannabis and cannabis extract(s) for use in individuals younger than age 21 should not be legalized in any form unless specifically FDA approved. A growing body of evidence links early cannabis exposure with neurobiological brain abnormalities, an increased risk of addiction, potential to be a gateway drug leading to other drug abuse, permanent neurocognitive decline, lower school performance, and compromised lifetime achievement.**

# Legalities and Regulations

## Introduction

Cannabis remains the most commonly used illicit drug today, particularly among youth (SAMHSA, 2014). As of 2015, roughly 23 states and the District of Columbia passed laws allowing the use of medical marijuana. Four states, Colorado, Washington, Alaska and Oregon, have also legalized marijuana use by individuals 21 and older (Marijuana Policy Project, 2015; see Figure 5). Historical drug policy perspectives suggest that as pro-marijuana legislation shifts occur, use in youth may also increase (Joffe & Yancy, 2004). Examining the impact of policy on cannabis use in adolescents and emerging adults remains a crucial focus in public health research today. The mean age of initiated cannabis use in 2013 was approximately 18 years old (SAMHSA, 2014) and younger initiates may be more likely to use other illicit drugs (Haug, Nunez, Becker, Gmel, & Schaub, 2014) and suffer greater neurocognitive consequences (Lisdahl, Gilbert, Wright, & Shollenbarger, 2013).

**Figure 5: US Marijuana Policy Map, 2015**




Source: Marijuana Policy Project, 2015.

This section describes three primary policy categories addressing personal use of marijuana: prohibition, legalization and decriminalization and summarizes available research on the impact of these policies on important public health outcomes. Recommendations are provided from a *public health perspective,* which legislators are urged to consider when reviewing marijuana policy in Wisconsin.

## Prohibition

**Definition:** Prohibition legally restricts the manufacturing/cultivation, sale, and possession of marijuana. Prohibition laws vary by state.

**Current Marijuana Laws in Wisconsin:**

**Possession:** First offense possession of any amount of marijuana is a misdemeanor punishable by a fine of up to $1,000 and/or imprisonment of up to 6 months. For subsequent offenses possession of any amount of marijuana is a class I felony and is punishable by a fine of up to $10,000 and/or imprisonment for up to 3.5 years, per Wis. Stat. §§ 939.50(3)(i) and § 961.14(3g)(em). Wisconsin Stat. § 961.475—Treatment option: Whenever any person pleads guilty to or is found guilty of possession or attempted possession of a controlled substance or controlled substance analog under § 961.41 3g), the court may, upon request of the person and with the consent of a treatment facility with special inpatient or outpatient programs for the treatment of drug dependent persons, allow the person to enter the treatment programs voluntarily for purposes of treatment and rehabilitation. Treatment shall be for the period the treatment facility feels is necessary and required, but shall not exceed the maximum sentence allowable unless the person consents to the continued treatment. At the end of the necessary and required treatment, with the consent of the court, the person may be released from sentence. If treatment efforts are ineffective or the person ceases to cooperate with treatment rehabilitation efforts, the person may be remanded to the court for completion of sentencing. **(https://docs.legis.wisconsin.gov/statutes/statutes/961/IV/475)**

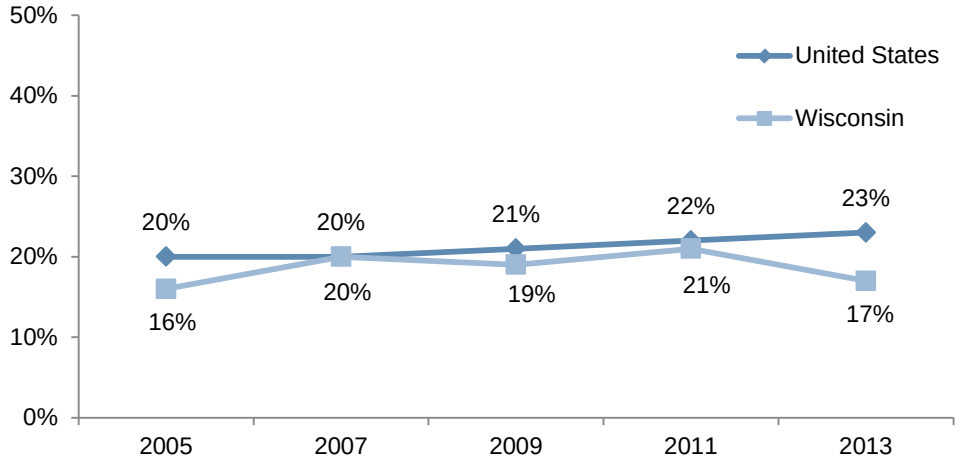
**Sale/Delivery/Cultivation:** Under Wisconsin law possession with the intent to distribute is the same as distribution. Distribution of 200 grams or less of marijuana is a class I felony and is punishable by a fine of up to $10,000 and/or imprisonment for up to 3.5 years. Distribution of 200-1,000 grams of marijuana or cultivation of 4-20 plants is a class H felony and is punishable by a fine up to $10,000 and/or up to 6 years of imprisonment. Distribution of 1,000-2,500 grams of marijuana or cultivation of 20-50 plants is a class G felony and is punishable by a fine up to $25,000 and/or up to 10 years of imprisonment. Distribution of 2,500-10,000 grams of marijuana or cultivation of 50-200 plants is a class F felony and is punishable by a fine up to $25,000 and/or up to 12.5 years of imprisonment. Distribution of over 10,000 grams of marijuana or cultivation of over 200 plants is a class E felony and is punishable by a fine up to $50,000 and/or up to 15 years of imprisonment, per Wis. Stat. §§ 961.14(1)(h) and 939.50(3)(e-i)). Subsequent offenders are subject to increased penalties ranging from up to 7.5 years of imprisonment for class I felony to up to 19 years of imprisonment for a class E felony, per Wis. Stat. § 961.48).

Current Wisconsin state marijuana policy is considered prohibition. For example, the first offense of possession of marijuana (any amount) is a misdemeanor punishable by a fine up to $1,000 or imprisonment of up to 6 months. Subsequent offenses are considered a felony (see box to the left for more details). However, some municipalities have passed ordinances that provide alternative consequences. For example, in 1997 the city of Milwaukee passed an ordinance that allows first-time offenders that possess 25 grams of marijuana or less to receive the equivalent of a municipal ticket. For second and subsequent offenses involving 25 grams or less, they are charged with a criminal offense under state law (misdemeanor or felony depending on previous record) (Public Policy Forum, 2015).

## Current Youth Use Rates

Current (past 30 day) use of marijuana in Wisconsin youth (17%) continues to be lower than or similar to national rates (23%) (WDHS, 2014; see Figure 6). Nationwide, daily use of marijuana in adolescents increased during the mid to late 90s, stabilized, then climbed again from 2009-2011 and have been relatively stable since then (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2015). Youth perceptions of risk have been decreasing since 1990, reaching levels measured in the 70s (Johnston et al., 2015). However, as discussed in the sections below, additional research is needed to differentiate how specific policies (e.g., prohibition, legalization, and decriminalization of marijuana) impact youth rates.

**Figure 6: Current Marijuana Use among High School Students, Wisconsin and United States, 2005-2013**




Source: Wisconsin Department of Health Services, Division of Public Health and Division of Mental Health and Substance Services, 2014.

### Wisconsin Rates of Incarceration for Marijuana (THC) Possession

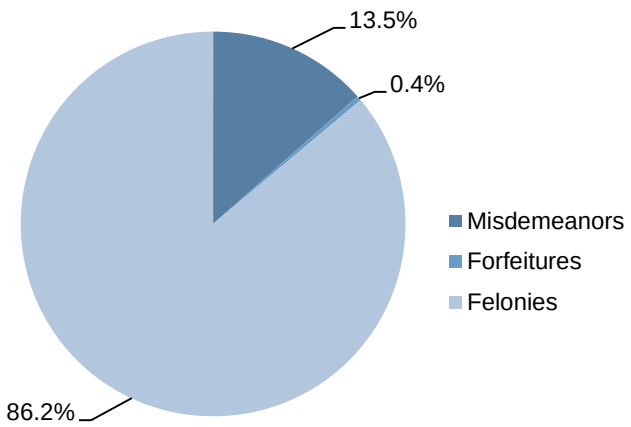
Currently, there is broad discretion within the justice system at all levels to enforce possession of marijuana offenses. For example, in Wisconsin the first offense of possession of marijuana (any amount) is a misdemeanor punishable by a fine up to $1,000 or imprisonment of up to 6 months. Subsequent possession offenses see an increase in potential fines of up to $10,000 and/or imprisonment for up to 3.5 years. Sentencing is discretionary for possession and covers a wide range of punishments for the same offense making current, accurate data on incarceration for possession of marijuana offenses in Wisconsin difficult to obtain. Therefore, a more detailed and accurate tracking system to properly codify criminal and civil legal consequences for possession of marijuana (and all drugs) within the Consolidated Court Automation Programs (CCAP) database is needed. Specifically, CCAP should include a comparison of the time sentenced to the actual amount of time served in jail.

Despite these limitations, for the current report, the committee conducted a preliminary review of the CCAP data for calendar year 2013, which revealed that 6,715 people were charged with possession of THC (marijuana) in Wisconsin. Of those, 1,406 were sentenced to jail (23%). However, a closer review of the data revealed 46% of those sentences were either imposed and stayed, or mediated through some other form of judicial discretion that did not involve confinement in jail. Further, in 2013, 4,394 cases were entered in CCAP in which possession of THC was either the only, or the most serious, charge. Of those, 999 (22%) were sentenced to jail. Of those, 41% were either imposed and stayed or mediated through some other form of judicial discretion that did not involve confinement in jail. In either case, if an initial jail sentence was issued, the average sentence was 71 days. Individuals with little or no previous criminal history were rarely sentenced to jail for first possession of marijuana.

Recently, the Public Policy Forum (2015) closely examined convictions and sentencing in Milwaukee County from 2012-2015. Their analysis revealed that in Milwaukee, the impact of current marijuana policy might primarily impact repeat offenders. For example, between the years of 2012 and 2015, of the 4,554 total marijuana possession cases where the defendant was found guilty, only 11 individuals received a jail sentence; among those, only 8 served any jail time (Public Policy Forum, 2015). Of note for future policymakers, the majority of those who received fines did not pay them (14% made partial payments,

28% paid in full, and 58% made no payments), possibly suggesting fines represent too great of an economic burden. In contrast, 86% of second and subsequent marijuana-only possession offenses resulted in a felony charge (Public Policy Forum, 2015; see Figure 7). The majority of these felony convictions resulted in jail time (265 of 275 defendants, with 9 additional individuals sentenced to time in a Wisconsin state prison) (Public Policy Forum, 2015). Therefore, second and subsequent offenses are costly and typically result in jail time, at least in Milwaukee County.

**Figure 7: Second Offense Marijuana Possession Charges, Milwaukee County, 2012-2015**




Source: Public Policy Forum, 2015.

## Racial Disparities

The range of penalties and discretionary sentencing currently allowed under Wisconsin law may contribute to racial and socioeconomic disparities. Indeed, one major criticism of prohibition is it has disproportionately impacted ethnic minorities, especially African American males (Golub, Johnson, & Dunlap, 2007; ACLU, 2013; Pawasarat & Quinn, 2013). In Wisconsin, African Americans were 5.98 times more likely than Caucasians to be arrested for marijuana possession; the disparity was highest in Brown (7.6x) and Rock counties (6.6x) (ACLU, 2013). Wisconsin demonstrates the fifth highest racial disparity in marijuana arrests in the country and this disparity has increased 153% during the years 2001-2010 (ACLU, 2013). In Milwaukee, African Americans make up 26% of the population and account for 86% of all those found guilty of a second or subsequent marijuana possession offense in 2013-2014 (Public Policy Forum, 2015).

The Wisconsin Youth Risk Behavior Surveillance System (WI YRBS) found that marijuana continues to be the illicit drug most frequently used by high school students. Among high school students, current marijuana use was highest among African American, American Indian and multiracial students. In 2011 and 2013, African American teens in Wisconsin were twice as likely to use marijuana in high school compared to Caucasians (34% vs. 17%) (Wisconsin DHS, 2014). Teen use rates have not been correlated with nor do they explain the racial disparity in arrest and sentencing rates in Wisconsin. However, teen usage rates clearly demonstrate the need for culturally competent prevention and intervention efforts that recognize and address the higher usage rates by youth of color in Wisconsin.

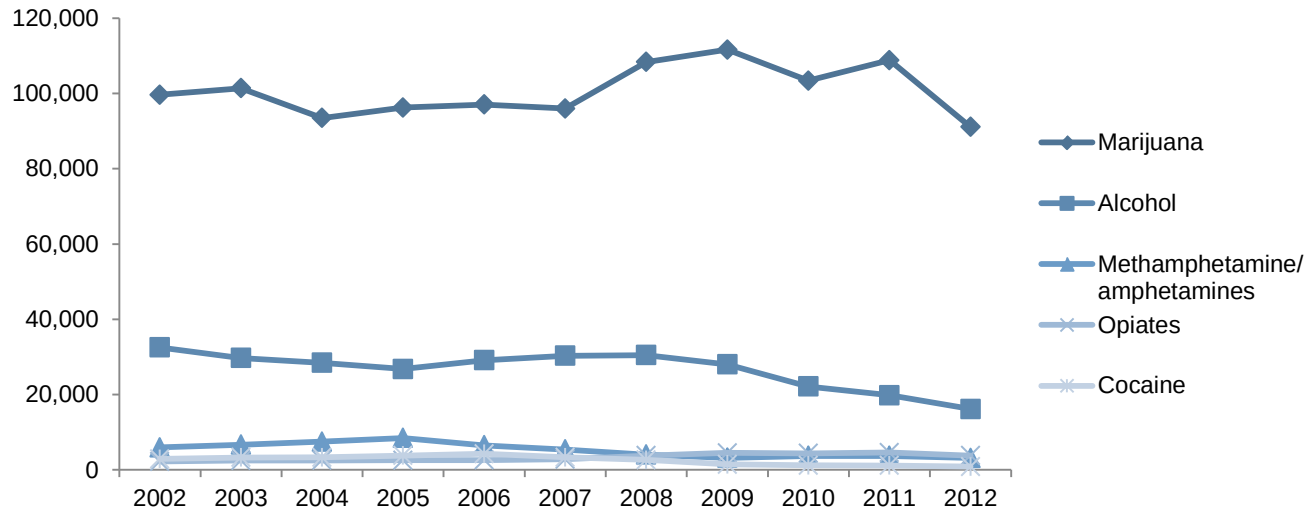
### Incarceration Effects

A drug charge on your record can impact eligibility for public housing, student financial aid, employment opportunities, child custody determinations, professional license eligibility, federal grants, and immigration status. Further, research has revealed numerous negative effects of incarceration on both individuals and families, including health decline, poverty, unemployment, poor child adjustment, and damaged family relationships (e.g., Arditti, 2012; Geller, Garfinkel, Cooper, & Mincy, 2008; Murray & Farrington, 2008; McLoyd, 1998; Phillips, Erkanli, Keeler, Costello, & Angold, 2006). Parental incarceration is often considered an *adverse childhood experience* (see Appendix E) that can cause repeated stressors and increased childhood trauma symptoms (Nagin & Snodgrass, 2013).

### Treatment Admissions through the Criminal Justice System

Although specific data in Wisconsin was not determined, national trends demonstrate that the most prevalent, primary drug of choice for adolescents admitted to treatment is marijuana (SAMSHA TEDS, 2013; Figure 8). One argument for prohibition is involvement in the criminal justice system can be a pathway into treatment for those who refuse voluntary admission. If marijuana policy is reformed in Wisconsin, the current methods for accessing substance use treatment services through the criminal justice system needs to be replaced with one that will screen youth and adults for cannabis use disorders and refer them to appropriate levels of treatment.

