



White Paper on  
**Medical Marijuana**

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## Marijuana Use

It was reported that in 2015, more than 22 out of the 27 illicit drug users in America were monthly users of marijuana, making up 8.3% of the 262 million American population aged 12 or older. A staggering finding of 48.1 percent of the American adult population with less than a high school diploma reported daily use.<sup>1</sup> These numbers have rapidly grown from the percentages from 2002 to 2013, before marijuana was legalized for medical marijuana use.<sup>2</sup> It has been seen that states that have progressed to legalizing marijuana for recreational use have seen a 155% increase in use in the three-year average since legalization.<sup>3</sup>

Marijuana is the most commonly used illicit drug, and likewise is associated with a lower public health status as it negatively affects individual health and well-being, economic, and social circumstances.<sup>4</sup> Marijuana use is associated with lower life satisfaction, more relationship problems, and less academic and career successes.<sup>5</sup> It is also identified with a wide range of health problems including hallucinations and paranoia, damages to DNA, breathing problems, including inflammation of the lungs, symptoms of chronic bronchitis, rapid lung destruction – even more severe than tobacco smokers, possible harm to fetus's neurological development, and low birth weight when used during pregnancy.<sup>3,6</sup> Furthermore, marijuana is heavily associated with high risk of addiction, schizophrenia, psychosis, and short-term declines in memory, attention, and learning.<sup>7</sup>

## Marijuana Use in Adolescents

A major concern with legalizing medical and recreational marijuana and lessening its restrictions is the increase of use and lower quality of life in adolescents. Adolescents, compared to any other age group, are particularly prone to risks associated with marijuana use.<sup>8</sup> Cannabis use is most prevalent in ages 18 to 25 in the United States, with 20% using it on a monthly basis.<sup>2</sup> Seven percent of 12 to 17 year olds currently use the substance, while 3% of adolescents have a Marijuana Use Disorder.<sup>2</sup> Unfortunately when marijuana is legalized, such as Washington's recent legalization for marijuana recreational use, adolescents' perceived harm decreases and use increases.<sup>9</sup> Following Colorado's legalization for marijuana recreational use, past month use in youth increased 20% during an average 2-year span. The passage of this law also contributed to Colorado possessing the highest ranking of adolescent marijuana users in the United States, as their rates increased 74% above the national average in 2013/2014 from the previous state of 39% above the national average in 2011/2012 during the time it was legalized for medical use.<sup>4</sup>

The increase of cannabis use in adolescents impairs overall well-being as it declines their progression in academics.<sup>8</sup> Any type of cannabis use in adolescents is associated with a decrease in learning from brain impairment, problem solving, memory, math, and reading.<sup>10</sup> Brain impairment from marijuana use has shown its inability to regain its previous state of neurological

function after stopping marijuana use, while it also permanently lowers adolescents' IQ scores by up to 8 points, bringing them to the lowest third quartile of intelligence.<sup>5,11</sup> Weekly use is correlated with decreased rates of high school graduation.<sup>7</sup> The negative impacts relating to educational attainment is comparative to living in a family with the poorest level of wealth.<sup>12</sup>

It has been shown that adolescents are particularly vulnerable to harmful situations with marijuana use, as it increases psychotic symptoms such as delusions, hallucinations, feelings of emotional unresponsiveness, and paranoia, which puts them at risk for mental illnesses such as schizophrenia, depression, and suicide.<sup>8, 13</sup> Use of marijuana in adolescents is also associated with relational harm, dating violence, disinterest in activities, isolation from family, and a lower quality of life.<sup>8</sup> Additionally, students who use marijuana are at risk for vehicle accidents, as over 28 thousand Seniors admitted they were in at least one motor vehicle accident each year in high school after the use of marijuana.<sup>10</sup>

## Medical Marijuana and the Food & Drug Administration (FDA)

Despite that a total of 29 states and the District of Columbia have now legalized marijuana for medical programs and/or recreational use, at the federal level it still remains a federal offense and is classified as a Schedule I substance under the Controlled Substances Act, where Schedule I substances have a high potential for dependence and are not for medical use.<sup>14</sup> Although marijuana is not FDA approved, i.e. it is not certified to be safe for prescription drug use or any indication, many states are allowing patients to purchase marijuana by using a medication card, given by a healthcare worker.

