

SUMMARY OF RESEARCH ARTICLES BY JOHNNY'S AMBASSADORS

Excerpted from johnnysambassadors.org/thc-youth

WHAT ARE THE EFFECTS OF MARIJUANA ON YOUTH?

2022

[Driving Performance and Cannabis Users' Perception of Safety](#) – January 2022. Participants' increasing willingness to drive at 1 hour 30 minutes may indicate a false sense of driving safety. Worse driving performance is evident for several hours postsmoking in many users but appears to resolve by 4 hours 30 minutes in most individuals. Further research is needed on the impact of individual biologic differences, cannabis use history, and administration methods on driving performance.

[Effect of Medical Marijuana Card Ownership on Pain, Insomnia, and Affective Disorder Symptoms in Adults](#) – March 2022. People who obtained cards immediately were twice as likely to develop cannabis use disorder, the study found. Ten percent had developed the disorder by week 12, and that figure rose to 20% if they were using marijuana for anxiety or depression. Medical marijuana use may “pose a high risk or may even be contraindicated for people with affective disorders. This finding is important to replicate because depression has been reported as the third most common reason that people seek a medical marijuana card.”

[“Evidence on the acute and residual neurocognitive effects of cannabis use in adolescents and adults: A systematic meta-review of meta-analyses”](#) - January 2022. The study found that cannabis intoxication leads to small to moderate cognitive impairments in areas including: making decisions, suppressing inappropriate responses, learning through reading and listening, the ability to remember what one reads or hears, and the time needed to complete a mental task.

[Evidence on the acute and residual neurocognitive effects of cannabis use in adolescents and adults: a systematic meta-review of meta-analyses](#) – January 2022. This meta-review measured the magnitude of acute and residual effects of cannabis on cognition in adolescents and adults provided by meta-analyses and evaluated quality of evidence. Meta-analytical data on the acute effects of cannabis use on neurocognitive function have shown that cannabis intoxication leads to small to moderate deficits in several cognitive domains. These acute impairments accord with documented residual effects, suggesting that the detrimental effects of cannabis persist beyond acute intake. “Cannabis use in youth may consequently lead to reduced educational attainment, and, in adults, to poor work performance and dangerous driving. These consequences may be worse in regular and heavy users,” Dumais said. “Thus far, the most consistent alterations produced by cannabis use, mostly its chronic use, during youth have been observed in the prefrontal cortex,” Dumais said. “Such alterations may potentially lead to a long-term disruption of cognitive and executive functions.”



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[Marijuana Legalization and Opioid Deaths](#) – Feb. 2022. Legal medical marijuana, particularly when available through retail dispensaries, is associated with higher opioid mortality. The results for recreational marijuana, while less reliable, also suggest that retail sales through dispensaries are associated with greater death rates relative to the counterfactual of no legal cannabis.

[Physicians Warn Cannabis Can Cause Serious Health Hazards](#) – May 2022. Thousands of peer-reviewed medical articles have been published on the harms of cannabis and marijuana. Reviews of medical benefits of cannabis published in highly ranked journals reveal only limited benefits for rare conditions, and generally do not consider long term consequences.

[Young marijuana smokers may be](#) at greater risk of recurrent stroke – February 2023. Among hospitalized adults, ages 18-44 who had a history of stroke or transient ischemic attack (TIA), the cause of another hospitalization was 48% more likely to be another stroke if they were habitual marijuana smokers. According to previous research, problematic marijuana use has already been associated with an increased risk of an initial stroke, however, this is the first study to suggest that recurrent stroke may also be more likely.

2021

[Cannabis use among military veterans with PTSD: A great deal to gain or lose?](#) January 2021. Veterans are disproportionately affected by conditions for which medical cannabis is often pursued, making an evidence-based perspective on risks versus benefits of high priority. The balance of the evidence associated cannabis use with negative health outcomes, with consistent positive associations with other substance use, psychiatric disorders, and self-harm/suicidality.

[Drinking, smoking, and drug use linked to premature heart disease in the young](#) – February 2021. Recreational drinking, smoking, and drug use is linked to premature heart disease in young people, particularly younger women, finds research published online in the journal *Heart*. Those who regularly use 4 or more substances are 9 times as likely to be affected, the findings indicate.

[Frequent Cannabis Use by Young People Linked to Decline in IQ](#) – January 2021. A study has found that adolescents who frequently use cannabis may experience a decline in Intelligence Quotient (IQ) over time. The results revealed that there were declines of approximately 2 IQ points over time in those who use cannabis frequently compared to those who didn't use cannabis. Further analysis suggested that this decline in IQ points was primarily related to reduction in verbal IQ.