**Figure 8: National Treatment Admissions Aged 12 to 17, by Primary Substance of Abuse, 2002-2012 (number)**




Source: SAMHSA TEDS, 2013.

### Drug and Diversion Courts

In 2005, Wisconsin passed Act 25, which grants counties the ability "to establish and operate programs, including suspended and deferred prosecution programs and programs based on principles of restorative justice, that provide alternatives to prosecution and incarceration for criminal offenders who abuse alcohol or other drugs." This led to the creation of the Treatment Alternatives and Diversion (TAD) Program, whose goal is to "promote public safety, reduce prison and jail populations, reduce prosecution and incarceration costs, reduce recidivism, and improve the welfare of participants' families...." There are seven TAD project sites across Wisconsin (including Burnett, Washburn, Rock, Wood, Dane, Milwaukee and Washington counties) that utilize Drug Court, diversion, bail diversion, and pre-trial diversion

programs. Each model includes case management, substance abuse treatment, drug testing, and monitoring, but there is variation in the program models across sites.

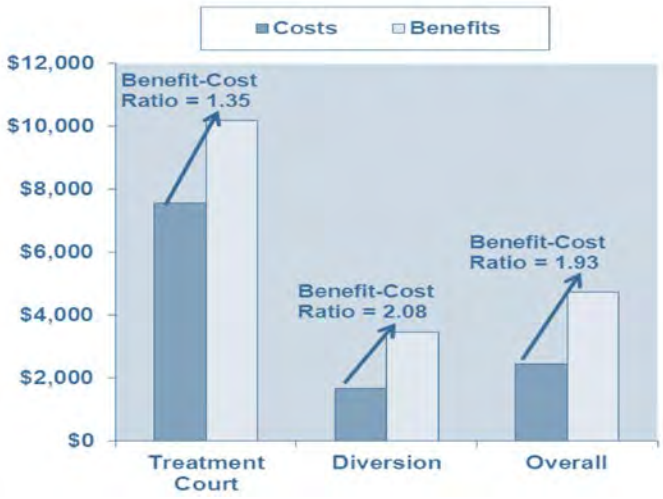
Analysis of the TAD programs in 2011 (Van Stelle, KT, Goodrich, J., & Paltzer, J, 2011) revealed that between 2007-2010, 2,061 individuals were admitted to TAD (half were between the ages of 17-25). The majority of the TAD admissions were white (57%), followed by African-American (35%). Nearly half (42%) had marijuana as their drug of choice, followed by alcohol (26%). Thirty-seven percent of admitted individuals met criteria for cannabis dependence.

Arrests, sentencing, and incarceration cause an economic burden to the state. According to the Vera Institute of Justice (2012), estimated state incarceration costs are $104/day. This can rapidly add up to burdensome criminal justice expenditures. Indeed, the ACLU (2013) estimated that Wisconsin spent $44,366,056 enforcing marijuana possession laws in 2010.

Outcomes of the TAD program were largely positive. Of those admitted to a TAD project during this period, 64% successfully completed the program. TAD completers (35%) were more likely than terminators (10%) to obtain employment while in TAD. Completers of a TAD program were also significantly more likely than terminators to have their charges dismissed (47 vs. 1%) or reduced (40 vs. 1%), or to complete TAD treatment as an alternative to revocation or probation/parole supervision (6 vs. 1%). Across sites, an estimated 86,530 jail days and 45,588 prison days were averted through TAD as of December 2010 (1,853 individuals).

Further, TAD programs reduced recidivism, with 19% of graduates compared to 33% of terminators being convicted of a new offense. Cost-benefits analysis revealed that for every $1 invested in TAD yields benefits of $1.93 to the criminal justice system through averted incarceration and reduced crime; TAD treatment courts yield benefits of $1.35 for every $1.00 invested; TAD diversion projects yield benefits of $2.08 for every $1.00 invested (Van Stelle et al., 2011, pg. 39; see Figure 9). It is notable that these cost-savings do not include additional benefits of mental health treatment, improvements in housing, employment, or cost-savings for families that avoided incarceration. **A monte-carlo statistical simulation revealed that TAD programs will result in taxpayer cost savings 78% of the time**. In conclusion, TAD programs provide an excellent alternative for drug charges in Wisconsin, reducing recidivism, costs, increasing employment and job training, and improving access to drug, alcohol and mental health treatment. It is recommended that these programs are maintained and expanded throughout the state for our medium to high-risk offenders.

**Figure 9: Cost-benefit Analysis of TAD Programs, Wisconsin**




Source: Van Stelle et al., 2011.

## Legalization of Cannabinoids for Medicinal Purposes

Please see **Cannabinoid Research** section for thorough discussion regarding "medical marijuana" considerations.

## Marijuana Legalization

**Definition:** Legalization for the growing, distribution, sale, and possession of marijuana (with some limitations in amounts) for personal use.

### Impact on Youth Use

To date, only Uruguay has legalized marijuana for consumption and sale, and it is too soon to know the impact of that policy shift. In the Netherlands, marijuana can be bought in cannabis shops, which are subject to strict rules. One study to date found that youth that lived within close proximity (20 km) to a cannabis shop had significantly earlier age of marijuana use onset (Palali & Van Ours, 2014), which is associated with greater risk for dependence and neurocognitive deficits (see Lisdahl, Wright, Kirchner-Medina, Maple, & Schollenbarger, 2014, for review).

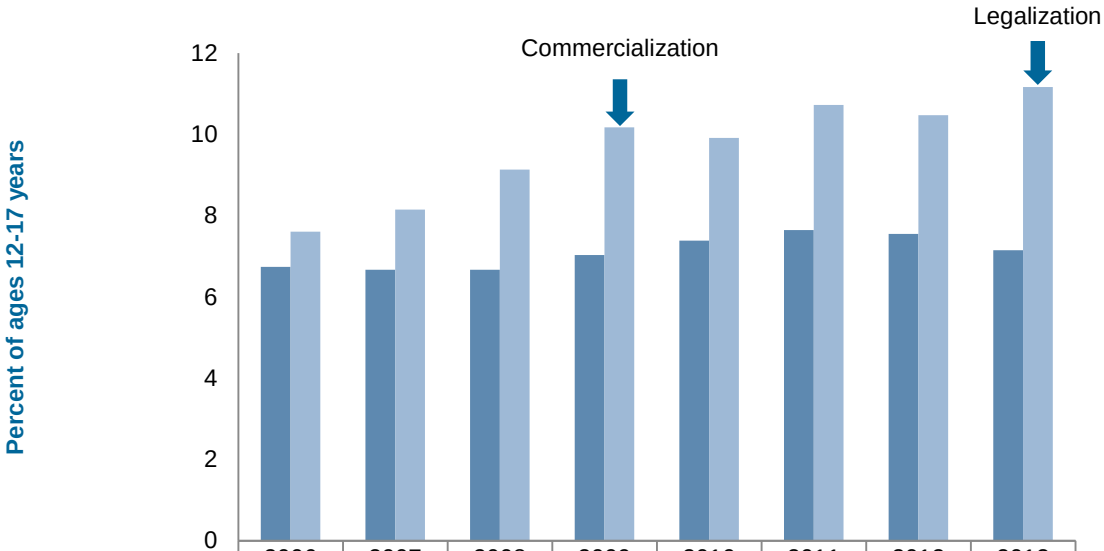
Of concern, in a study of 3,829 high school seniors throughout the United States, 10% of non-cannabis using students reported they intended to initiate use of marijuana if it becomes legal in their state. Further, 18% of lifetime users reported they would plan on increasing their use if marijuana was legal (Palamar, Ompad, & Petkova, 2014). **The authors of the study concluded that "prevalence of cannabis use is expected to increase if cannabis is legal to use and legally available" (Palamar et al., 2014).**

Others have warned that legalization could result in decreased prices (Kilmer 2014; Pacula et al., 2001; Williams, 2003), increased availability, reductions in perceived harm, and increased marketing aimed at youth (see Joffe & Yancy, 2004). For example, adolescents who report that marijuana is easy to obtain are 2.5 times more likely to use than those who report marijuana difficult to obtain (Kandel et al., 2001). Some argue marijuana is relatively safer than alcohol, and legalization would result in less alcohol use in youth. However, studies that incorporate the price of marijuana into models demonstrate that adolescents are more likely to increase both marijuana and alcohol use, and that these two drugs are economic complements (Hall & Pacula, 2003). Consistent with this theory, Colorado had a 4% increase in alcohol

sales from 2012-2014 following marijuana legalization (Rocky Mountain High Intensity Drug Trafficking Area (RMHIDTA), 2015).

Amendment 64 passed in Colorado in 2012, allowing use of marijuana for individuals 21 years of age or older. Colorado has been faced with numerous challenges following legalization, such as: regulatory concerns, addressing opposing federal laws, state law enforcement changes, defining public use, handling driving under the influence, regulating civilian growers, earmarking tax revenue toward local government establishments, and prevention efforts for those under age (Blake & Finlaw, 2014). While reasons for pro-legalization laws include protecting citizen rights, profit from taxing the product, and reducing black market distribution (Richter & Levy, 2014), legalization has had unintended consequences on the public's health. For example, the same year it legalized marijuana, high school seniors began to report significant reductions in perceived harmfulness of regular cannabis use (Johnston et al., 2014b). (Please note that the Monitoring the Future data collects limited statewide data; the full impact of marijuana legalization on youth usage will not be available until 2016). In a 2015 report, Colorado teen use (12-17-year-olds) was reportedly third in the nation (56% higher than the national average), and use rose 6.6% from 2013-2014 (RMHIDTA, 2015; see Figure 10). Further, the total number of suspensions almost doubled following both medical and recreational legalization between 2004-2014 (from 3.2% to 6.4% respectively) (RMHIDTA, 2015). Colorado ranks second in use rates in young adults (18-25), with 29.1 % of Colorado young adults using in the past month compared to the National average (18.9%) (SAMHSA, 2014). Some experts argue that these high rates have been established years ago and are not directly due to legalization; however, the full impact of this policy shift may not be available for a couple of years.

**Figure 10: Youth Past Month Marijuana Use, Colorado and United States, 2013-2014**




| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|
| National Average | 6.74 | 6.67 | 6.67 | 7.03 | 7.38 | 7.64 | 7.55 | 7.15 |
| Colorado Average | 7.6 | 8.15 | 9.13 | 10.17 | 9.91 | 10.72 | 10.47 | 11.16 |

Source: RMHIDTA, 2015.

From a public health perspective, even a small increase in adolescent marijuana use would result in a significant rise in new users (e.g., if an additional 1% of 15-19 year olds in the United States initiated marijuana use, there would be 190,000 new users [Joffe & Yancy, 2004]), 17% of whom (32,300) would

be at risk for developing a cannabis use disorder. Therefore, we need to closely examine the impact of this legalization on public health costs and youth substance use.

### Marijuana-Related Injuries

Three other areas of concern with legalization have been increased Emergency Room visits, especially pediatric admissions (RMHIDTA, 2015; Onders, Casavant, Spiller, Chounthirath, & Smith, in press), injuries caused by THC extraction lab explosions (RMHIDTA, 2015), and increased proportion of drivers in a fatal motor vehicle crashes who were marijuana positive (Salomonsen-Sautel, 2014). For example, Onders et al. (2015) found a 147.5% increase in marijuana exposure in children younger than 6 years old. In Colorado, the number of marijuana-related exposures rose from 4 per year in 2006-2008 to 38 in 2014 and calls to the Rocky Mountain Poison and Drug Center in 2014 increased 70% from 2013 (RMHIDTA, 2015). Assessment also found a 400% increase in THC infused edible exposures from 2013-2014 (RMHIDTA, 2015). In Colorado from 2013-2014, there were 48 injuries reported due to explosions in labs created to extract THC (RMHIDTA, 2015). In Denver, there was a 100% increase in driving under the influence of drugs (DUIDs) involving marijuana (RMHIDTA, 2015). The data provided does not include what percentage of these DUIDs exclusively involved marijuana or were in combination with alcohol.

**Important considerations for policymakers are to invest early in prevention, enforcement of drugged driving laws, marijuana research, and treatment with the goal of reducing the public health burden of marijuana in Wisconsin**. This also includes reducing risk factors for addiction, such as investing in poverty reduction, job training and education. Investment in research to examine how future policy changes impact youth and adult use, drugged driving, addiction rates, and treatment utilization will be critical. Finally, prior to considering marijuana legalization, it is recommended that Wisconsin commission an independent policy group of experts to research the economic and public health impacts related to marijuana prevention, addiction, mental health, economics, environment/agriculture, toxicology, and business impacts.

In conclusion, the committee agrees with the following statement: **"Colorado and Washington serve as experimental labs for the nation to determine the impact of legalizing marijuana. This is an important opportunity to gather and examine meaningful data and facts. Citizens and policymakers may want to delay any decisions on this important issue until there is sufficient and accurate data to make an informed decision" (RMHIDTA).**

## Depenalization

**Definition:** Depenalization is the removal of all criminal and civil penalties for marijuana use and possession. Under depenalization, there are no arrests, tickets, or other consequences as long as the possession complied with the existing regulation.

## Decriminalization

**Definition:** Decriminalization replaces all criminal penalties for marijuana possession with civil penalties; policies greatly vary across states (Pacula, Kilmer, Wagenaar, Chaloupka, & Caulkins, 2014).

In most cases, decriminalization makes possession of small amounts of marijuana a civil infraction with monetary fines placed on the individual (i.e., a ticket). In Massachusetts, adult possession of an ounce or less of marijuana for personal use carries a maximum civil penalty of $100 fine and forfeiture of the marijuana. Further, they require anyone under the age of 18 to complete a drug awareness program. In some states only the first offense is decriminalized—repeat offenses remain misdemeanors, which include possible jail time. In other states fines increase with multiple possession offenses or are handled in drug diversion programs. Under current Wisconsin law, second and subsequent possession charges are entirely at the discretion of the district attorney's office of the county in which the offense occurred.

Some areas of Wisconsin have depenalized marijuana possession. For example, in Madison, possession of up to 112 grams of marijuana in a private place is allowed without any penalties or consequences.

### Portugal Model Impact

In 2001, Portugal passed a comprehensive drug policy that included decriminalization of all drug use, acquisition and possession. If someone is caught in possession of any drug, they are issued a citation to appear before a municipal administrative committee (a three-person administrative body consisting of two medically qualified and one legal member) who decides the course of action based on the severity of the offense, type of drug used, and addiction severity. This legislation also funds public health programs for drug prevention, treatment, harm reduction, and social reintegration measures.

Review of the impact of the Portugal drug policy changes is challenging, and reports have come out on both extremes, calling it a "resounding success" or a "disastrous failure" (Hughes & Stevens, 2012). The Hughes & Stevens (2012) report shows that past year and past month drug use in youth aged 15-24 went down between the years 2001 and 2007. However, in adults aged 25-54, past year and past month drug use went up during the same period (7% in 25-34 year olds, 3% in 35-44 year olds, 1% in 45-54 year olds). Drug-attributable deaths (as measured by the Portugal National Statistics Institute) demonstrate a decrease from years 2001-2004, but then increased again from 2005-2008; still, levels in 2009 remained lower than pre-decriminalization levels. Experts attribute this reduction to increased access to drug treatment and harm reduction services (Hughes & Stevens, 2010).

