



King County Youth Marijuana Prevention & Education Program

HEALTH EFFECTS OF CANNABIS USE: The Current Evidence on Benefits & Risks

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With cannabis being legal in Washington, in ten other U.S. states, and the District of Columbia, you’ve probably heard a lot lately about both the good and the potential harm that can come from using cannabis. The truth is, we don’t know as much as we’d like to about any of the effects of cannabis. You can find a scientific study to support almost anything you want to say about the health effects of cannabis, and anecdotes (both good and bad) abound. This report digs into the science, summarizing what we know and what we don’t know about the benefits and risks cannabis can have to health.

The best sources of information on the health effects of cannabis will usually be reviews, where scientists have looked at all of the studies that have been conducted in a certain area, assessed their quality (e.g., sample, design, analyses), and conducted some analyses to pool or summarize results across the high quality studies. For this report, we are relying heavily on four such published reviews: one by the National Academies of Sciences, one by the World Health Organization, and two by the Colorado Department of Public Health and Environment.

Before we get started, it’s important to note that what we know about the health effects of cannabis is almost all by association. This means that we really cannot say that cannabis “causes” any of the things we talk about below, yet. Studies have not been designed in a way that establishes causality. It will be important to advance science so we have a better understanding in the future of whether the effects we describe below are caused by cannabis use, or just occur at higher rates in cannabis users due to other factors. In addition, some of the research we review below has not been conducted using the entire cannabis plant, but rather isolated components of the plant (or cannabinoids).

We refer below to a classification of the evidence that is based on the following terms drawn from the National Academies of Sciences Report:

- Conclusive evidence: There is strong evidence from many good-quality studies, including randomized control trials, with few or no credible opposing findings. Limitations, including bias and confounding factors, can reasonably be ruled out.
- Substantial evidence: There is strong evidence from several good-quality studies with few or no credible opposing findings. Minor limitations may exist that cannot be ruled out, including possible bias or confounding.
- Moderate evidence: There is some evidence from good to fair quality studies with few or no credible opposing findings. Limitations exist and bias and confounding factors cannot be ruled out.
- No or insufficient evidence: No or insufficient evidence (e.g., mixed findings, a single poor quality study) exists to support that cannabis or cannabinoids are an effective or ineffective treatment, or to refute a statistical association between cannabis or cannabinoids and the endpoint.

Potential therapeutic effects associated with cannabis use

Cannabis has a long history of use as a medicinal plant. While clinicians may recommend cannabis for a broad array of medicinal uses, and states may authorize a variety of medical conditions for cannabis use, the science is still fairly limited on the medical benefits of cannabis. There are five areas for which we have modest to substantial evidence of therapeutic effects from cannabis. These are reviewed below.

There is conclusive evidence that oral cannabinoids are effective in relieving chemotherapy-induced nausea and vomiting.

There are two FDA-approved synthetic THC drugs currently on the market that are indicated for chemotherapy-induced nausea and vomiting (dronabinol and nabilone). These drugs have been available outside of the U.S. for more than 30 years, and much of the research on the use of cannabis for relief of chemotherapy-induced nausea has been conducted with them.



There is conclusive evidence that cannabis-derived CBD is effective in the treatment of seizures associated with Lennox-Gastaut Syndrome or Dravet Syndrome (two rare, severe childhood-onset epilepsies).

The FDA approved a specific pharmaceutical formulation of highly purified, plant-derived CBD (Epidiolex) in August of 2018 for this medical use.

There is substantial evidence of improvement in patient-reported symptoms from multiple sclerosis-related spasticity.

This evidence comes primarily from studies of nabiximols, an oral spray available outside of the U.S. that delivers a dose of 2.7 mg THC and 2.5 mg CBD.

There is substantial evidence that cannabinoids are effective in treating chronic pain in adults.

Relief from chronic pain is the most common condition for which patients report using medicinal cannabis. Among adults with chronic pain, those treated with cannabis or cannabinoids were more likely to experience a clinically significant reduction in pain symptoms. Importantly, a number of the studies reviewed to arrive at this conclusion have been conducted using specific cannabinoids isolated in a medical form (e.g., nabiximols and nabilone) – not the entire plant.

There is moderate evidence that cannabinoids (primarily nabiximols) are effective in improving short-term sleep outcomes in individuals with sleep disturbances associated with obstructive sleep apnea, fibromyalgia, chronic pain, and multiple sclerosis.