[Marijuana: A systems-based primer of adverse effects associated with use and an overview of its therapeutic utility](#) – March 2021. A systematic review of systematic reviews performed in 2020 has found there to be an increased risk of lung cancer in inhalational marijuana users, ranging from 8% to 410% after controlling for confounding factors."

[Prevalence and Correlates of Driving Under the Influence of Cannabis in the U.S.](#) – March 2021. 57 percent of daily users and 63.8 percent of those with a cannabis use disorder drove under the influence of the drug. The latter also were more likely to be under the influence of other drugs, to take part in illegal behavior, and to suffer from mental distress.

[Prevalence of Substance Use Disorders by Time Since First Substance Use Among Young People in the US](#) – March 2021. In the time after first trying cannabis or first misusing prescription drugs, the

percentages of young people who develop the corresponding substance use disorder are higher among adolescents (ages 12-17) than young adults (ages 18-25). The researchers found that the prevalence of past-year cannabis use disorder was higher for adolescents than young adults at all examined time frames since first use of the drug. For example, within 12 months since first cannabis use, 10.7% of adolescents had cannabis use disorder versus 6.4% of young adults.

[Trends in cannabis use among adults with children in the home in the United States, 2004-2017:](#)

Impact of state-level legalization for recreational and medical use – March 2017. Among adults with children living in the home, cannabis use appears to be more common in US states with legalized cannabis use compared with states with no legal cannabis use. Recreational legalization appears to increase use among adults with children in the home broadly across nearly all sociodemographic groups, whereas the effect of legalization for medical use is heterogeneous by age and socioeconomic status.

2020

[Associations Between Prenatal Cannabis Exposure and Childhood Outcomes](#) – Sept. 2020. This study suggests that prenatal cannabis exposure and its correlated factors are associated with greater risk for psychopathology during middle childhood. Cannabis use during pregnancy should be discouraged.

[E-cigarette use among young adults: A latent class analysis examining co-use and correlates of nicotine vaping and marijuana](#) – November 2020. The most pervasive co-occurring substance use was observed among the e-cigarette Users class. Young adults reporting moderate or greater levels of nicotine vaping tended to engage in binge drinking and cannabis use, which may ultimately increase risk of deleterious health outcomes. Public health efforts may benefit from increased selectivity in targeting young adults for e-cigarette prevention and intervention services.

[Even occasional marijuana use raises risk of coronavirus complications, doctors say](#) – April 2020. Many believe that when marijuana use is limited, the risks and adverse symptoms often associated with heavy use of marijuana are not present. This article discusses how even occasional marijuana use can exacerbate the symptoms of coronavirus, bringing to bear doctors' research and observations.

[Even when sober, frequent marijuana users are dangerous drivers](#) – January 2020. The number of fatal vehicle crashes in which drivers tested positive for cannabis more than doubled from 2007 to 2016, rising from 8 percent to 18 percent, according to the National Highway Traffic Safety Administration. As states legalize recreational use of marijuana, more research is needed on how consumption affects driving safety.

[EVALI: adolescents more likely to obtain vaping products through informal sources](#) – May 2020. A total of 2155 patients were included in this cross-sectional study. Based on national surveillance data, adolescents were more likely to report obtaining nicotine-containing and THC (tetrahydrocannabinol)-containing e-cigarette or vaping products through informal sources than young adults or adults with EVALI.

[Informed Consent: A Policy Prescription for Communicating Benefit and Risk in State Medical Marijuana Programs](#) – 2020. Surveys suggest that the U.S. public has an overly optimistic view of marijuana's health effects. Aside from legal problems or the possibility of addiction, the majority of adults believe that marijuana has no significant risks, and 9% of adults believe that it has no risks at all. Among youths between ages 16 and 19, survey data demonstrate that almost two-thirds of them

are not worried at all that marijuana use will damage their health. Meanwhile, a third of adults believe that eating, smoking, or vaping marijuana products will actually prevent health problems.

[Is Marijuana Addictive?](#) National Institute on Drug Abuse – July 2020. Marijuana dependence occurs when the brain adapts to large amounts of the drug by reducing production of and sensitivity to its own endocannabinoid neurotransmitters. Marijuana use disorder becomes addiction when the person cannot stop using the drug even though it interferes with many aspects of his or her life. Studies suggest that 9% of people who use marijuana will become dependent on it rising to about 17% in those who start using in their teens.