Compared to other European and non-European countries, Portugal has low annual prevalence of marijuana and cocaine use, but higher levels of opiate use (EMCDDA, 2010). Still, compared to geographical neighbors Spain and Italy, Portugal is "similar or performing better for most indicators" and was "the only nation to exhibit declines in problematic drug use," although their declines in marijuana use specifically were less pronounced (Hughes & Stevens, 2010). A recent analysis (Goncalves, Lourenco, & Nogueira da Silva, 2015) reported that the Portuguese National Strategy for the Fight against Drugs policy has resulted in a significant, 18%, 11-year social cost reduction, due to both reduced legal system and health-related cost reductions.

In summary, the Portugal model has resulted in increased access to treatment and harm-reduction techniques, reduction in overall youth drug use (except marijuana), slight increases in adult drug use, and a slight reduction in drug-related deaths. **These changes, however, cannot be solely attributed to decriminalization because additional treatment, harm-reduction and welfare services were implemented at the same time.**

### Impact of Decriminalization on Youth

Nationally, individuals 24 and under make up over half of all marijuana possession arrests (ACLU, 2013). Research on the impact of decriminalization on youth marijuana use and other public health outcomes has been challenging due to vast variations in statutes and substantial discretion of both police and prosecutors in decision-making related to arrests and judicial processing. Of the 19 states that have decriminalized, 11 of them are from states within the Northeast or Western regions of the United States (NCSL, 2015), which had the greatest rates of adolescent marijuana use in recent years (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014a, 2014b).

Three states have decriminalized marijuana possession for all ages. For example, California decriminalized possession of less than one ounce (28.5 grams) of marijuana, which now carries a fine of $100 (possession on school campus remains a criminal offense). Data from California has demonstrated some potential benefits for youth associated with decriminalization. Following reform that changed marijuana possession from a felony to a misdemeanor in 2011, youth marijuana possession charges fell

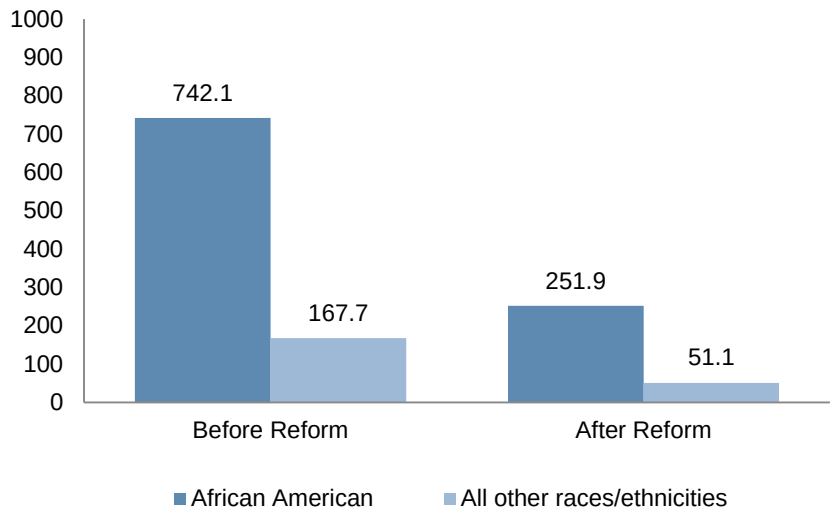
61% in one year (Males, 2012). Risk behavior in California analyzed by Males (2014) before and after reform noted most risk behaviors went down; including marijuana-related driving while intoxicated, drug overdose deaths, property crime arrests, and school dropout rate.

However, studies in other countries, such as Australia, have had mixed results, with some reporting no changes in use (Christie, 1991; Donnelly, Hall, & Christie, 1995; McGeorge and Aitken, 1997; Lenton, 2000), and others finding increased use with decriminalization (Cameron & Williams, 2001; Williams, 2003). For example, Williams & Bretteville-Jensen (2014) conducted a thorough analysis of the impact of liberalizing marijuana laws in Australia and found that youth demonstrate the highest increases in marijuana use, especially within five years following reform. In contrast, a recent national-level drug policy analysis conducted on European countries revealed that in countries where there was decriminalization of drug possession, the odds of past month drug use were 79% *lower*; the authors concluded that "*eliminating punishments for possession for personal use is not associated with higher drug use*" in these countries (Vuolo, 2013).

### Racial Disparities after Decriminalization and Legalization

One alarming finding of recent research into the impact of decriminalization and legalization on racial disparities in arrest rates for African-Americans has revealed that while overall arrests and court cases have dramatically decreased, these policy changes have not reduced the disparities as experts had hoped (Males, 2014). In four states that underwent reform (California, Colorado, Connecticut, and Massachusetts), overall rates of arrests have decreased, but African-Americans remain more likely to be arrested for marijuana-linked offenses (see Figure 11). Therefore, more research into the contributing factors or underlying causes of inconsistent marijuana arrest rates across races is warranted.

**Figure 11: Arrest rates (per 100,000) for African-Americans Versus All Other Ethnicities Before and After Marijuana Policy Reform in California, Colorado, Connecticut and Massachusetts**




Source: Males, 2014.
Note: "All other races/ethnicities" refers to people classified as any race or ethnicity besides "black" or "African American" including "White," "Hispanic," "Latino," "Other," "Asian," "Native," "Unknown," and "White/Hispanic." The four states with relevant post-reform data on all marijuana arrests/cases by race are California, Colorado, Massachusetts, and Connecticut. Rates are per 100,000 population by race, averaged for the four states. Sources: Criminal Justice Statistics Center (California) (2013); Colorado State Judicial Branch (2014); CJIS (2014).

In conclusion, although there are some inconsistencies in the literature, there is not strong evidence that decriminalization results in significant increases or decreases in youth use. Research also shows that marijuana decriminalization has not reduced racial disparities as expected. Continued research of these issues should be treated as a priority if Wisconsin considers reform of its marijuana laws and policies.

## Legalities and Regulations Recommendations

### Recommendation 6: Marijuana should not be legalized for personal, recreational use in the state of Wisconsin.

Based on the resulting increase in availability of marijuana and the documented poor behavioral, health, and neurocognitive impacts of this drug, legalization for general consumption of products containing any level of THC is not recommended. (The exception to this is the prescribed use of *FDA-approved* cannabinoid products for medicinal purposes.)

- In states and countries where marijuana has been legalized for general consumption, data shows either no change or an increase in the number of people using marijuana products. At best, decreased financial burden on the criminal justice system is offset by an increased burden on prevention, mental health, and treatment systems.
- According to both Colorado and Washington state data, black market cultivation and sales of marijuana have actually increased; requiring continued counter drug enforcement, resulting in minimal saving to taxpayers.
- Increased marijuana cultivation may have a negative agricultural and environmental impact in Wisconsin, although this requires more investigation.
- If Wisconsin legislature considers any alternative policies regarding marijuana outside of this recommendation, they need to consult marijuana/cannabinoid policy and science experts to ensure decisions minimally impact public health (e.g., see RANDs report commissioned by the state of Virginia in 2015).

### Recommendation 7: All employers should follow the United States Department of Labor's Drug-Free Workplace Act of 1988.

Appendix D highlights requirements of the Drug-Free Workplace Act.

- Marijuana use should be closely monitored for all employees in safety-sensitive positions, whether or not covered by federal drug testing.
- In all cases, a clear policy should be developed to guide decisions on how to evaluate for impairment due to marijuana use. Further, legal consultation during policy development is strongly advised to assure compliance with all state and federal regulations.
- Employers' rights to drug test and administer company policies regarding drug use should be preserved.

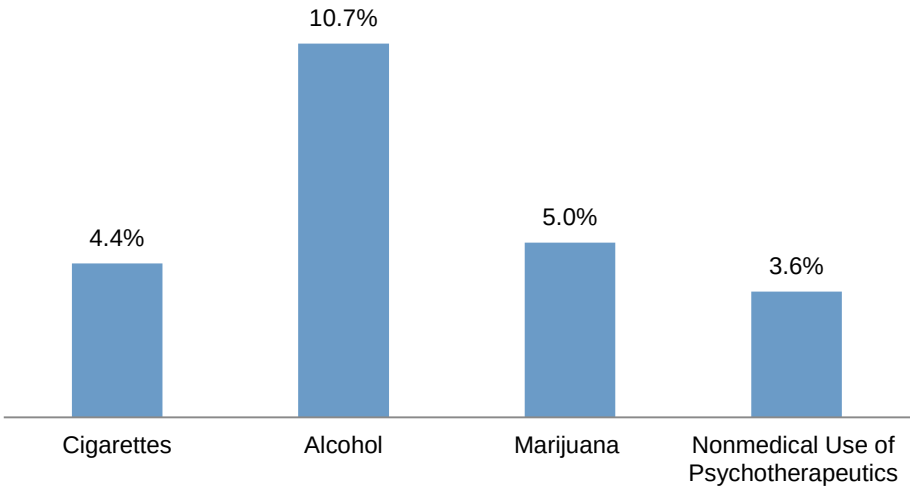
# Prevention

As demonstrated throughout this report, marijuana is not harmless. The previous sections of this report highlight the adverse effects that marijuana use can have on both mental and physical health. Despite this growing body of knowledge, marijuana continues to increase in popularity as both a mind-altering substance and an unapproved, unregulated "herbal" remedy. This section of the report focuses primarily on the need to prevent the initiation of marijuana use by adolescents. Targeting prevention efforts to this age group is critical for preventing the negative health and social outcomes experienced by adults who began using during their teen years.

## Preventing Teen Marijuana Use Must be a Priority

As shown in Figure 12, marijuana is the second most commonly initiated substance by teens in Wisconsin (SAMHSA, 2015). Looking exclusively at substance use disorders, it is estimated that approximately 9% of those older than 18 who experiment with marijuana will become addicted. This rate goes up to nearly 17% among those who begin using as teenagers, and between 25% and 50% for young people who develop a daily pattern of use (Volkow, Baler, Compton, & Weiss, 2014).

**Figure 12: Past-Year Initiation of Substance Use by Substance Among Adolescents Aged 12-17 in Wisconsin, 2009-2013**




Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2009-2013.
Note: Psychotherapeutics includes an array of drugs used to treat mental health conditions.

Research investigating marijuana's influence on mental health and cognitive abilities reinforces the need for targeted prevention efforts for children and adolescents. This is due primarily to the fact that the adolescent brain is undergoing important development that continues well into the mid-20s. Early onset of marijuana use, and continued use during the teen years can significantly increase a person's lifetime risk for mental illness and cognitive deficits (Renard, Krebs, LaPen, & Jay, 2014). In fact, brain images taken from young, frequent marijuana users reveal structural and functional abnormalities in the brain critical to cognitive functions like memory, executive function, sustained attention, and psychomotor speed (Lisdahl et al., 2014).

**Research-based Risk and Protective Factors for Youth Marijuana Use**

Prevention programs should target those factors that increase or decrease an individual's vulnerability for marijuana use. These are known as risk and protective factors.

*Risk Factor*: a characteristic at the biological, psychological, family, community, or cultural level that precedes and is associated with a higher likelihood of problem outcomes (such as antisocial behavior, parental use or favorable community norms toward substance use.)

*Protective Factor*: a characteristic associated with a lower likelihood of problem outcomes or that reduces the negative impact of a risk factor on problem outcomes (such as youth perception of parental disapproval of marijuana use and neighborhood cohesion).

**Risk factors by social context**

Individual factors:
- Any of the following identified by grade 6 - conduct disorder, impulsivity, self-control problems, attention problems
- High sensation seeking and low harm avoidance temperament in middle school and high school
- Positive attitudes toward substance use, intention to use, low perception of harm
- Untreated mental illness
- Antisocial or aggressive behavior
- Early onset alcohol and/or tobacco use

Relationship factors:
- Having cannabis using friends
- Aggressive behavior
- Perceived parental attitudes toward drug use
- Parental use

Community Factors:
- Perceived availability of the drug
- Favorable community norms toward substance use

**Protective factors by social context**

Individual factors:
- Self-efficacy, refusal and resistance skills
- Emotional intelligence

Relationship factors:
- Youth perception of parental monitoring
- Youth perception of parental disapproval of marijuana use
- Parents and peers disapprove of marijuana use

Community Factors:
- Neighborhood cohesion and intergenerational networks

Source: SAMHSA's Center for the Application of Prevention Technologies

## *Progression from Marijuana to Other Substance Use*

Scientists have explored the influence of early marijuana use on the eventual use of other illicit drugs. While the term "gateway drug" has been controversial, research findings strongly suggest that adolescent marijuana use can contribute to increased curiosity and willingness to try other substances; marijuana use during adolescence may also sensitize the brain's reward-system and make one more likely to use other drugs. A recently published study of over 6,500 adults who started marijuana use before using any other drug found that nearly 45% progressed to other illicit drug use in their lives, a rate that is significantly higher than the general population (Secades-Villa, Garcia-Rodriguez, Jin, Wang, & Blanco, 2015; IJDP 2015). While the study did confirm marijuana's "gateway" effect, it also uncovered risk factors that predicted who was most vulnerable to making the transition to other drugs, a finding that the researchers hope will inform prevention and early intervention efforts. The presence of any of the following increased the likelihood that initiating substance use with marijuana would lead to other illicit drug use: mood disorder, anxiety disorder, conduct disorder, personality disorder, and family history of substance use disorder (Secades-Villa et al., 2015).

## *Other Vulnerable Populations*

Studies looking at the impact of toxic stress on the developing brain strongly suggest that children and adolescents who have experienced adverse childhood experiences are at increased risk for adopting unhealthy coping strategies including early initiation of marijuana use (Anda & Brown, 2010). Additional information on this relationship and adverse childhood experiences can be found in Appendix E.

In addition to individuals who experience adverse childhood experiences, individuals within other groups may also be at increased risk for experiencing the harmful effects of marijuana use. For the purpose of this report, vulnerable individuals are those who do not have access to evidence-based prevention services and/or are unable to make fully informed decisions for themselves. This vulnerability can result from developmental problems, personal incapacities, disadvantaged social status, inadequacy of

interpersonal networks and supports, degraded neighborhoods and environments, and the complex interactions of these factors throughout the lifespan (Mechani & Tanner, 2007).

## Reducing Marijuana Use Through Evidence-based Prevention

Evidence-based prevention refers not only to those specific prevention activities that evaluation research has shown to be effective, evidence-based prevention also refers to a process.

An example of an evidence-based process for marijuana prevention is the Strategic Prevention Framework (SPF). The SPF is a five-step strategic process, grounded in public health and prevention research, designed to guide prevention planners in the selection, implementation, and evaluation of effective, culturally appropriate, and sustainable prevention activities. The effectiveness of this process begins with a clear understanding of community needs and depends on the involvement of community members in all stages of the planning process. Refer to **http://www.samhsa.gov/spf** for more information about the SPF process and evidence-based prevention.

Success in achieving measurable reductions in marijuana use will depend in large part on the capacity of communities and organizations throughout the state to address the problem locally, utilizing evidence-based prevention. Building and sustaining local capacity for marijuana prevention requires a statewide prevention infrastructure that can provide the needed technical assistance and support. The foundation for this infrastructure is already in place with the existence of the Alliance for Wisconsin Youth (AWY) and the growing number of certified Prevention Specialists throughout the state.

AWY, a program of the Wisconsin Department of Health Services is designed to build the capacity of its over 80 member coalitions in substance abuse prevention and youth development work. Through a network of five regional prevention centers, AWY member coalitions have access to, and share, information about evidence-based/emerging programs, practices and policies, as well as resources to develop and implement these strategies. Certified Prevention Specialists are professionals trained in evidence-based prevention and possess the knowledge and skills to assist coalitions and organizations in effectively addressing local marijuana concerns.

Given the impact of substance abuse on public health and safety, strengthening the state's prevention infrastructure must become a priority. Increasing the investment in the AWY and in opportunities to increase the certified Prevention Specialist workforce will provide communities and organizations with the capacity needed to reduce marijuana use, especially among our youth.