We do not have enough scientific evidence (evidence is either limited or insufficient) to draw conclusions about the use of cannabis or cannabinoids for:

- Increasing appetite and decreasing weight loss associated with HIV/AIDS
- Treatment of cancer-associated anorexia-related syndromes
- Treatment of irritable bowel syndrome
- Improving symptoms of Tourette syndrome
- Improving or treating symptoms of ALS (amyotrophic lateral sclerosis)
- Treatment of chorea and neuropsychiatric symptoms associated with Huntington's disease
- Treatment for the motor system symptoms associated with Parkinson's disease or medication-induced uncontrolled, involuntary movements
- Treatment of dystonia, or sustained or repetitive muscle contractions.
- Improving symptoms associated with dementia
- Treatment of the intraocular pressure associated with glaucoma
- Improved symptoms and outcomes following traumatic brain injury or intracranial hemorrhage
- Treatment of other substance use addiction
- Treatment of anxiety (though there is limited evidence of improvement of symptoms in people with social anxiety disorders)
- Treatment of depression
- Treatment of PTSD
- Treatment of schizophrenia or psychosis

Potential harmful effects associated with cannabis use

While cannabis has some therapeutic benefits, those benefits must be weighed against potential harms and risks. While some of these harms/risks are linked to any cannabis use, others are tied to earlier initiation of use and more frequent use patterns.

There is moderate evidence that cannabis use leads to impairments in short-term learning, memory, and attention.

In other words, cannabis use can cause difficulty in completing complex tasks, making decisions, and learning and remembering. Research suggests that the younger people initiate cannabis use, and/or the more often they use cannabis, the bigger the differences in brain function. Long-term effects on learning, memory, and attention still are not clear. However, in youth, differences in cognitive function are more likely to last longer. The brain continues to develop into young adulthood, so adolescents and young adults are at particular risk.

There is moderate evidence that longtime, daily, or near daily cannabis use is associated with development of hyperemesis syndrome, a condition that causes severe nausea, vomiting, and weight loss.

There is moderate evidence that regular cannabis use in youth is negatively associated with impacts on academic achievement and graduation.

Again, the earlier youth initiate cannabis use and the more frequently they use, the stronger the association. Importantly, however, youth who initiate cannabis use early may also exhibit other risk factors for reduced educational attainment, making it difficult to understand the specific role cannabis plays in the association.

There is limited evidence on the effects of secondhand cannabis smoke.

Preliminary research suggests that secondhand cannabis smoke has many of the same cancer-causing toxins as tobacco smoke, and that secondhand smoke exposure is associated with impaired vascular function. Studies suggest that these effects are likely due to other constituents in the smoke, not to the THC or CBD components.



There is moderate to substantial evidence that typical secondhand smoke exposure does NOT yield a positive drug screen for THC by urine or blood.

WITH REGARD TO MENTAL HEALTH:

There is substantial evidence that cannabis use, especially heavy use or overconsumption, is associated with acute psychotic symptoms including hallucinations.

These effects may occur at lower doses in people who have not used cannabis before or are prone to psychoses.

There is substantial evidence that cannabis use is associated with the development of schizophrenia and other psychotic disorders, with the highest risk among those who initiate early and use frequently.

Some data suggest that cannabis use may make symptoms more likely in individuals who are predisposed to psychoses. In other words, it's unclear from research at this point if cannabis causes schizophrenia, or if those who are already at high risk for schizophrenia are drawn to use cannabis.

There is moderate evidence that cannabis use is associated with an increased risk of depression and social anxiety disorder.

There is limited evidence related to impacts on other anxiety disorders. It is not clear whether cannabis use causes depression and anxiety, or whether people prone to depression and anxiety are more likely to use cannabis.

There is moderate evidence that cannabis use is associated with of increased incidence of thinking about suicide, attempting suicide, and completing suicide.

There is limited evidence that cannabis use increases the likelihood of developing bipolar disorder, and moderate evidence that cannabis use is associated with increased symptoms of bipolar disorder like mania and hypomania.

There is limited or insufficient evidence for the relationship between cannabis use and Post-Traumatic Stress Disorder (PTSD).

WITH REGARD TO BEHAVIORAL HEALTH:

There is substantial evidence that cannabis use is associated with addiction to or dependence on cannabis.

About 9% of cannabis users develop cannabis use disorder, but the likelihood of addiction or dependence is higher in people who start using cannabis at an early age and/or use cannabis frequently. Treatment can decrease use and dependence.

There is moderate evidence that cannabis use is associated with the development of substance use or dependence on other substances, including abuse of alcohol, tobacco, and illicit drugs.