[Marijuana Concentrates Spike THC Levels But Don't Boost Impairment](#) – CU June 2020. Regular users of marijuana concentrates develop a tolerance over time. There may be genetic or biological differences that make some people metabolize THC more quickly. Cannabinoid receptors may become saturated with THC at higher levels, beyond which there is a diminishing effect of additional THC. The study examined regular users who have learned to meter their use based on the desired effect and does not apply to inexperienced users. Those users should still be extremely cautious with concentrates.

[Marijuana Impairs Female Fertility](#) – April 2020. Female eggs exposed to THC, the psychoactive ingredient in marijuana, have an impaired ability to produce viable embryos, and are significantly less likely to result in a viable pregnancy, according to an animal study.

[Marijuana Legalization and Youth Marijuana, Alcohol, and Cigarette Use and Norms](#) – July 2020. It is important to consider recent broad declines in youth substance use when evaluating the impact of nonmedical marijuana legalization. States that legalize nonmedical marijuana for adults should increase resources for the prevention of underage marijuana and alcohol use.

[Marijuana Withdrawal is Real, Study Shows](#) – April 2020. Experts have long argued that marijuana withdrawal is a real phenomenon, but these concerns received a new legitimacy with the 2013 publication of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*. The DSM-5, considered the standard for psychiatric diagnoses, recognized cannabis withdrawal syndrome as a bona fide disorder.

[News Stories About Adolescents Using Marijuana with Poor Outcomes](#) – updated 2020. George F. Spicka, a former addict, shares evidence, research, and studies, and also first-hand accounts of marijuana's adverse effects on children and youth. While he concedes there may be some legitimate uses for marijuana in medical applications, he is concerned by the belief, perpetuated by NORML, Marijuana Policy Project, and similar organizations, that marijuana poses no danger.

[Prevalence and Correlates of Medicinal Cannabis Use Among Adolescents](#) – Aug. 2020. An estimated 6.89% of students reported Medicinal Cannabis Use (MCU), representing one quarter of the students reporting current cannabis use. Relative to the Recreational Cannabis Use (RCU)-only group, the MCU group reported using cannabis more frequently, were more likely to report vaping and eating cannabis, had greater risk for cannabis dependence, perceived cannabis as less harmful, were more likely to report tobacco use, recreational use of other drugs, and medicinal use of sedatives or tranquilizers, and were less likely to report good health and sleeping for seven or more hours per night.

[Prevalence of Cannabis Withdrawal Symptoms Among People With Regular or Dependent Use of Cannabinoids](#) – April 2020. Cannabis withdrawal syndrome appears to be common among people

with regular or dependent use of cannabinoids, with an overall pooled prevalence of 47% in this meta-analysis. Cannabis withdrawal syndrome was more common in men, participants from clinical samples, individuals with comorbid drug or tobacco use, and those with a higher level of cannabis use. Clinicians should be aware of the high prevalence of CWS and should consider screening for CWS, particularly among those who are at greater risk, in order to counsel patients and support individuals who are reducing their use of cannabis.

[Researchers identify more than 100 toxic chemicals in cannabis smoke](#) – June 2020. Among the billions of particles found in a single puff of cannabis smoke, Nishida's team observed 2,575 chemical compounds and was able to identify 536. Of those, 110 are known to be toxic, whether they be carcinogenic, mutagenic or teratogenic, which are chemicals that can interfere with the development of the embryo or fetus. And while they found more toxic chemicals in tobacco (173), Nishida's team found the particles in cannabis smoke were about 29 percent larger. In all, researchers found 3.4 times more mass from the total particulate matter in a typical cannabis joint than a cigarette.

[The Truth about Gateway Drugs and Addiction](#) – February 2020. There is evidence that using some substances early in development does result in a greater probability that an individual will abuse other substances; however, the reason for this is not well understood. This condition may represent some combination of inherent factors (e.g., genetic) and the interaction of environmental factors (e.g., peers, learning, stress, etc.).

[Weed Is Not Good for Your Heart, Studies Say – AHA August 2020](#). The American Heart Association recommends that people not smoke or vape any substance, including cannabis products, because of the potential harm to the heart, lungs and blood vessels. Weed has the potential to interfere with prescribed medications as well as trigger cardiovascular conditions or events, such as heart attacks and strokes.

[What is the prevalence and risk of cannabis use disorders among people who use cannabis?](#) A systematic review and meta-analysis – November 2020. This review provides prevalence and risks estimates for CUDs from using cannabis in developed countries. People who use cannabis have 1 in 5 risks of having CUD (abuse or dependence) and 1 in 8 risk of having CA or CD. The risk of developing CD increases to 1 in 3 among people who use cannabis weekly or more often. These risks may increase in the future if cannabis users more often and use more potent cannabis products after cannabis legalisation.