## Call to Action

Preventing the adverse effects of marijuana use on the health and safety of Wisconsin residents will require a comprehensive approach involving communities, schools, families, policymakers, businesses, healthcare, social service providers, and others who engage with youth and families.

### *Community Groups, Organization and Coalitions*

According to Hawkins, Shapiro and Fagan (2010), "When community stakeholders from diverse organizations and backgrounds come together to achieve clear and common goals, use scientific advances regarding what works to prevent problem behaviors, and monitor their activities for quality assurance, positive outcomes can be achieved." (p. 518-527)

### *Municipal Governments and Influential Leaders*

In addition to elected officials, county and municipal leaders are those charged with overseeing the provision of general government services. For example, police and fire chiefs, village and town administrators, directors of health and human services, public health, parks and recreation, planning

and zoning, and municipal and circuit court judges. Together with elected officials, these local leaders can be instrumental in fostering an environment that discourages marijuana use and supports healthy behaviors.

### *School Districts and Post-Secondary Education Providers*

A 2014 review of evidence-based, research-based and promising programs and policies conducted by the Washington State Institute for Public Policy showed that evidence-based prevention education and early intervention, properly delivered, reduces marijuana use among young people. In addition, 86% of the programs and policies reviewed provided benefits that exceeded costs (WSIPP, 2014).

### *Parents, Guardians, and Other Caring Adults*

Over 40 years of research on child and adolescent resiliency, and risk and protective factors points to positive relationships with parents, guardians, and other caring adults as being the *key* ingredient for positive youth development. These individuals can provide an important protective role as children are being bombarded with messages about marijuana use from their peers, and social and traditional media sources.

### *Businesses and Employers*

The effects of marijuana include: relaxation; euphoria; relaxed inhibitions; sense of well-being; disorientation; altered time and space perception; lack of concentration; impaired learning and memory; alterations in thought formation and expression; drowsiness; sedation; mood changes such as panic reactions and paranoia; and a more vivid sense of taste, sight, smell, and hearing. Stronger doses intensify reactions and may cause fluctuating emotions, flights of fragmentary thoughts with disturbed associations, a dulling of attention despite an illusion of heightened insight, image distortion, and psychosis (Couper & Logan, 2014). Given its effects on human performance, the potential consequences of marijuana use in the workplace include the risk and associated costs of accidents, injuries, and loss of productivity. Business leaders play an important role in taking a proactive stance to ensure the health and safety of their workforce.

### *State Lawmakers*

State lawmakers will play a critical role in determining the future course of marijuana regulation and control in Wisconsin. Wisconsin SCAODA established the Marijuana Ad hoc Committee, in part, to help inform future policies with a focus on promoting public health and safety. Additionally, this report seeks to provide policymakers at all levels, including state lawmakers, with up-to-date, accurate information about marijuana to help inform future decisions about marijuana regulation in the state.

### *Healthcare Professionals, Social Service Providers, and Other Youth-Serving Professionals*

Any individual that provides direct health and/or social services to young people and their families is in an ideal position as a helping professional to educate their patients and clients about the dangers of marijuana use. Professionals who work directly with patients or clients are also identifying those who are experiencing problems as a result of marijuana use and referring them to the appropriate helping resources in the community.

## Prevention Recommendations

The following recommendations are offered as actionable items to prevention-minded individuals within each of the sectors listed above. A list of online resources that may be helpful in implementing the following recommendations is provided in Appendix F.

### Recommendation 8 - Community groups, organizations and coalitions should implement evidence-based prevention strategies that address known risk and protective factors for marijuana use.

To ensure effectiveness in addressing local marijuana concerns, community groups, organizations and coalitions need to be guided by a data-driven, evidence-informed process such as Substance Abuse and Mental Health Services Administration's (SAMSHA's) Strategic Prevention Framework (SPF) or the National Association of County and City Health Officials' (NACCHO) Community Health Improvement Plan (CHIP). These plans guide the selection, implementation and evaluation of effective, culturally appropriate and sustainable prevention activities.

- In order to guide a school district's prevention planning and align it with that of broader community prevention efforts, schools should regularly assess student attitudes and behaviors around marijuana use and share their findings with coalitions and other community stakeholders that are working to address marijuana use.
  - School districts are strongly encouraged to institutionalize the administration of the Youth Risk Behavior Survey (YRBS) every other year to middle and high school students in order to continually assess student attitudes and behaviors around marijuana use and other risky behaviors.
  - Universities can implement surveys such as the Indiana College Substance Use Survey or the American College Health Association's National College Health Assessment (ACHA-NCHA), collecting data from their students in order to inform program and policy decisions.
- Utilize student survey results, relevant local data, and findings from organizational needs assessments to develop and implement a comprehensive strategy for evidence-based marijuana prevention.
  - Youth development and prevention experts within the community should partner with schools, coalitions, businesses, local government, and elected officials to identify ways to work together in addressing marijuana issues at the community level.
  - Universities should organize a campus-wide prevention coalition made up of representatives from each of the major academic, student life, and athletic departments, as well as key stakeholders from the broader community, to develop and implement a comprehensive strategy for evidence-based marijuana prevention.
- Recent research on 200 effective programs and practices found that 183 had benefits that outweighed their costs (Lee, Aos, & Pennucci, 2015). Wisconsin should substantially increase its investment in these evidence-based prevention and public health services at the state, community, coalition, and school levels.

### Recommendation 9 - Support coalitions as the vehicle through which communities will successfully prevent and reduce marijuana use.

- Connect with the Alliance for Wisconsin Youth (**http://www.allwisyouth.org/**) to learn more about how coalitions work and why they are effective in reducing substance abuse locally.
- If a formal partnership or coalition for prevention exists, meet with members to learn more about their work and ways the community can help the coalition sustain its efforts.
- In communities where a formal partnership for substance abuse prevention does not exist, municipal and civic leaders can advocate among their peers to rally support for the formation of a community coalition.

### Recommendation 10 - Work to foster an environment locally that empowers young people not to use marijuana.

- Strive to provide developmentally appropriate, evidence-informed, substance abuse prevention to all students every year beginning in kindergarten.
  - Carefully research programs to identify and select interventions that best fit the prevention needs identified through a strategic planning process.
  - Consult with a regional coordinator of the Wisconsin Safe and Healthy Schools Training and Technical Assistance Center and the director of the Regional Prevention Center of the Alliance for Wisconsin Youth for guidance in selecting prevention programs.
  - Provide students with services and opportunities to strengthen their resilience and enhance their social and emotional development. For example, institute afterschool programs that follow evidence-based practices to promote social and emotional development and educational support groups.
- Educators, administrators, student service professionals, and support staff (K-12) should be trained to identify and assist students who may be experiencing problems resulting from marijuana use.
  - Develop and implement policies and procedures for conducting early interventions within the school and for ensuring appropriate/effective communication with parents/community resources (UCLA, 2010).
  - Utilize a tool such as Screening, Brief Intervention and Referral to Treatment (SBIRT) to help students who may be experiencing problems resulting from marijuana or other substance use (**http://www.samhsa.gov/sbirt**).
- In research summarized by SAMHSA, key tools parents can use to help to protect their children against substance use include talking with them about the dangers of substance use, showing disapproval of such behavior, and staying involved in their day-to-day activities (SAMHSA, 2009).
  - Promote family-friendly, alcohol and tobacco-free community events to help promote the norm that fun can be had without substances.
  - Attend parenting classes, especially those that incorporate skills such as talking with youth about the risks of substance use, monitoring social media, setting limits, and negotiation of solutions.
  - Become knowledgeable about marijuana's impact on child and adolescent development, and learn to recognize the signs and symptoms of marijuana and other substance use, and know who to turn to if a child needs help.
  - Continually seek out credible, current, factual information about marijuana's impact on child and adolescent development (**www.drugabuse.gov/parents-educators** and **www.adai.washington.edu**).
  - Talk with physicians, counselors, and youth ministers to identify community resources.
- Similar to zoning restrictions that have been used to limit the exposure of young people to alcohol and tobacco marketing, municipalities should enact similar ordinances for advertising aimed at promoting and normalizing marijuana use.
    - Support positive youth development initiatives and efforts aimed at promoting safe and healthy neighborhoods.
- Major policies should be analyzed before adoption to identify their likely impact on public health and safety (Healthiest Wisconsin, 2020).

**Recommendation 11: Provide information to employers, and especially supervisors, regarding signs, symptoms, and consequences of marijuana use, as well as local resources for obtaining help for cannabis use disorders.**

- Implement evidence- or research-based worksite prevention training programs.
- Implement Employee Assistance Programs (EAPs) to provide confidential counseling and referrals to employees experiencing personal problems that are adversely impacting their job performance, health, or well-being.
- Disseminate information on substance use/misuse, local resources, and programs such as Alcoholics Anonymous, Narcotics Anonymous, Al-Anon and EAPs via worksite health fairs, staff meetings, etc.
- Institute recommendations provided by the American College of Occupational and Environmental Medicine and American Association of Occupational Health Nurses in *Marijuana in the Workplace: Guidance for Occupational Health Professionals and Employers*. This joint guidance statement can be accessed online at **http://journals.lww.com/joem/Fulltext/2015/04000/Marijuana_in_the_Workplace___Guidance_for.17.aspx**

**Recommendation 12: Make drugged driving prevention and enforcement a statewide priority.**

- Mandate drug recognition training, such as Advanced Roadside Impaired Driving Enforcement (ARIDE) for all law enforcement officers.
- Every county in the state should have at least one trained Drug Recognition Expert (DRE).
- As new technology is developed to accurately test for THC impairment, provide grants to local law enforcement agencies to assist in acquiring these new enforcement tools.

**Recommendation 13: Incorporate Screening, Brief Intervention and Referral to Treatment (SBIRT) as a tool for helping clients who may be experiencing problems resulting from marijuana or other substance use (http://www.samhsa.gov/sbirt).**

- Utilize scheduled appointments and meetings with patients and clients as opportunities to provide education about the adverse effects of marijuana use.
  - Make educational materials available in waiting rooms and lobbies.
  - Pregnant and breastfeeding clients should be strongly discouraged from using marijuana in any form to prevent any risk of THC compromising the brain development of their infant.

# Treatment and Recovery

## Background

The *Diagnostic and Statistical Manual of Mental Disorders, 5th ed.* states, "Cannabis use disorder and other cannabis-related disorders include problems that are associated with substances derived from the cannabis plant and chemically similar synthetic compounds." The most essential feature of a substance use disorder is a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues using the substance despite significant substance-related problems. An important characteristic of substance use disorders is an underlying change in brain circuits that may persist beyond detoxification (American Psychiatric Association, 2013).

**Cannabis Use Disorder Diagnostic Criteria – DSM-5**

A problematic pattern of cannabis use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:

1. Cannabis is often taken in larger amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful efforts to cut down or control cannabis use.
3. A great deal of time is spent in activities necessary to obtain cannabis, use cannabis, or recover from its effects.
4. Craving, or a strong desire or urge to use cannabis.
5. Recurrent cannabis use resulting in a failure to fulfill major role obligations at work, school, or home.
6. Continued cannabis use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of cannabis.
7. Important social, occupational, or recreational activities are given up or reduced because of cannabis use.
8. Recurrent cannabis use in situations in which it is physically hazardous.
9. Cannabis use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by cannabis.
10. Tolerance, as defined by either of the following:
    a. A need for markedly increased amounts of cannabis to achieve intoxication or desired effect.
    b. Markedly diminished effect with continued use of the same amount of cannabis.
11. Withdrawal, as manifested by either of the following:
    a. The characteristic withdrawal syndrome for cannabis (refer to Criteria A and B of the criteria set for cannabis withdrawal).
    b. Cannabis (or a closely related substance) is taken to relieve or avoid withdrawal symptoms.

Specify current severity:
305.20 Mild: Presence of 2-3 symptoms
304.30 Moderate: Presence of 4-5 symptoms
304.30 Severe: Presence of 6 or more symptoms

The DSM-5 recognizes that sudden cessation of daily or near daily cannabis use often results in the onset of a cannabis withdrawal syndrome. Cannabis withdrawal syndrome may not be as severe as other withdrawals, like alcohol and opiates, but it can cause significant distress and contribute to difficulty quitting and relapse among those trying to abstain (APA, 2013). Common symptoms of withdrawal include:

- Irritability
- Anger or aggression
- Anxiety
- Depressed mood
- Restlessness
- Sleep difficult
- Decreased appetite or weight loss

## Treatment Can Be Effective for Cannabis Use Disorder

Both cannabis use and potency has increased, which has increased the demand for cannabis use disorder (CUD) treatment. Many seek treatment for CUD because of the negative consequences/effects it has on their life and how they function in their day-to-day activities. "Adult and adolescent treatment program should address the skills and lifestyle changes necessary to attain and maintain abstinence, and should address, psychiatric, relationship, legal, and medical problems, when necessary"

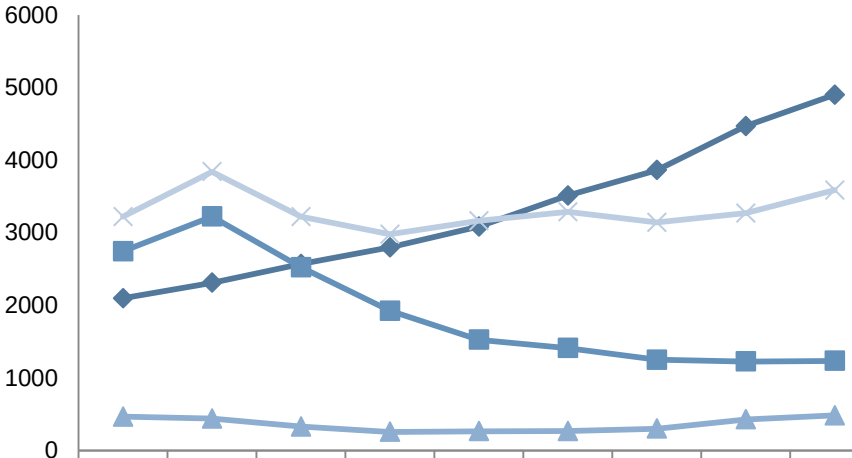
(Caron Treatment Centers, 2006). Since adolescents and adults have different substance use treatment needs, age-specific strategies will need to be implemented and are recommended to meet the treatment and recovery needs of clients of all ages.

Marijuana is the most commonly cited drug among primary drug treatment admissions in Wisconsin. In 2011, nearly one-third of Wisconsin publically funded drug treatment admissions were for marijuana (ONDCP, 2013). In 2010, there were nine Wisconsin deaths attributed to marijuana use (Wisconsin DHS, 2014).

Some identified barriers to accessing available substance use treatment and recovery facilities and services in Wisconsin are:

- Meeting eligibility requirements for primary drug treatment admissions.
- Adequate financial resources to pay for primary drug treatment admissions.
- Health insurance policy restrictions limiting access to primary drug treatment.
- Personal motivation—self-awareness of one's own needs.
- Limited primary drug treatment services in many geographic regions of the state.
- Capacity of local service systems to meet the demand for professional, primary drug treatment services (Wisconsin DHS, 2014).

**Figure 13: Number of Persons Admitted to Substance Abuse Treatment for Selected Illicit Drugs, Wisconsin, 2005-2013**.




| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|
| Opiates | 2096 | 2311 | 2568 | 2798 | 3084 | 3512 | 3863 | 4470 | 4902 |
| Cocaine | 2746 | 3223 | 2525 | 1925 | 1525 | 1411 | 1250 | 1226 | 1235 |
| Stimulants | 464 | 438 | 329 | 255 | 264 | 267 | 300 | 427 | 482 |
| Marijuana | 3221 | 3842 | 3222 | 2979 | 3164 | 3288 | 3143 | 3271 | 3589 |

Source: Human Services Reporting Systems (HSRS) and Program Participation System (PPS), Wisconsin Department of Health Services.