Although there have been some studies conducted that associate benefits with cannabis use and certain ailments, the FDA cannot approve marijuana for drug use because it has been linked to harmful health outcomes and has not been proven for effective medication.<sup>14</sup> In states that have approved medical marijuana, healthcare workers have the freedom to give patients access to a marijuana medication card for purchasing marijuana; however, proper dosages cannot be prescribed due to the limitations of not being FDA certified, allowing patients to consume potentially harmful amounts of the substance for their ailments.<sup>15</sup> Another concern that the FDA found with marijuana being a certified drug is the unmonitored and varying levels of THC in the *cannabis sativa* plant.<sup>15</sup> THC concentrations are continuing to increase to harmful levels, but this varies based upon the dispensary.<sup>8</sup> Thus, it has been too difficult to produce a consistent dosage of medical marijuana to consumers.<sup>15</sup>

There has been considerable interest in the effects of marijuana for certain conditions, such as the attempt to decrease symptoms in glaucoma, AIDS, neuropathic pain, cancer, multiple sclerosis, nausea, and certain seizure disorders; however, there is no current scientific evidence that marijuana is effective for these treatments due to the harm that may occur with testing human subjects.<sup>10, 15</sup> The FDA has realized this interest in treatment, and thus approved two other

drugs that contain a synthetic variation of a substance present in marijuana known for its medicinal effects, while they do not contain any of the harmful compounds found in marijuana, making them safe for medical use.<sup>14</sup>

Cannabinoid (CBD) oil is a substance derived from separating the resin, i.e., the sticky substance, from the flower of the *cannabis sativa* plant, and its purposes are typically used topically for localized pain and differ than that of marijuana use. CBD oil has been legalized in Tennessee and can be purchased for medicinal purposes, but has been known to be used in other ways, such as smoked and orally ingested for the effects of THC found in marijuana.<sup>16</sup>

## Other State Outcomes

Out of the 29 states that have legalized marijuana for recreational or medical use, the most documented health outcomes have been seen in Colorado, one of the first states to legalize marijuana for recreational use.<sup>7</sup> Alaska, Washington, and Oregon have also progressed from legalizing medical marijuana to recreational use.<sup>7</sup> There has been a trend found in the legalization process in states—marijuana use starts from a more restrictive law of medical marijuana use, to voting in lesser restrictive laws, and then finally being voted in for recreational use.<sup>3</sup>

Since the passing of marijuana for recreational use in Colorado in 2012, significant health concerns have been found.<sup>3</sup> Marijuana's increase of use in Colorado following the legalization of recreational use was associated with a 49% increase in Emergency Department visits, an 87% increase in vehicle crashes whose drivers tested positive for marijuana, and a 5% increase in alcohol consumption, making alcohol consumption 6% above the national average. A large concern has been found in supporting evidence for the increased burden of homelessness—there has been a 50% increase in homeless shelter utilization and higher incident rates for employer troubles, such as more employee drug test failures, absenteeism, injuries, and disciplinary problems.<sup>3,17</sup> Other findings include a 471% increase of seizures in Colorado marijuana in the United States mail in the 3-year average following legalization of recreational use. Also, when Colorado had legalized medical marijuana in 2009, the average number of seizures of Colorado marijuana increased 357% in a 3-year span, showing that legalizing medical marijuana increases illegal and harmful habits among users.<sup>3</sup>

The state of Washington, although has not documented its health effects to the extent of Colorado, also legalized recreational marijuana in 2012. It was recorded that vehicle accidents related to a positive THC test in 2014 were doubled in 2 years.<sup>3</sup> According to the Washington State Traffic Safety Commission, there was a 460% increase in marijuana-only DUI's since 2012.<sup>3</sup> In the state of Oregon, which has had a recreational marijuana legalization since 2014, and had a medical marijuana law for the 16 years prior, currently has 11% of its population regularly using marijuana, and half of its population has used marijuana in the past.<sup>17</sup>

Knowing the detrimental health effects marijuana has on adolescents, the increasing rates of their illegal use is a great concern. Furthermore, states that have legalized it for recreational and medical purposes, also show increased adolescent use because students see marijuana as being acceptable to use.<sup>18</sup> Out of 11<sup>th</sup> grade students that drove in Oregon, half of the students that smoked marijuana admitted to driving within 3 hours of use, and over 62% of students reported having easy access to the substance, despite over half of students realizing that moderate consumption increased their risk for injury and decreased their state of health.<sup>18</sup>

## Marijuana and Addiction

Addiction to marijuana is becoming an increasing problem, as clinical dependence has been found to affect roughly 10% of marijuana users, most being adolescents and young adults.<sup>4</sup> Marijuana production has had a steady increase in THC levels over the past decades, producing a more potent plant, which has been linked to higher addiction rates. Part of this complication could be linked to the unmonitored dispensaries of marijuana, in which concentration of THC levels varies by producers.<sup>8</sup>

Marijuana Use Disorder in 2015 was found among 4 million Americans, which is a precursor for addiction.<sup>17</sup> It has been recorded that up to 30% of individuals who use marijuana are likely to develop Marijuana Use Disorder to some degree.<sup>8</sup> In a study conducted in 2009, individuals between the ages of 12 and 25 comprised 66% of treatment admissions for Marijuana Use Disorder.<sup>17</sup> It has been shown that users below the age of 18 are 4 to 7 times more likely than adults to develop this disorder leading to addiction.<sup>19</sup> Colorado reported that their drug treatment facilities were at full capacity, the majority of patients being young in age, and almost half were admitted for their high dependence to marijuana versus other illicit drugs.<sup>10</sup>