2019

[Acute Illness Associated With Cannabis Use, by Route of Exposure](#) – Monte Oct. 2019. Clinical symptoms for cannabis-attributable hospital visits varied between the inhaled and edible exposure groups. Gastrointestinal symptoms were more common in patients exposed to inhalable compared with edible cannabis; had cannabinoid hyperemesis syndrome. Although there was no difference in the frequency of overall psychiatric-related visits between groups, visits related to acute psychiatric symptoms were more common in patients with edible exposures. Visits due to cardiovascular symptoms were also more common in patients exposed to edible products. Severe adverse cardiovascular events, including myocardial infarction and ventricular dysrhythmia, occurred in both groups.

[Emergency Department and Radiological Cost of Delayed Diagnosis of Cannabinoid Hyperemesis](#) – January 2019. Cannabinoid Hyperemesis (CH) has become a much more commonly recognized disease process as cannabis use has become much more transparent with the decriminalization and legalization of cannabis in numerous US states. An increase in patients presenting with CH, coupled with its under recognition in the Emergency Department (ED), is costly and leads to wasted resources and unnecessary radiation exposure, evidenced by the average CH evaluation cost prior to diagnosis of \$76,290.92 per patient in these three hospitals under study.

[Grey Matter Volume Differences Associated with Extremely Low Levels of Cannabis Use in Adolescence](#) – March 2019. Cannabis use has been associated with reduced brain volumes, but studies typically report on adults with heavy substance use histories. Studies on young adults have reported gray-matter density increases in the amygdala and nucleus accumbens of young adult recreational users and observed hippocampal enlargement in cannabis-using adolescents. This study shows greater cortical thickness in male adolescents with <5 instances of cannabis use relative to THC-naive control.

[Legalized Cannabis in Colorado Emergency Departments: A Cautionary Review of Negative Health and Safety Effects](#) – June 2019. Cannabis legalization has led to significant health consequences, particularly to EDs and hospitals in Colorado. The most concerning include psychosis, suicide, and other substance abuse. There are deleterious effects on the brain and some of these may not be reversible with abstinence. Other significant health effects include increases in fatal motor vehicle collisions, adverse effects on cardiovascular and pulmonary systems, inadvertent pediatric exposures, cannabis contaminants exposing users to infectious agents, heavy metals, and pesticides, and hash-oil burn injuries due to preparation of concentrates. Finally, cannabis dispensary workers not trained in medicine are giving medical advice that could be harmful to patients.

[National Institute on Drug Abuse – Is Marijuana a Gateway Drug?](#) – December 2019. Early exposure to cannabinoids in adolescent rodents decreases the reactivity of brain dopamine reward centers later in adulthood.¹ To the extent that these findings generalize to humans, this could help explain the increased vulnerability for addiction to other substances of misuse later in life. These findings are consistent with the idea of marijuana as a “gateway drug.” However, the majority of people who use marijuana do not go on to use other, “harder” substances. An alternative to the gateway-drug hypothesis is that people who are more vulnerable to drug-taking are simply more likely to start with readily available substances such as marijuana, tobacco, or alcohol, and their subsequent social interactions with others who use drugs increases their chances of trying other drugs.

[Prescription Opioid Misuse and Use of Alcohol and Other Substances Among High School Students](#) — Jones, Youth Risk Behavior Survey YRBS, United States, 2019. This report provides key insights into substance use behaviors of U.S. high school students during 2009–2019. Encouraging findings include decreasing prevalence of current alcohol use and decreases in the prevalence of lifetime use of marijuana, cocaine, methamphetamine, heroin, synthetic marijuana, and injection drug use. However, the findings in this report underscore that substance use among high school students remains common, with approximately one in three students reporting current alcohol use, one in five reporting current marijuana use, and one in seven reporting current binge drinking. Because of the ongoing U.S. opioid crisis, of particular concern are the high rates of lifetime (one in seven students) and current prescription opioid misuse (one in 14 students).

[Relationship Between Recency and Frequency of Youth Cannabis Use on Other Substance Use](#) – March 2019. Cannabis use is prevalent among youth and associated with other substance use. Efforts to scale

up prevention programming and science-based messaging on risks of substance use are needed.

[What to Know About Marijuana Withdrawal](#) – Jan. 2019. There are many misconceptions about whether people can become addicted to marijuana. The truth is that it is possible to become dependent on, or even addicted to, marijuana with regular use. Over 300,000 people begin treatment for marijuana use disorders in the U.S. each year. Research from 2012 suggests that 30.6 percent of those who use marijuana had marijuana use disorder in 2012–2013.