### Definitions

The following definitions are provided for clarity of the recommendations that follow.

- **Substance Use Treatment:** Individual and group counseling include a variety of treatments used to treat behavioral health problems associated with Cannabis Use Disorder and other Substance Use Disorders. Counseling and more specialized psychotherapies seek to change behaviors, thoughts, emotions, and how people see and understand situations. Counseling can take a number of forms depending on the type of therapy being used, the goals of the treatment, and other factors in the life of the person receiving therapy. The treatment system for substance use disorders is comprised of multiple service components, including the following: individual and group counseling, inpatient and residential treatment, intensive outpatient treatment, partial hospital programs, case or care management, medication, recovery support services, 12-Step fellowship, and/or peer supports. A person accessing treatment may not need to access every one of these components, but each plays an important role in fostering successful treatment outcomes. These systems are embedded in a broader community and the support provided by various parts of that community also play an important role in supporting the recovery of people with substance use disorders. Some courses of counseling last for months or even years, while others can be brief. Counseling is provided by trained clinicians such as psychologists, psychiatrists, social workers, professional counselors, substance abuse counselors (CSAC and SAC), and other appropriately trained as well as credentialed treatment and recovery providers (SAMHSA, 2015).
- **Recovery:** A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential (SAMHSA, 2012).
- **Screening:** Determines the likelihood that a client has a mental health, substance use disorder, or co-occurring substance use and mental health disorders, or that his or her presenting signs, symptoms, or behaviors may be influenced by co-occurring issues. The purpose is not to establish the presence or specific type of such a disorder, but to establish the need for an in-depth assessment. Screening is a formal process that typically is brief and occurs soon after the client presents for services (CSAT, 2006).
- **Assessment:** Gathers information and engages in a process with the client that enables the provider to establish (or rule out) the presence or absence of a mental health, substance use disorder, or co-occurring disorder. Determines the client's readiness for change, identifies client strengths or problem areas that may affect the processes of treatment and recovery, engages the client in the development of an appropriate treatment relationship (CSAT, 2006).

## Treatment Recommendations

**Recommendation 14: Expand adolescent substance use disorders treatment and recovery options across the state to allow timely access of appropriate level of care for all youth and young adults.** *(Adapted from Recommendation #29 of "Wisconsin's Heroin Epidemic: Strategies and Solutions, July 2014).*

Currently, there are limited options for adolescent substance use disorders treatment in Wisconsin. Adolescent populations should receive fair and equitable services in line with services provided to adults with substance use disorders, recognizing the special needs of adolescents and young adults.

- Maintain an updated environmental scan of behavioral health service options, primary treatment sources for substance use disorders and other appropriate resources for youth in Wisconsin.
- Utilize the updated environmental scan to collaborate and work with the Children, Youth and Family Sub-Committee of the Intervention and Treatment Committee of SCAODA to build capacity and expand adolescent substance abuse services in Wisconsin.

- Identify and implement new ways of providing behavioral health services, especially substance use disorder treatment for adolescents so they can maintain a tie to their community.
  - Partner with local hospitals and community agencies to provide Student Assistance Programs in schools.
  - Identify appropriately credentialed and trained counselors to help support students while receiving academic instruction, behavioral health and substance abuse treatment services.
- Work with leading health insurance companies in Wisconsin to provide fair and adequate compensation for adolescent substance use disorder services.
- Prioritize and support recovery high schools, peer recovery support programs, court diversion programs, recovery coaching and other similar efforts to sustain recovery from cannabis use disorders, particularly for adolescents and young adults (SCAODA, 2014).
- See Appendix G - *Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide.*

**Examples of evidence-based or evidence-informed treatment services and supports to improve the lives of youth and young adults who have or are at-risk of having a serious mental health and substance use condition(s):**

1. Cognitive Behavioral Therapy (CBT)
2. Motivational Interviewing
3. Dialectical Behavioral Therapy (DBT)
4. Aggression Replacement Training
5. Adolescent Community Reinforcement Approach (A-CRA)
6. Brief Strategic Family therapy
7. Family Support Network (FSN)
8. Functional Family Therapy Adolescent Alcohol and Drug Abuse
9. Motivational Enhancement Therapy and Cognitive Behavioral Therapy for Adolescent Cannabis Users and Other Substance Users (MET/CBT)
10. Multidimensional Family Therapy (MDFT)
11. Multisystemic Therapy (MST) for Juvenile Offenders
12. Residential Student Assistance Program (RSAP)
13. Trauma Informed Care
14. Assertive Continuing Care (ACC)

### Recommendation 15: Expand adult substance use disorders treatment and recovery options across the state to allow timely access of appropriate level of care for all residents.

The Wisconsin Department of Health Services' 2014 Wisconsin Mental Health and Substance Abuse Needs Assessment assessed gaps within substance abuse services. "In 2010, 395 persons statewide were denied a needed service…due to a lack of availability or lack of public funding. An additional 2,460 persons statewide were placed on a waiting list for services…Studies show that clients from waiting lists are at higher risk of not starting treatment or withdrawing from treatment." (Wisconsin DHS, 2014)

- Prioritize the funding of substance use disorder treatment in Wisconsin.
- Provide fair compensation from insurance companies for substance use disorder services (SCAODA, 2014).
- Address barriers to accessing mental health or substance abuse treatment, including cost, motivation, transportation/distance, living in rural areas, and stigma in order to increase the number of persons receiving treatment (Wisconsin DHS, 2014).
- Achieve mental health and substance use disorder service appropriateness and equity by ensuring the appropriate mix of inpatient, detox, residential, intensive outpatient, outpatient, psychosocial rehabilitation services, sober living, halfway house programs, crisis intervention, recovery support services, peer specialists, recovery coaches, consumer-run centers, etc. (Wisconsin DHS, 2014).

**Examples of evidence-based or evidence-informed treatment services and supports to improve the lives of adults have or are at-risk of having a serious mental health and substance use condition(s):**

1. Cognitive Behavioral Therapy (CBT)
2. Motivational Interviewing
3. Dialectical Behavioral Therapy (DBT)
4. Brief Marijuana Dependence Counseling
5. Correctional Therapeutic Community for Community Abusers
6. Motivational Enhancement Therapy (MET)
7. Trauma Informed Care

- Reduce disparities in access to effective, culturally and linguistically competent mental health and substance use disorder services among populations of differing races, ethnicities, sexual orientation and deaf/hard of hearing persons (Wisconsin DHS, 2014).
- Increase veterans, active service members and military families who receive effective treatment for mental health or substance use disorders (Wisconsin DHS, 2014).

### Recommendation 16: Substance use disorders treatment and recovery services for pregnant women should promote abstinence from marijuana during and after pregnancy to protect unborn and developing children and prevent drug-affected newborns and nursing infants.

Marijuana use in pregnancy and breastfeeding mothers is a public health concern. A report issued by the Colorado Department of Public Health & Environment noted that marijuana's psychoactive ingredient, THC, is passed to children through the placenta and breast milk. The health consequences, short- and long-term, of this THC exposure are not fully understood. What is known is that an infant's brain is not fully developed at birth, and introduction of THC into the infant's developing system must be avoided.

Pregnant women in substance use treatment typically face financial, social and psychological difficulties that affect their options and treatment progress. The Center for Substance Abuse Treatment (CSAT) outlined substance use treatment recommendations to assist pregnant women in feeling supported and successful. This committee supports the following CSAT recommendations in Wisconsin:

- Treatment should be provided in a gender specific, non-punitive, non-judgmental, nurturing manner, with attention to each client's fears and cultural beliefs.
- Incorporate psychological interventions to address disruptions in the mother-child relationship, guilt, depression, low self-esteem, and victimization and past trauma.
- All pregnant and breastfeeding clients should be screened using SBIRT.
- Provide comprehensive treatment services, including individual, group and family therapy, address the physiological effects of substance use and psychosocial factors.
- Provide positive proactive supportive services and alternative healthy coping strategies to replace substance use for pregnant women and people with substance use disorders with dependent children, (Adapted from Recommendation #30 of "Wisconsin's Heroin Epidemic: Strategies and Solutions, July 2014).
- Use of the person-centered planning approach, which helps the mother identify her own "needs by putting [her] in charge of defining the direction for [her life], not on the systems that may or may not be available to serve [her]" (from **http://www.personcenteredplanning.org/**). When helping the expectant mother determine her ultimate goal, the clinician should encourage her to work toward as close to abstinence as possible. Once the mother has identified her own goals (be it abstinence or harm reduction), then treatment can proceed accordingly.
- A family has several points where they can be lost in follow-up care, such as a 'warm handoff' between agencies and providers; it is crucial that state health agencies play a key role in linking

various resources and providers systematically track substance-exposed infants through screening, assessment and service delivery (SCAODA, 2014).

### Recommendation 17: Research, evaluate and implement promising alternative diversion programs including substance use disorders treatment within the legal system.

The traditional approach of incarceration and prosecution of marijuana users has not deterred recidivism. In fact, this approach may contribute to the 'revolving door' of the justice system by limiting employment opportunities. This approach also creates barriers regarding housing opportunities and eligibility for benefit programs. Several areas around the state and throughout the country are exploring diversion options within the legal system for low-risk marijuana using offenders. Due to the emerging need and newness of these programs, the effectiveness of several are currently being evaluated. One such promising program:

> Law Enforcement Assisted Diversion (LEAD) is a promising program which allows law enforcement officers to redirect low-level offenders engaged in drug or prostitution activity to community-based services, instead of jail and prosecution. By diverting eligible individuals to services, LEAD is committed to improving public safety and public order, and reducing the criminal behavior of people who participate in the program (**http://leadkingcounty.org/**).

### Recommendation 18: Provide substance use disorders treatment for persons while incarcerated and develop better linkages to improve the integration of services between criminal justice, primary medical care and treatment and recovery providers to ensure continuing care.

(*Adapted from Recommendation #26 of "Wisconsin's Heroin Epidemic: Strategies and Solutions, July 2014).*

- Establish ways to fund treatment since medical assistance is stopped while individuals are incarcerated.
- Find alternative ways for individuals to serve their time while receiving treatment, such as alternative sanction programs.
- Increase and continue dialogue with corrections staff to examine their views/opinions regarding marijuana use and identify future training opportunities.
- Provide education services for individuals as they are released from incarceration, as well as their family members, related to the risk of relapse and community resources for supporting recovery.
- Strengthen linkages between the criminal justice and primary care systems and substance use disorder treatment providers to ensure continuity of care.

### Recommendation 19: Provide continuing educational opportunities for treatment and recovery providers in an effort to increase understanding of developing science with regard to cannabis use disorders.

Educational opportunities should include (but not be limited to):

- Evidence-based treatment options and promising research.
- Research findings regarding pharmacotherapies to assist in treatment.
- Clinical innovations to use in the management of withdrawal symptoms.
- The effect of marijuana use on the developing brain.
- The impact of adverse childhood experiences and treatment approaches that reflect best practice in trauma-informed care.
- Emerging research of best practices for adolescent and young adult-specific recovery and support programs.

# Conclusion

On a national landscape, the perception of marijuana, its use and regulation continue to evolve. While shifting social and political positions create a myriad of challenges at state and local levels, Wisconsin has a distinct opportunity to benefit from the silver lining—learning from those who have come before. As a state that chooses to outlaw the vast majority of marijuana use, Wisconsin is well positioned to observe, consider, integrate, and/or discard the policies and practices of states that have changed their marijuana usage laws. Studying other states and the breadth of implications following such policy change(s) is critical. Wisconsin must lean on, and lead, additional research and data into the effects of marijuana use.

With existing research and data in tow, marijuana remains an illegal substance in Wisconsin. A primary structure for reducing its use is in place. Adopting the policies and practices outlined in this report will enrich this structure, which will reverberate throughout Wisconsin and positively impact the reduction of marijuana use among youth and adults. With a focus on reducing the public health impact of marijuana, this report offers recommendations with a goal of creating a healthier and safer Wisconsin.

# Summary of Recommendations

| | | Related Workgroups | | | |
|---|---|---|---|---|---|
| **Recommended in:** | Recommendation | C | LR | P | TR |
| **Cannabinoid Research Workgroup** | Recommendation 1: Cannabis, cannabinoid pharmaceuticals and cannabis/cannabinoid delivery systems should be subject to the same rigorous standards for approval that are applicable to other prescription medications and medical devices and should not be available for use by patients until such a time as they have been approved by the Food and Drug Administration (FDA). | ✓ | ✓ | | |
| | Recommendation 2: The state and federal government should encourage and promote further research and development focused on the study of specific pharmaceutical-grade cannabinoid compounds and preparations (including whole plant preparations) for various clinical applications. | ✓ | | | |
| | Recommendation 3: Smoked cannabis is not a safe delivery system for cannabinoids, and should not be legalized in any form since it appears to have similar clinical efficacy via inhalation (vaporized route), sublingual, and oral routes which are safer, and that may have decreased abuse potential. | ✓ | | | |
| | Recommendation 4: Non-pharmaceutical grade oral formulations ("edibles") and oral formulations are not approved by the FDA and should not be permitted. There is significant variability in dosing between samples, inconsistent distribution of cannabinoids and there are current FDA-approved oral cannabinoids by prescription, in the form of Dronabinol (Marinol®) and Nabilone (Cesament®). | ✓ | | | |
| | Recommendation 5: Cannabis and cannabis extract(s) for use in individuals younger than age 21 should not be legalized in any form unless specifically FDA approved. A growing body of evidence links early cannabis exposure with neurobiological brain abnormalities, an increased risk of addiction, potential to be a gateway drug leading to other drug abuse, permanent neurocognitive decline, lower school performance and compromised lifetime achievement. | ✓ | | | |
| **Legalities and Regulations Workgroup** | Recommendation 6: Marijuana should not be legalized for personal, recreational use in the state of Wisconsin. | | ✓ | | |
| | Recommendation 7: All employers should follow the United States Department of Labor's Drug-Free Workplace Act of 1988. | | ✓ | | |
| **Prevention Workgroup** | Recommendation 8: Community groups, organizations and coalitions should implement evidence-based prevention strategies that address known risk and protective factors for marijuana use. | | | ✓ | |
| | Recommendation 9: Support coalitions as the vehicle through which communities will successfully prevent and reduce marijuana use. | | | ✓ | |
| | Recommendation 10: Work to foster an environment locally that empowers young people not to use marijuana. | | | ✓ | |
| | Recommendation 11: Provide information to employers, and especially supervisors, regarding signs, symptoms and consequences of marijuana use, as well as local resources for obtaining help for cannabis use disorders. | | | ✓ | |
| | Recommendation 12: Make drugged driving prevention and enforcement a priority statewide. | | | ✓ | |
| | Recommendation 13: Incorporate SBIRT (Screening, Brief Intervention and Referral to Treatment) as a tool for helping clients who may be experiencing problems resulting from marijuana or other substance use. | | | ✓ | ✓ |
| **Treatment and Recovery Workgroup** | Recommendation 14: Expand adolescent substance use disorders treatment and recovery options across the state to allow timely access of appropriate level of care for all youth and young adults. | | | | ✓ |
| | Recommendation 15: Expand adult substance use disorders treatment and recovery options across the state to allow timely access of appropriate level of care for all residents. | | | | ✓ |

| | | | | |
|---|---|---|---|---|
| | Recommendation 16: Substance use disorders treatment and recovery services for pregnant women should promote abstinence from marijuana during and after pregnancy to protect unborn and developing children and prevent drug-affected newborns and nursing infants. | | | ✓ |
| | Recommendation 17: Research, evaluate and implement promising alternative diversion programs including substance use disorders treatment within the legal system. | | | ✓ |
| | Recommendation 18: Provide substance use disorders treatment for persons while incarcerated and develop better linkages to improve the integration of services between criminal justice, primary medical care and treatment and recovery providers to ensure continuing care. | ✓ | ✓ | ✓ |
| | Recommendation 19: Provide continuing educational opportunities for treatment and recovery providers in an effort to increase understanding of developing science with regard to cannabis use disorders including (but not limited to):<br>• Evidence-based treatment options and promising research.<br>• Research findings regarding pharmacotherapies to assist in treatment.<br>• Clinical innovations to use in the management of withdrawal symptoms.<br>• The effect of marijuana use on the developing brain.<br>• The impact of adverse childhood experiences and treatment approaches that reflect best practice in trauma-informed care.<br>• Emerging research of best practices for adolescent and young adult specific recovery and support programs. | | | ✓ |