## Societal and Economic Impacts

Lessening the restrictions on marijuana is becoming a perpetual theme in the polls in all states, which is also associated with poorer societal and economic outcomes.<sup>10</sup> Many new cannabis use laws were elected during 2016 throughout the United States, which not only allowed over 28 states and Washington D.C. access to medical marijuana, but also lessened the restrictions associated with its use in other states, making marijuana more easily acceptable to the public.<sup>20</sup> Connecticut took the lead on allowing minors to enroll in the medical marijuana program and many states are following, while Delaware now allows minors to use Cannabinoid oil on school buses.<sup>20</sup> According to the State-by-State Medical Marijuana Laws Report, almost every state that has initiated the ballot for marijuana use or less restrictive regulations associated with its use has enacted it into law by popular vote.<sup>20</sup>

There are many adverse side effects associated with increased marijuana use at the societal level. According to one study, the negative impacts of expanding marijuana laws will have such a severe impact on public health from a social and economic standpoint, there will be no turning back.<sup>3</sup> The costs presently cannot be determined; however, they are noted to be cruel.<sup>10</sup> One argument for marijuana use is that it will yield more profit to the government through increased tax revenues. Nonetheless, this rationale is mistaken for various reasons. First, tax revenue assessments cannot be determined because the impact of the black-market's supply to users is not known, although it has been documented that Colorado's black market has increased significantly since marijuana has been legalized.<sup>3</sup> Furthermore, it has been observed that Colorado's tax revenue from marijuana is only 0.5% of total tax income. This amount may seem somewhat of a worthy amount; however, according to the National Drug Intelligence Center, in 2011 there were over \$193 billion annual losses due to negative side effects of illicit drug use, such as sickness, accidents, loss of productivity, and crimes. Over 66% of the losses were from poor productivity, which is heavily associated with marijuana use.<sup>3</sup> In another study by the National Center on Addiction and Substance Abuse at Columbia University, it was found that much of governmental spending is towards attempting to decrease the negative effects of our continued failure to treat the substance misuse, rather than preventing it before the damage occurs.<sup>3</sup> Only 3% of governmental funds is spent towards preventative care, while 60% was spent towards healthcare costs, including alcohol and drug abuse.<sup>3</sup>

Other economic impacts of the legalization of marijuana include negative environmental side effects, such as an increase in air pollution from production. It was found that for every pound of marijuana grown indoors, there is almost 5,000 pounds of carbon dioxide released into the environment.<sup>3</sup>

## Marijuana Use and Safety

A major concern with the use of marijuana is its negative effects on traffic accidents and correlated deaths. It was reported in that marijuana-related traffic accidents, deaths increased almost 50% in the three-year average after legalization of recreational marijuana, which was 40% more than the national average.<sup>3</sup> The use of marijuana prior to driving has been shown to double the chances of collisions, due to slower cognitive function, reaction speed, and lane-weaving.<sup>3</sup>

Other safety issues have been found among employees at work that are marijuana users, who are at increased risks to accidents and injuries to themselves and others, due to inability to safely multitask, lessened sensorimotor skills, and attentional deficits.<sup>3</sup> There are also studies that highlight marijuana's impacts on public safety. Short and long-term uses have been shown to delay cognitive function, affecting sensorimotor abilities, attention span, memory, self-control, learning, and educational attainment, which have detrimental effects on many aspects of daily

life. There has also been moderate evidence that marijuana use has been linked to suicidal attempts and completions.<sup>5</sup>

## Glossary

***Cannabinoid***: a class of diverse chemical compounds that act on receptors in the brain that repress neurotransmitter release, including endocannabinoids (produced in the body), phyto-cannabinoids (found in plants) and synthetic cannabinoids (manufactured chemically). There are two types of cannabinoid receptors in the body: type one, found in the brain (basal ganglia and limbic system, including hippocampus) and type two, found in the immune system (especially in the spleen).

***Current use***: use of a substance within the past 30 days.

***Illicit drug***: use includes the non-medical use of a variety of drugs that are prohibited by international law. These drugs include: amphetamine-type stimulants, cannabis, cocaine, heroin and other opioids, and ecstasy.

***Marijuana***: dried leaves, flowers, stems and seeds from the hemp plant *Cannabis sativa*, which contains the psychoactive chemical delta-9-tetrahydrocannabinol (THC), as well as other related compounds; may also be concentrated in a resin called hashish or a sticky black liquid called hash oil.

***Schedule I***: classification for drugs, substances or chemicals with no currently accepted medical use and high potential for abuse; pose potentially severe psychological or physical dependence.

***THC***: primary psychoactive component of the Cannabis plant; delta-9-tetrahydrocannabinol; scheduled by the international Single Convention on Narcotic Drugs (Schedule I and IV) and by the United States Drug Enforcement Administration (Schedule I).

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