2018

[Impact of Marijuana Legalization in Colorado on Adolescent Emergency and Urgent Care Visits](#) – Aug. 2018. From 2005 to 2015, 4,202 marijuana-related visits were identified. Behavioral health evaluation was obtained for 2,813 (67%); a psychiatric diagnosis was made for the majority of these visits. Coingestants were common; the most common was ethanol (12%). Marijuana-related visits increased from 1.8 per 1,000 visits in 2009 to 4.9 in 2015. Despite national survey data suggesting no appreciable difference in adolescent marijuana use, our data demonstrate a significant increase in adolescent marijuana-associated emergency department and urgent care visits in Colorado.

2017 and later

[Adverse Health Effects of Marijuana Use](#) – April 2016. The regular use of marijuana during adolescence is of particular concern, since use by this age group is associated with an increased likelihood of deleterious consequences. Although multiple studies have reported detrimental effects, others have not, and the question of whether marijuana is harmful remains the subject of heated debate. Here we review the current state of the science related to the adverse health effects of the recreational use of marijuana, focusing on those areas for which the evidence is strongest.

[Cannabis Withdrawal Syndrome: Current Insights](#) – April 2017. Several lines of evidence from human studies indicate that cessation from long-term and regular cannabis use precipitates a specific withdrawal syndrome with mainly mood and behavioral symptoms of light to moderate intensity, which can usually be treated in an outpatient setting. However, comorbidity with mental or somatic disorders, severe CUD, and low social functioning may require an inpatient treatment (preferably a qualified detox) and post-acute rehabilitation or long-term outpatient care.

[Marijuana Dependence and Its Treatment](#) – Dec. 2007. Some 4.3 percent of Americans have been dependent on marijuana, as defined in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000), at some time in their lives. Marijuana produces dependence less readily than most other illicit drugs. Some 9 percent of those who try marijuana develop dependence compared to, for example, 15 percent of people who try cocaine and 24 percent of those who try heroin. However, because so many people use marijuana, cannabis dependence is twice as prevalent as dependence on any other illicit psychoactive substance.

[Marijuana Intoxication Blamed In More Deaths, Injuries](#). Both immediate exposure and long-term exposure to marijuana impair driving ability; marijuana is the illicit drug most frequently reported in connection with impaired driving and accidents, including fatal accidents. There is a relationship between the blood THC concentration and performance in controlled driving-simulation studies.

[Prior use of alcohol, cigarettes, and marijuana and subsequent abuse of prescription opioids in young adults](#) – Feb. 2013. These findings demonstrate that reported antecedent alcohol, cigarette, and marijuana use are all associated in bivariate analysis with a two to three times greater likelihood of subsequent abuse of prescription opioids in this sample of 18- to 25-year-olds. When adjusting for other variables and stratifying by gender, this relationship persists for young men but is only found with marijuana use in young women.

[Probability and Predictors of the Cannabis Gateway Effect: A National Study](#) – Feb. 2015. The cumulative probability of transition from cannabis use to other illicit drug use was 44.7%. Several socio-demographic and psychiatric variables and indicators of substance use severity predicted progression, including being male, urban residence, being never married, separated or divorced, having a broad range of psychiatric disorders or a family history of SUD, and early onset of cannabis use. Our results, in line with previous findings suggest that a large proportion, but not all, of individuals who use cannabis go on to use other illegal drugs.

[Review of the validity and significance of cannabis withdrawal syndrome](#) – Nov. 2004. Converging evidence from basic laboratory and clinical studies indicates that a withdrawal syndrome reliably follows discontinuation of chronic heavy use of cannabis or tetrahydrocannabinol. Common symptoms are primarily emotional and behavioral, although appetite change, weight loss, and physical discomfort are also frequently reported. The magnitude and severity of these symptoms appear substantial, and these findings suggest that the syndrome has clinical importance.

[Teen Cannabis Use and Illicit Drug Use in Early Adulthood Linked](#) – Science Daily June 2017. Researchers have found regular and occasional cannabis use as a teen is associated with a greater risk of other illicit drug taking in early adulthood. The study also found cannabis use was associated with harmful drinking and smoking.

[Ten myths marijuana advocates want you to believe](#) – November 2014. About 15% of all users and a much higher percentage of heavy users will experience psychotic symptoms. Half of those individuals will become chronically schizophrenic if they don't stop using. Fortunately, some do stop using because psychosis is not pleasant, and they wisely recognize that pot caused their problems.