# Frequently Used Acronyms

| | |
|---|---|
| ACE | Adverse Childhood Experiences |
| ACLU | American Civil Liberties Union |
| AIDS | Acquired Immune Deficiency Syndrome |
| AED | Anti-epileptic drugs |
| AES | American Epilepsy Society |
| AODA | Alcohol and Other Drug Abuse |
| APA | American Psychiatric Association |
| AWY | Alliance for Wisconsin Youth |
| CADCA | Community Anti-Drug Coalitions of America |
| CBD | Cannabidiol |
| CCAP | Consolidated Court Automation Programs |
| CDC | Center for Disease Control and Prevention |
| CHS | Cannabis Hyperemesis Syndrome |
| CSAT | Center for Substance Abuse Treatment |
| CUD | Cannabis Use Disorder |
| CUO | Cannabis Use Onset |
| CWS | Cannabis Withdrawal Syndrome |
| DHS | Department of Health Services |
| DSM-5 | Diagnostic and Statistical Manual for Mental Disorders, 5th Edition |
| EAP | Employee Assistance Program |
| FDA | Food and Drug Administration |
| MDD | Major Depressive Disorder |
| NIDA | National Institute on Drug Abuse |
| NSDUH | National Survey on Drug Use and Health |
| PTSD | Post-Traumatic Stress Disorder |
| RMHIDTA | Rocky Mountain High Intensity Drug Trafficking Area |
| SAMHSA | Substance Abuse and Mental Health Services Administration |
| SBIRT | Screening, Brief Intervention and Referral to Treatment |
| SCAODA | State Council on Alcohol and Other Drug Abuse |
| SPF | Strategic Prevention Framework |
| SUD(s) | Substance Use Disorder(s) |
| TAD | Treatment Alternative and Diversion |
| THC | Delta-9-tetrahydrocannabinol |
| YRBS | Youth Risk Behavior Survey |

# Appendix A: Endocannabinoid System

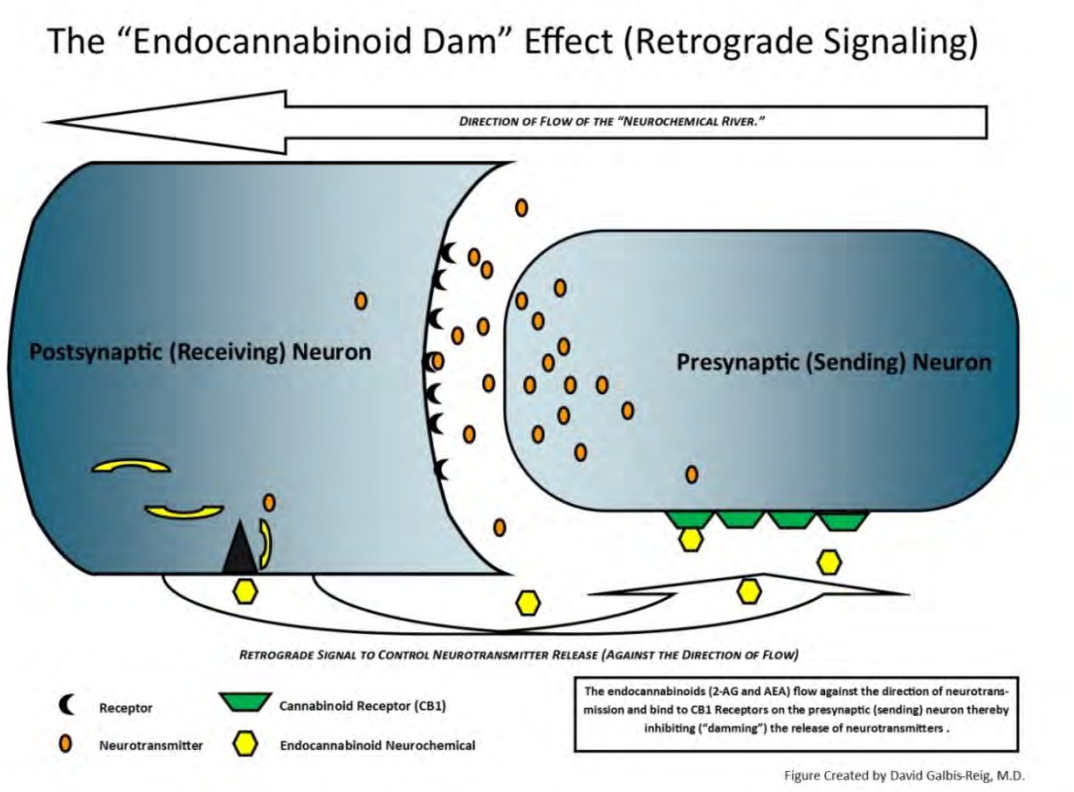
The endocannabinoid system is composed of an intricate network of neural pathways that are controlled by naturally occurring endogenous cannabinoids (known as endocannabinoids) created by the human body that produce their effects by interacting with the CB1 and CB2 receptors. The two endocannabinoids that have received the greatest amount of attention, however, are anandamide (N-arachidonoylethanolamide, AEA) and 2-AG (2-arachidonoylglycerol), both of whose synthetic and degradation pathways have been well described. Endocannabinoids, like their plant derivatives, are highly lipid soluble (meaning that they dissolve in fat but not water) and act via the cannabinoid receptors as neuromodulator signals throughout the central and peripheral nervous system.

In fact, it is now understood that the CB1 and CB2 receptors are found on the pre-synaptic membrane of the neuron and that cannabinoids produce their effects via retrograde signal transmission in the nervous system, thus acting much like a dam would in a flowing river. In order to control the amount of water (neurochemicals) that flows downriver, a dam (or a series of dams), known as synapses in the body, is built on the river that is controlled at each point by a person that sits upstream of the dam. Unfortunately, this person cannot "see" the effects of the water downstream and has no way of knowing whether or not s/he is allowing too much or too little water to flow downriver through the dam. In order to be able to let each of the dam operators know when to open or close their respective dam, a series of telephone lines is built from each dam to the one before it so that the dam operator downriver can tell the one upriver when to open and close the dam. The endocannabinoid system of the body functions much like these telephone lines to provide a way for the nerve cell "downstream" of the flow to communicate with the nerve cell "upstream" of the flow regarding when to open or close the dam to allow for the flow of neurotransmitters such as dopamine, serotonin, GABA, glutamate, or norepinephrine. In this manner, the endocannabinoid system is capable of modulating neurochemical flow throughout the central and peripheral nervous system

The effect of individual cannabinoids on this system depends on their differential activity at each of the cannabinoid receptors, which are found in different densities and concentrations throughout the body. The CB1 receptor is primarily found in the central nervous system while the CB2 receptor is primarily found in the body's periphery and immunological system. Delta-9-tetrahydrocannabinol (THC), cannabidiol (CBD), and other phytocannabinoids (cannabinoids derived from plants) produce their psychological effects via the CB1 receptor, though many also stimulate the CB2 receptor to produce other effects. Laboratory synthesized cannabinoids (dronabinol, nabilone, and ajulemic acid for instance) work in much the same way as the endocannabinoids and phytocannabinoids but vary in potency and effect from THC depending on their chemical structure, route of administration, bioavailability, and differential activity at the CB1 and CB2 receptors. It is for this reason that it is important to characterize and study each cannabinoid entity (including combinations of cannabinoids in different ratios such as the optimum ratio of THC to CBD for a given condition) for specific disease states to better elucidate clear medical indications and/or adverse effects. In order to accomplish this task, however, the chemical composition and purity of the cannabinoid(s) in question must be exactingly known. Clinical studies using the cannabis plant or extracts from the plant are difficult to conduct because the exact composition of cannabinoids in each "batch" varies widely depending on factors such as the strain (genetics) of the cannabis plant utilized (cannabissearch.com, 2013); growing conditions for each of the plants (light, fertilizer, temperature, water, and humidity), which can cause variations in cannabinoid content even within a strain (Mahlberg & Hemphill, 1983; Tipparat, Natakankitkul, Chamnivkaipong, & Chutiwat, 2011); effects of pesticide residues and fungal infestation (Wilkinson & D'Souza, 2014; Verweij, Kerremans, Voss, & JF,

2000); the part of the plant cultivated (Hemphill, Turner, & Mahlber, 1980); and the confounding of a myriad of other phytocannabinoids (up to 100 described) in the cannabis plant, many of whose exact effects are not well understood. Because of this variability, the evidence supporting the efficacy of cannabis as medicine varies substantially from study to study and in general falls short of the U.S. Food and Drug Administration's (FDA's) standards for approval of other drugs currently in clinical use (including, it might be noted, a laboratory synthesized pill form of THC called dronabinol) (Wilkinson & D'Souza, 2014).

**Figure 14: The "Endocannabinoid Dam" Effect (Retrograde Signaling)**

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# Appendix B: Potential Therapeutic Applications of Cannabis and Cannabinoids for Treatment of Disease

**GLAUCOMA**—Glaucoma is a disease of the eye that occurs due to increased pressure within the eye, which can lead to destruction of the retina. An early study from the 1970s demonstrates reductions in intraocular pressures with marijuana (Hepler & Frank, 1971). THC, cannabinol, and nabilone (Cesamet®) have been shown to be effective in lowering intraocular pressures in rabbits (Chen et al., 2005; Volkow et al., 2014). While physicians currently have numerous medications that are safe and effective to control glaucoma, further research into cannabinoid pharmaceuticals may be warranted to determine whether these agents provide additional benefits towards neuroprotection in addition to lowering intraocular pressures (Nucci et al., 2008; Weinreb, Aung, & Medeiros, 2014; Song, Huang, & Zang, 2015; Yazulla, 2008).

**NAUSEA**—One of the first indications for use of cannabinoids in clinical medicine was the treatment of nausea and vomiting associated with chemotherapy. The first FDA-approved cannabinoid product was an oral, synthetic delta-9-tetrahydrocannabinol (THC) preparation, dronabinol (Marinol®), approved in 1985 for the treatment of chemotherapy associated nausea and vomiting (Abbott Products, Inc., 2011). FDA approval was based on studies versus then-available antiemetic medications that are not as effective as currently available medications for chemotherapy-associated nausea and vomiting, such as ondansetron (Barthwell, Baxter, Cermak, Dupont, Kraus, & Levounis, 2010). More recently, in a study comparing dronabinol alone, ondansetron[1] alone, or a combination of dronabinol and ondansetron for delayed chemotherapy-induced nausea and vomiting, ondansetron and dronabinol were equally tolerated and effective but the combination did not produce any additional benefits over either alone (Meiri et al., 2007). It should be noted, however, that long-term use of cannabis has also been associated with Cannabis Hyperemesis Syndrome (CHS), which results in bouts of abdominal pain, nausea, vomiting, and compulsive bathing in hot water (Suns & Zimmermann, 2013).

**SPASTICITY IN MULTIPLE SCLEROSIS**—Several recent studies have demonstrated the efficacy of specific cannabinoid formulation, nabiximols (Sativex®) for the treatment of intractable spasticity, neuropathic pain, and disturbed sleep in patients with multiple sclerosis (Arroyo, Vila, & Dechant, 2014; Freidel, Tiel-Wilck, Schreiber, Prechtl, Essner, & Lang, 2015; Flachenecker & Henze, 2014; Syed, McKeage, & Scott, 2014). In fact, the data of specific cannabinoids for treatment of spasticity in multiple sclerosis is robust enough for the American Academy of Neurology, in their 2014 publication of evidence-based guidelines regarding complementary and alternative medicine for multiple sclerosis, to provide specific recommendations regarding the use of different cannabinoid formulations for treatment of Multiple Sclerosis Spasticity (MSS) and pain (Yadav et al., 2014). **Smoked cannabis is not among the recommended dosage forms in the American Academy of Neurology recommendations.**

**EPILEPSY**—The potential antiepileptic effects of cannabinoids are well documented in early preclinical trials of animal models dating back to the 1970s (Carlini, Leite, Tannhauser, & Berardi, 1973; Izquierdo, Orsingher, & Berardi, 1973; Karler, Cely, & Turkanis, 1973). No human studies were reported, however, until 1980 when a study of 15 individuals with temporal lobe seizures refractory to available medications were recruited to receive a cannabidiol-rich extract for epilepsy (Cunha et al., 1980). The results of this study demonstrated promise in the use of CBD for epilepsy. Despite these encouraging results, however, it was not until Dr. Sanjay Gupta's CNN documentary regarding Charlotte's Web, a CBD-rich species of

[1] Ondansetron (Zofran®) is a modern anti-nausea medication approved by the FDA in 1998, well after dronabinol, was already being utilized for chemotherapy-associated nausea and vomiting. Ondansetron is much more effective than anti-emetics that were available at the time that dronabinol was FDA approved in 1985.

cannabis, aired in 2013 that interest in the use of CBD made its resurgence (Young, 2013). In this documentary, the use of CBD on a child by the name of Charlotte appeared to completely eradicate her seizures despite repeated failures of currently available antiepileptic drugs (AEDs). As a result of this documentary, popular support for legalization of cannabis-based medicines (in particular cannabidiol-rich extracts) has significantly increased in the past three years. In fact, as a result of this documentary, several states (including Wisconsin) have legalized purified forms of CBD for use as a therapeutic agent to treat intractable childhood epilepsy **despite a lack of studies meeting the rigorous criteria required for drug approval by the FDA** (State of Wisconsin, 2014).

More recent data is now becoming available regarding the use of cannabidiol oil, and cannabis extracts rich in cannabidiol oil, for epilepsy, particularly in children with intractable seizure disorders. In a recent open-label study presented at the American Epilepsy Society (AES) 68th annual meeting in December 2014 that utilized 98% pure cannabidiol oil, developed by GW Pharmaceuticals, developed under the brand name, Epidiolex®, demonstrated a greater than 50% reduction in seizures in 39% of patients (Devinsky et al., 2014).

In a second study presented at the same conference, patients using oral cannabis extracts from different cannabis plant strains found similar results with approximately one-third of patients reporting a seizure reduction of 50% or more (Press, Knupp, & Chapman, 2014). These data are encouraging for the development a new class of anti-epileptic medications for treatment of epilepsy, but the results are by no means the outstanding results expected by proponents of CBD and marijuana in the popular media that has driven legalization and widespread availability of these substances. As Dr. Chapman, the primary investigator of the second study using marijuana, states eloquently in an interview with Medscape, “I would say be cautious. Don’t expect miracles. Families have been led to believe that marijuana products are more effective than anything else but our data do not suggest that this is necessarily true.” (Hughes, 2014)

In addition to the efficacy data, however, it is important to document the side effect profile and drug-to-drug interactions of any new cannabinoid therapeutic, as treatment of epilepsy typically requires a combination of agents to achieve adequate control. In the open label study with Epidiolex®, for example, the primary adverse effects were classified as mild to moderate and primarily included somnolence, fatigue, weight changes, diarrhea, and changes in appetite (Devinsky et al., 2014).