The earlier someone starts using cannabis, and the more regularly they use cannabis, the more likely they are to abuse other substances.

Cannabis Use Disorder

The DSM-5 Cannabis Use Disorder (Addictive Disorder) provides 11 criteria to identify a problematic pattern of cannabis use leading to clinically significant impairment or distress. Problematic patterns are those manifesting at least 2 of the 11 criteria in a 12 month period).

- Criteria 1-9: the behavioral patterns for addictive use of marijuana. These patterns represent the loss of control over the use of marijuana with adverse consequences over a period, and recurrent pattern of problematic cannabis use.
- Criteria 10 and 11 represent pharmacological tolerance and dependence.

WITH REGARD TO PREGNANCY AND BREASTFEEDING:



There is substantial evidence that cannabis use during pregnancy is associated with low birthweight infants.

There is limited to moderate evidence that prenatal cannabis exposure may interfere with normal development and maturation of the brain.

Children exposed to cannabis during pregnancy (e.g., in utero) are more likely to have impairments in attention, learning, and memory, as well as impulsivity and behavioral problems.

There is limited evidence that cannabis use during pregnancy is associated with other pregnancy complications and admission of the infant to the neonatal intensive care unit.

There is insufficient evidence about the effects of cannabis use during breastfeeding.

However, THC is fat-soluble and passes to the baby through breast milk. Breastfeeding women should be advised not to use cannabis.

WITH REGARD TO CHRONIC DISEASE:

There is substantial evidence that cannabis smoking is associated with worse respiratory symptoms, including more frequent chronic bronchitis episodes.

There is limited evidence that cannabis use is associated with an increased risk of developing chronic obstructive pulmonary disease (COPD). There is insufficient evidence on the respiratory effects of vaporizing or aerosolizing cannabis.

Acute exposure to cannabis increases heart rate and blood pressure.

There is limited evidence that cannabis use is associated with cardiovascular disease and heart attack (myocardial infarction); the risk may be higher in patients who have recently had a heart attack. There is limited to moderate evidence that cannabis use increases the risk for some forms of stroke, especially in cannabis users under 55 years of age.

There is limited evidence that cannabis use is associated with increased risk of prediabetes, though data are conflicting about the role cannabis may play in people with metabolic syndrome and diabetes.

Data suggest that THC itself is not a cancer-causing agent. However, burning cannabis plant matter does contain cancer-causing chemicals, including many of the same chemicals that are found in tobacco smoke.

Current research remains unclear on the effects of cannabis use and many cancers, including lung cancer and upper respiratory cancers. One of the reasons for this is that many people who smoke cannabis also smoke (or have smoked) tobacco products, which have been definitively linked to many cancers. There is limited evidence that cannabis use is associated with certain types of testicular cancer (non-seminoma germ cell tumors) and prostate cancer.

WITH REGARD TO INJURY:

There is substantial evidence that cannabis use is associated with increased risk of motor vehicle crashes, particularly when combined with alcohol.

Impairing effects from cannabis may last up to 6 hours in users, depending on the amount and type of cannabis consumed.

There is moderate to substantial evidence that states with legalized cannabis policies have an increased risk of overdose injuries in pediatric populations due to accidental consumption.

These injuries can include severe respiratory distress. In case of accidental consumption, call the Washington Poison center at 1-800-222-1222. Cannabis should be locked up and placed out of reach at home to help prevent accidental consumption by children, other unknowing adults, or pets.



There is insufficient evidence to support or refute other associations between cannabis use and injuries, including occupational injuries and violence victimization.

More research is needed.

Why don't we know more about the health effects of cannabis?

Cannabis is a federal schedule 1 substance in the U.S., which means it has no accepted medicinal uses and is a federally illegal substance. This has made researching cannabis and its constituents very difficult. Researchers who want to conduct studies using cannabis need a specially sanctioned lab, and have to get the cannabis they use through the federal government. These barriers have made it difficult to do the type of research that is needed to better understand the effects of cannabis and cannabinoids.

Additionally, in studies that have been conducted, it is often difficult to tease out what is attributable to cannabis, and what is attributable to other substances – particularly tobacco and/or alcohol, both of which are also often consumed by people who use cannabis.

Finally, it's reasonable to suspect that the amount and frequency of cannabis that someone uses, and the way in which they consume it (e.g., smoke, eat, dab, etc.) may contribute to its effects. These variables have often not been included in research, though that is starting to shift. Most of the research reviewed above has focused on smoked cannabis, and cannabis potency that is consistent with dried flower. Little is known about the health effects of other forms of cannabis, including newer, high potency products.

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