Additional questions regarding use of cannabinoids and/or cannabis for epilepsy include the following: 1) questions regarding the appropriate dose to maximize benefits and reduce risk, 2) differential efficacy of combination cannabinoid products vs single agent formulations (e.g., cannabidiol with other cannabinoids vs cannabidiol by itself vs whole cannabis extract for epilepsy), 3) short and long term adverse effects of treatment particularly in children, 4) is there development of tolerance for seizure efficacy over time, and 5) at what point in the natural history of epilepsy are cannabinoids most beneficial and should they be reserved solely as a last resort. There are currently several ongoing studies that will hopefully answer many of these questions.

As the data of cannabidiol now demonstrates, cannabidiol oil is not the panacea that popular media coverage has made it out to be, and in fact may actually have benefits on par with many of the currently available AEDs, albeit with possible differential efficacy in some rare forms of epilepsy. It is important that politicians and the general public allow these studies to be completed prior to advocating widespread availability of cannabis and cannabinoids for any condition.

**CHRONIC PAIN—**The pain relieving effects of cannabis have been noted for centuries. It is only in recent years, however, that the neuromodulatory effects of the endocannabinoid system on pain

reception have started to be better understood (Walker, Huang, Strangman, Tsou, & Sanudo-Pena, 1999; Ulugol, 2014).

Recent studies have demonstrated the benefits of cannabinoid pharmaceuticals in alleviating cancer pain, chronic non-malignant neuropathic pain, and neuropathic pain. Even very low levels of vaporized THC (1.29%) provide analgesic benefit (Wilsey, Marcotte, Deutsch, Gouaux, Sakai, & Donaghe, 2013), indicating that currently available cannabis preparations containing higher level THC content (often in the double digits) may not be necessary, and have been associated with greater neuropsychiatric side effects.

In at least one study comparing oral dronabinol (synthetic THC that is currently already available by prescription in all states) to smoked marijuana in daily marijuana smokers, decreases in pain sensitivity and pain tolerance were equivalent in both groups, but the effect lasted longer in the dronabinol group with less abuse-related subjective effects (drug likability/ subjective high) than with smoked marijuana (Cooper, Comer, & Haney, 2013). This latter study suggests that at least one currently available oral preparation of a synthetic cannabinoid pharmaceutical is as effective, with a longer duration of action, as smoked marijuana for treatment of pain, with a lower abuse potential. This study begs the question: why legalize herbal marijuana if a prescription alternative is already available?

**INFLAMMATION**—Cannabinoids have been shown to have significant anti-inflammatory effects as demonstrated by their ability to cause cell death (which may be useful for the treatment of cancer), their ability to prevent cells from multiplying (also potentially helpful in the treatment of cancer), and their ability to block the production of chemicals that produce inflammation in the body (Nagarkatti, Pandey, Rieder, Hegde, & Nagrkatti, 2009). Cannabidiol has especially garnered attention for this indication due to its lack of psychoactive adverse effects and early animal models that suggest potential therapeutic benefits for the treatment of rheumatoid arthritis (Zuardi, 2008). Nabiximols (Sativex®) has also demonstrated promise as a potential treatment option for rheumatoid arthritis in an initial concept study published in Rheumatology (Blake, Robson, Ho, Jubb, & McCabe, 2006). Ajulemic Acid (AJA), a non-psychoactive, marijuana-derived, synthetic cannabinoid has also shown promise in treatment of rheumatoid arthritis and other painful conditions (William Reed Business Media, SAS, 2002; Bidinger et al., 2003; Burstein, Karst, Schneider, & Zurier, 2004; Burstein S., 2007).

Given the role of endocannabinoids in modulating immunological function via the CB2 receptor and their influence within the inflammatory cascade, it is not surprising that cannabinoid medications provide anti-inflammatory benefits, but research in this area is still in its infancy and further studies are necessary to elucidate the exact role that cannabinoid pharmaceuticals may play in immune mediated diseases.

**AIDS-ASSOCIATED ANOREXIA AND WASTING SYNDROME**—Cannabis has been thought to increase appetite and weight when ingested or smoked on a regular basis in patients with AIDS-associated anorexia and wasting syndrome (D'Souza et al., 2012). More recent studies, however, have failed to demonstrate a clear benefit on morbidity and mortality for cannabinoids in patients with AIDS who are receiving adequate antiretroviral therapy and data on therapeutic benefit are inconclusive (Lutge, Gary, & Siegfried, 2013). The only FDA-approved cannabinoid medication for this indication is dronabinol (Marinol®) (Abbott Products, Inc., 2011).

**POST-TRAUMATIC STRESS DISORDER (PTSD)**—The endocannabinoid system may play a crucial role in allowing the brain to adapt to stressful situations by promoting extinction of the fear response associated with such situations, particularly when combined with other behavioral modalities such as cognitive behavioral therapy (Singewald, Schmuckermair, Whittle, Holmes, & Ressler, 2015). This type of

pharmacological activity could have profound clinical implications for some psychiatric conditions, particularly with respect to disease states that occur due to imbalances in the brain's ability to control severe stressors such as in PTSD, phobias, anxiety, and panic disorder.

In PTSD, especially, the fear response becomes pathologically generalized to many situations and is associated with symptoms of re-experiencing the trauma, nightmares, insomnia, and a constant state of hyper-autonomic arousal, suggesting that the process of fear extinction (diminution in the fear response after the danger has passed) is not functioning appropriately. Early studies have demonstrated that the endocannabinoid system modulates neuronal excitability in stressful situations (Singewald, Schmuckermair, Whittle, Holmes, & Ressler, 2015). In at least one study, the levels of the endocannabinoid, anandamide, were shown to be significantly suppressed in individuals with PTSD, suggesting dysregulation of the endocannabinoid system (Neumeister et al., 2013).

In a recent pre-clinical open label study of add-on oral THC for PTSD, the intervention demonstrated statistically significant improvements in global symptoms of severity, sleep quality, frequency of nightmares, and hyper-arousal symptoms with only mild side effects (Roitman, Mechoulam, Cooper-Kazaz, & Shalev, 2014). While cannabinoid therapeutics show promise as adjunctive treatments for PTSD, larger and better-controlled clinical trials are necessary before such treatment can be recommended on a broader scale, particularly when the potential long-term consequences of cannabinoid use are taken into account.

Further, it is important to note that chronic use of recreational marijuana, which typically has high levels of THC, is linked with poorer affective functioning, including altered amygdala response to emotion (Gruber, Rogowska, & Yurgelun-Todd, 2009), abnormal amygdala structure (McQueeny et al., 2011), and reduced frontolimbic white matter quality (Shollenbarger, Price, Wieser, & Lisdahl, 2015)—these brain abnormalities are associated with increased depressive symptoms and apathy in young adults. Therefore, treatments for chronic PTSD must use low dose THC that will not result in long-term down-regulation of the endogenous cannabinoid system.

# Appendix C: Adverse Effects of Marijuana

**CARDIOVASCULAR ADVERSE EFFECTS—**The first description of the effects of cannabis on the cardiovascular system where published in 1972 (Beaconsfield, Ginsburg, & Rainsbury, 1972). This initial study demonstrated that cannabis increases heart rate and limb flow via beta-adrenergic vascular systems and recommended caution with administration of vasoactive drugs and anesthesia in patients who had recently smoked marijuana.

More recent studies suggest that smoked cannabis may increase mortality in patients with a previous history of acute myocardial infarction. In a case-control study by Mittleman, Lewis, Maclure, Sherwood, and Miller (2001), in patients with previous history of myocardial infarction, cannabis use was associated with a 4.8 times increased risk of a myocardial infarction within the first hour after use. A more recent study also demonstrated a trend towards increased mortality (29% increase in mortality) among habitual marijuana users with known cardiovascular disease when compared with non-users, over an 18-year period after a myocardial infarction, though the results of this study did not reach nominal statistical significance (Frost, Mostofsky, Rosenblum, Mukamal, & Mittleman, 2013).

In addition to an increased risk of mortality in habitual users with known cardiovascular disease, there is growing evidence that cannabinoid use, especially high-dose, frequent cannabis or high potency cannabinoids may increase the risk of stroke, even among young individuals (Freeman et al., 2013; Wolff et al., 2013). In addition to the cannabinoids, it is well documented that a large number of individuals who smoke cannabis also use tobacco products, which itself increases the risk of stroke. In a recent study, for example, investigators described an association between what they termed “the cannabis lifestyle,” which included tobacco use in 88% of the cannabis-use population, and an increased risk of ischemic stroke (Barber et al., 2013).

Once again, these preliminary studies demonstrate a clear dose and potency dependent relationship between cannabinoid and/or cannabis use and cardiovascular and cerebrovascular disease. Future studies are still necessary to determine whether smaller doses, lower potency cannabinoids, or CB2-specific cannabinoids (such as cannabidiol) may have a differential neuro-protective effect that is reversed at higher doses or with greater potency. Recent preliminary studies provide support for this assertion of a differential cannabinoid effect with mounting evidence that cannabidiol may actually provide protection against stroke and heart attacks (Mishima et al., 2005; Stanley, Hind, & O'Sullivan, 2012). Further research is still necessary.

**PULMONARY ADVERSE EFFECTS—**The pulmonary effects of smoked cannabis have been well described. Cannabis is associated with inflammation of the large airways, hyperinflation of the lungs, and increased airway resistance, all findings consistent with chronic bronchitis, a condition that is more common in marijuana smokers than non-smokers (Volkow et al., 2014). Smoked marijuana also appears to compromise the immunological function of the lungs resulting in an increased risk of respiratory tract infections and pneumonia in chronic cannabis smokers (Owen, Sutter, & Albertson, 2014).

In addition to respiratory symptoms, because cannabis smoke is qualitatively similar to tobacco smoke with twice as many carcinogenic polyaromatic hydrocarbons and because the quantity of smoke inhaled with cannabis use is greater due to it being smoked without a filter (Hoffmann, Brunnerman, Gori, & Wynder, 1975); in theory at least, it is reasonable to expect that smoked cannabis produces a significant increase in the risk of oral and lung cancers. In practice, however, this has been difficult to prove because the majority of individuals who smoke cannabis regularly also use tobacco products (Hall & Degenhardt,

2009). As a result, in most studies that have shown an association between cannabis use and cancer, the effect essentially disappears when you control for tobacco use (Hall & Degenhardt, 2009). It should be noted that it was not until larger scale population studies were conducted with tobacco products that the relationship between smoked tobacco and lung cancer became evident.

**RENAL ADVERSE EFFECTS—**While cannabis and pharmaceutical-grade, investigational cannabinoids have not been associated with acute or chronic kidney injury, synthetic, high-potency cannabinoids (K2, Spice) have been associated with numerous case reports of acute kidney injury (AKI) (Bhanushali, Jain, Fatima, Leisch, & Thornley-Brown, 2012). It is unclear at this time whether or not the synthetic cannabinoids themselves, or some adulterant is responsible, though a CDC investigation into a multistate outbreak determined that a novel fluorinated synthetic cannabinoid (XLR-11) was a common finding in many of the cases (Centers for Disease Control and Prevention, 2013). Additional epidemiological data and investigational studies will need to be conducted to determine whether high potency synthetic cannabinoids may play a role in the development of AKI.

**HEPATOBILIARY AND GASTROINTESTINAL ADVERSE EFFECTS—**As is the case with kidney disease, cannabis and investigational pharmaceutical-grade cannabinoids have not been associated with liver toxicity. The synthetic cannabinoids K2/Spice, however, have been implicated in at least one case of toxic hepatitis.

As for gastrointestinal side effects, and despite its widespread use as an anti-nausea medication during cancer chemotherapy, cannabis and cannabinoids are clearly associated with a Cannabis Hyperemesis Syndrome (CHS) that has been well-described in the literature (Suns & Zimmermann, 2013; Ukaigwe, Karmacharya, & Donato, 2014; Simonetto, Oxentenko, Herman, & Szostek, 2012; Lacopetti & Packer, 2014). The syndrome is characterized by recurrent bouts of abdominal pain, nausea, vomiting, and compulsive bathing in hot water in patients with a history of long-term cannabis use. The condition appears to be underdiagnosed and is frequently confused with cyclic vomiting syndrome. Unfortunately, no standard evidence-based management strategy currently exists for treatment of CHS but supportive care and discontinuation of cannabis appear to provide good symptomatic relief (Suns & Zimmermann, 2013). The condition resolves with discontinuation of cannabis but has been shown to recur with reinstatement of cannabis use. Long-term treatment requires abstinence from cannabinoid pharmaceuticals.

**VIOLENCE POTENTIAL—**Popular media has also propagated the idea that some individuals who smoke marijuana will become acutely hostile, violent, and aggressive. The scientific literature does not support this myth. Epidemiological studies do not demonstrate any correlation between cannabis use and violent crimes, except as they are associated with illegal drug trafficking (Carroll, 2015). In fact, in an epidemiological study regarding marijuana use and domestic violence, the risk of partner violence was actually lower among marijuana users than the general population (Smith et al., 2014). As such, at the current time it does not appear that cannabis, per se, increases the risk for interpersonal violence to any significant degree.

# Appendix D: Drug–Free Workplace Act of 1988

## Requirements for Organizations

All organizations covered by the Drug-Free Workplace Act of 1988 are required to provide a drug-free workplace by taking the following steps:

1. **Publish and give a policy statement** to all covered employees informing them that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance is prohibited in the covered workplace and specifying the actions that will be taken against employees who violate the policy.
2. **Establish a drug-free awareness program** to make employees aware of a) the dangers of drug abuse in the workplace; b) the policy of maintaining a drug-free workplace; c) any available drug counseling, rehabilitation, and employee assistance programs; and d) the penalties that may be imposed upon employees for drug abuse violations.
3. **Notify employees** that as a condition of employment on a Federal contract or grant, the employee must; a) abide by the terms of the policy statement; and b) notify the employer, within five calendar days, if he or she is convicted of a criminal drug violation in the workplace.
4. **Notify the contracting or granting agency** within 10 days after receiving notice that a covered employee has been convicted of a criminal drug violation in the workplace.
5. **Impose a penalty on—*or* require satisfactory participation** in a drug abuse assistance or rehabilitation program by—any employee who is convicted of a reportable workplace drug conviction.
6. Make an ongoing, **good faith effort to maintain a drug-free workplace** by meeting the requirements of the Act.

# Appendix E: Adverse Childhood Experiences

Adverse childhood experiences (ACE) are stressful or traumatic experiences during childhood that include abuse, neglect and household dysfunction. Household dysfunction is described as growing up with substance abuse, mental illness, parental discord, crime in the home, or witnessing domestic violence. Living with ACEs results in toxic stress that can harm a child's brain. It also increases the child's risk of health and social problems that follow him or her into adulthood. Children living with household members that use marijuana or other substances are starting life with at least one ACE.

The original ACE study was conducted by the Centers for Disease Control and Prevention in collaboration with the Kaiser Permanente, a health maintenance organization in California. The results were surprising, finding significant correlations between the number of ACEs experienced as a child and his or her adult health and well-being. The original and subsequent ACE studies, including studies conducted in Wisconsin, confirm with scientific evidence that adversity during development increases the risk of physical, mental and behavioral problems later in life. ACEs have been identified as a leading cause of health and social problems in our nation (**http://www.ajpmonline.org/article/S0749-3797(98)00017-8/pdf**). In total, 9,039 Wisconsin residents were surveyed in 2011 and 2012. The data shows that approximately 58% of Wisconsin residents have experienced an ACE. Among those who have experienced ACEs, 61% experienced more than one, and 25% have experienced four or more (Children's Trust Fund, Children's Hospital of Wisconsin. Wisconsin ACE Brief 2011 and 2012 Data. 2014).

**What is an ACE?**
An adverse childhood experience is a traumatic experience prior to the age of 18. The ACE module in the Wisconsin Behavioral Risk Factor Survey consists of eight survey questions.

To assess the presence of ACEs, adults in Wisconsin are asked about the following:

1. Recurrent physical abuse
2. Emotional abuse
3. Sexual abuse
4. Alcohol and/or drug abuser in the household
5. An incarcerated household member
6. A household member who was chronically depressed, mentally ill, institutionalized, or suicidal
7. Violence between adults in the home
8. Parental divorce or separation

The ACE score is a measure of cumulative exposure to adverse childhood conditions. Exposure to any single ACE condition is counted as one ACE or point.

Source: "Adverse Childhood Experiences in Wisconsin: Findings from the 2010 Behavioral Risk Factor Survey," produced by Children's Trust Fund, Children's Hospital and Health System and Child Abuse Prevention Fund. **http://www.wichildrenstrustfund.org/index.php?section=adverse-childhood**

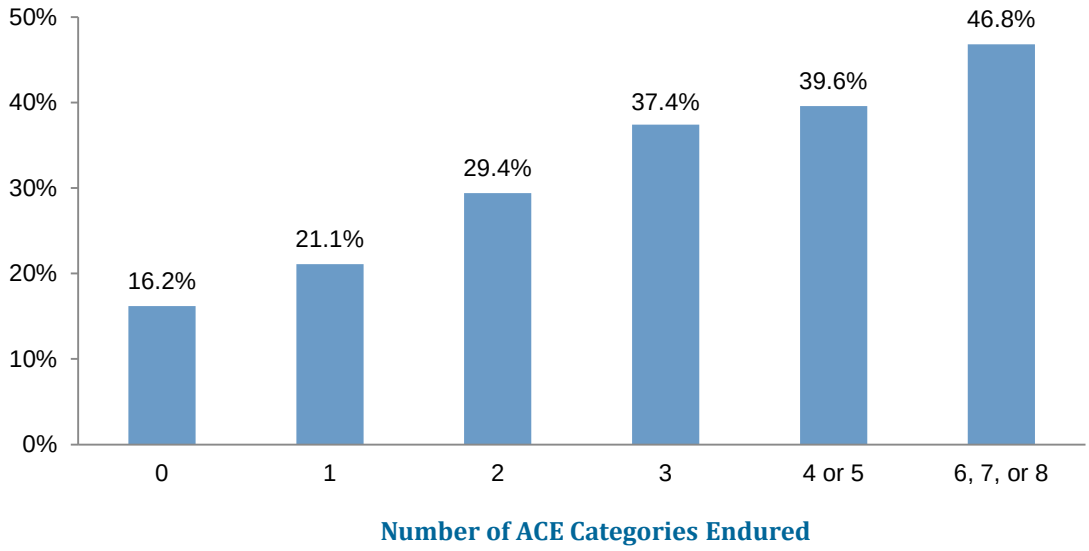
Children living with ACEs experience stress to the extent that it becomes toxic. Of particular concern is the negative impact of ACEs on the brain development of a child. An infant's brain is not fully developed at birth and depends upon life experience to develop the brain's complex neural networks. If those life experiences consist of continuous stress or trauma, the stress hormones become toxic to brain cells. This toxicity makes it difficult for the child's brain cells to develop healthy neural networks and can even cause brain cells to die. Brain development continues through adolescence and early adulthood. Healthy childhood experiences and moderate, predictable, controlled stressors cause the brain to adapt and develop good coping skills. Adverse childhood experiences alter the body's stress management system and brain architecture, leading to negative outcomes such as poor health, lower levels of school and work success and lower socioeconomic status in adulthood.

The use and abuse of marijuana and other substances by a parent or caregiver is recognized as an ACE, which requires support or intervention to ensure healthy child development and prevent maladaptive and

risky behaviors. Drug use does not mean that a parent will be a bad parent, but drug use by a parent or other caregiver may cause serious problems in their children's lives. The Substance Abuse and Mental Health Services Administration cites research that has demonstrated a strong graded (i.e., dose-response) relationship between ACEs and a variety of substance use-related behaviors, including early initiation of alcohol use, early smoking initiation, prescription drug use, and lifetime illicit drug use (**http://captus.samhsa.gov/prevention-practice/targeted-prevention/adverse-childhood-experiences/2**).

What all this means is that our children who have endured ACEs are more likely to choose fast, effective ways to alleviate their anxiety, depression, difficulty concentrating, etc., rather than developing necessary coping skills that will serve them well throughout life. Marijuana is mistakenly perceived by youth and many adults as a safe way to find relief from their problems or discomfort with a temporary, chemically induced sensation. ACE studies provide conclusive evidence that for many adults, ACEs in their young lives follow them into adulthood in the form of physical, mental and behavioral health struggles. What is still unknown and of great concern is the full impact of marijuana on the child's developing brain.

**Figure 15: Percentage of Adults that First Used Marijuana at Age 17 or Younger by the Number of Different Categories of Adverse Childhood Experiences They Endured Prior to the Age 18, Washington State**




Source: Anda, R. F., & Brown, D. W. (2010). Adverse childhood experiences and population health in Washington: The face of a chronic public health disaster. *The Washington State Family Policy Council*. Accessed online: **www.acesconnection.com**

# Appendix F: Resources to Assist with Implementing Prevention Recommendations

Prevention planners and practitioners are encouraged to explore any of the resources provided in this appendix. Most of the websites listed contain information, guides and tools that can be of value to any marijuana prevention effort.

## Resources for Community Groups, Organizations and Coalitions

**Community Anti-Drug Coalitions of America (CADCA)** has demonstrated that when all sectors of a community come together—social change happens through the coalition model. CADCA is the premier membership organization representing those working to make their communities safe, healthy and drug-free. We have members in every U.S. state and territory and working in 18 countries around the world. They also serve as a center for training, technical assistance, evaluation, research, and capacity building for community anti-drug coalitions throughout the United States.

Visit: **http://www.cadca.org/**

SAMHSA's **Center for the Application of Prevention Technologies (CAPT)** is a national substance abuse prevention training and technical assistance (T/TA) system dedicated to strengthening prevention systems and the nation's behavioral health workforce. Resources are available to enhance the capacity of prevention practitioners on such topics as

- The Strategic Prevention Framework
- Evidence-based prevention
- Environmental prevention strategies for substance abuse prevention
- Tools to help practitioners prevent youth marijuana use in their states and communities

Visit: **http://captus.samhsa.gov**

**Alliance for Wisconsin Youth (AWY)** is a program of the Wisconsin Department of Health Services, Division of Mental Health and Substance Abuse Services, in the Bureau of Prevention Treatment and Recovery. The Alliance's purpose is to enhance and support the capacity of member coalitions in their substance abuse prevention and youth development work. Over 80 Wisconsin coalitions are members of the Alliance.

Visit: **http://www.allwisyouth.org**

**What Works, Wisconsin** is a project of the UW-Madison's School of Human Ecology and the UW-Extension's Family Living Programs. Initiated in 2004, the *What Works* project focuses on distilling the latest scientific knowledge on effective policies, practices, and programs, including "evidence-based programs," for youth and their families, schools and communities.

Visit: **http://fyi.uwex.whatworkswisconsin/** and select "Evidence-based Program Registries" from the menu.

## Resources for State and Municipal Governments and Lawmakers

**Benefit-Cost Results** provides findings from cost benefit analysis conducted by the Washington State Institute for Public Policy on 200 effective prevention, early intervention and treatment programs.

Visit: **www.wsipp.wa.gov/**

**Learn About Marijuana: Science-based Information for the Public** is an online resource provided by the Alcohol and Drug Abuse Institute of the University of Washington. The site features easy-to-read factsheets on a number of topics including marijuana's impact on adolescent development, mental health, physical health, driving, human performance, and much more.

Visit: **http://learnaboutmarijaunawa.org**

**What Works for Health: Policies and Programs to Improve Wisconsin's Health** provides communities with information to help select and implement evidence-informed policies, programs, and system changes that will improve the variety of factors that affect health. The research underlying this site is based on a model of population health that emphasizes the many factors that can make communities healthier places to live, learn, work, and play. In What Works for Health, project analysts assess strategies that could improve health through changes to health behaviors, social and economic factors, clinical care, and the physical environment.

Visit: **http://whatworksforhealth.wisc.edu/**

Positive Youth Development Resources

The **Family and Youth Services Bureau** and its **National Clearinghouse on Families and Youth** provide a wide array of resources, toolkits, and tutorials for providing positive youth development opportunities at the community level. **Building a Youth Program** is an online toolkit consisting of video-based guides that walk individuals and groups through the fundamentals of launching a nonprofit organization that will serve youth.

Visit: **http://ncfy.acf.hhs.gov**

Safe Communities

**Celebrate Safe Communities (CSC)** is an initiative of the National Crime Prevention Council. It was developed in 2008 in partnership with the Bureau of Justice Assistance at the U.S. Department of Justice and the National Sheriffs' Association (NSA) to promote crime prevention in local communities across the country. A CSC event can be anything large or small, such as an anti-drug march, a community safety fair, or a neighborhood cleanup. When you register your event, you will have access to free downloadable crime prevention resources, training programs, and other incentives.

Visit: **www.ncpc.org/programs/celebrate-safe-communities/**

## Resources for School Districts and Post-Secondary Education Providers

Resources for K-12

The **Wisconsin Safe and Healthy Schools Training and Technical Assistance Center** builds the capacity of Wisconsin public school districts to implement programs that effectively prevent and intervene in alcohol and other drug abuse and violent behavior among students in order to reduce these barriers to learning.

Visit: **www.wishschools.org**

The **Department of Public Instruction's (DPI) AODA program**, first authorized under Chapter 331, Laws of 1979, is designed to help local school districts utilize their staff and program resources to develop comprehensive AODA programs. DPI's AODA Assessment Tool is an evidence-based resource that can help a district or individual school identify gaps/needs in their AODA programming.

Visit: **http://sspw.dpi.wi.gov/sspw_aodaprog**

**Collaborative for Academic, Social, and Emotional Learning (CASEL)** is one of the leading organizations in advancing the development of academic, social and emotional competence for all students. Their mission is to help make evidence-based social and emotional learning (SEL) an integral part of education from preschool through high school. Through research, practice and policy, CASEL's website provides an online guide to effective social and emotional learning programs.

Visit: **www.casel.org/guide**

The **National Center on Safe Supportive Learning Environments (NCSSLE)** provides resources for professionals at all education levels: Pre-k/elementary school; middle/high school; and higher education. NCSSLE is funded by the U.S. Department of Education's Office of Safe and Healthy Students to help address such issues as bullying, harassment, violence, and substance abuse. Their website includes information about the Center's training and technical assistance, products and tools, and latest research findings.

Visit: **http://safesupportivelearning.ed.gov/**

**Search Institute** has been a leader and partner for organizations around the world in discovering what kids need to succeed. Their research, resources, and expertise help organization, schools and community coalitions solve critical challenges in the lives of young people. Search Institute's 40 Developmental Assets framework of strengths and supports is a widely respected, user-friendly approach to positive youth development.

Visit: **www.search-institute.org**

Resources for Post-Secondary

The **National Center on Safe Supportive Learning Environments** cited above also provides training and technical assistance, products and tools, and current research for post-secondary schools and institutions. The following resources may be helpful to post-secondary schools and institutions wishing to survey students to measure attitudes and behaviors around marijuana use and other substances.

The **ACHA-National College Health Assessment (NCHA)** is a nationally recognized research survey that can assist you in collecting precise data about your students' health habits, behaviors, and perceptions.

Visit: **www.acha-ncha.org**

Indiana Prevention Resource Center's Indiana College Substance Use Survey

Visit: **www.drugs.indiana.edu/indiana-college-survey/substance-use-survey**

## Resources for Parents, Guardians, and Other Caring Adults

**National Institute on Drug Abuse** provides the latest science-based information about the health effects and consequences of drug abuse and addiction and resources for talking with kids about the impact of drug use on health. NIDA's site also features **Family Checkup: Positive Parenting Prevents Drug Abuse**, an evidence-based resource for parents.

Visit: **www.drugabuse.gov/parents-educators**

**Partnership for Drug-Free Kids** is a nonprofit organization dedicated to reducing teen substance abuse and helping families impacted by addiction. The Partnership translates the science of teen drug use and addiction for families, providing parents with direct support to prevent and cope with teen drug and

alcohol abuse. Among the many resources available on their website, the **Marijuana Talk Kit** is specifically designed to assist parents in having meaningful, productive conversations with their teen about marijuana.

Visit: **www.drugfree.org**

## Resources for Employers

**Marijuana in the Workplace: Guidance for Occupational Health Professionals and Employers.** A joint guidance statement of the American Association of Occupational Health Nurses and the American College of Occupational and Environmental Medicine.

Visit: **www.acoem.org/Guidance_Statements.aspx**

**SAMHSA's The Division of Workplace Programs (DWP)** provides oversight for the Federal Drug-Free Workplace Program, to eliminate illicit drug use in the federal workforce. DWP's website provides the downloadable Drug-free Workplace Toolkit.

Visit: **www.samhsa.gov/workplace**

## Resources for Health Care Professionals, Social Service Providers, and other Youth-serving Professionals

**American Society of Addiction Medicine (ASAM)** is dedicated to increasing access and improving the quality of addiction treatment, educating physicians and the public, supporting research and prevention, and promoting the appropriate role of physicians in the care of patients with addiction.

Visit: **www.asam.org**

Information on **SBIRT: The SAMHSA-HRSA Center for Integrated Health Solutions (CIHS)** promotes the development of integrated primary and behavioral health services to better address the needs of individuals with mental health and substance use conditions, whether seen in specialty behavioral health or primary care provider settings.

Visit: **www.integration.samhsa.gov/clinical-practice/SBIRT**

# Appendix G: Principles of Adolescent Substance Use Disorder Treatment

The National Institute on Drug Abuse (NIDA) wrote *Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide* (January 2014) that outlines the principles and key components of creating and sustaining a comprehensive adolescent substance use treatment program. These principles are:

- Adolescent substance use needs to be identified and addressed as soon as possible.
- Adolescents can benefit from a drug abuse intervention even if they are not addicted to a drug.
- Routine annual medical visits are an opportunity to ask adolescents about drug use.
- Legal interventions and sanctions of family pressure may play an important role in getting adolescents to enter, stay in and complete treatment.
- Substance use disorder treatment should be tailored to the unique needs of the adolescent.
- Treatment should address the needs of the whole person, rather than just focusing on his or her drug use.
- Behavioral therapies are effective in addressing adolescent drug use.
- Families and communities are important aspects of treatment.
- Several evidence-based interventions for adolescent drug abuse seek to strengthen family relationships by improving communication and improving family members' ability to support abstinence from drugs.
- In addition, members of the community (such as school counselors, parents, peers, and mentors) can encourage young people who need help to get into treatment—and support them along the way.
- Effectively treating substance use disorders in adolescents requires also identifying and treating any other mental health conditions they may have.
- Sensitive issues such as violence and child abuse or risk of suicide should be identified and addressed.
- It is important to monitor drug use during treatment.
- Staying in treatment for an adequate period of time and continuity of care afterward are important.

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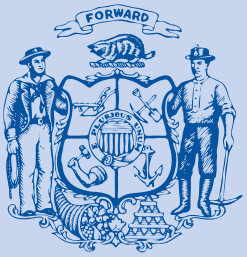


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