

# the Neuroconnection News

## MARIJUANA ABUSE & DANGERS

*"Epidemiologic studies provide strong evidence to warrant a public health message that cannabis use can increase the risk of psychotic disorders,"*

- Journal of Biological Psychiatry

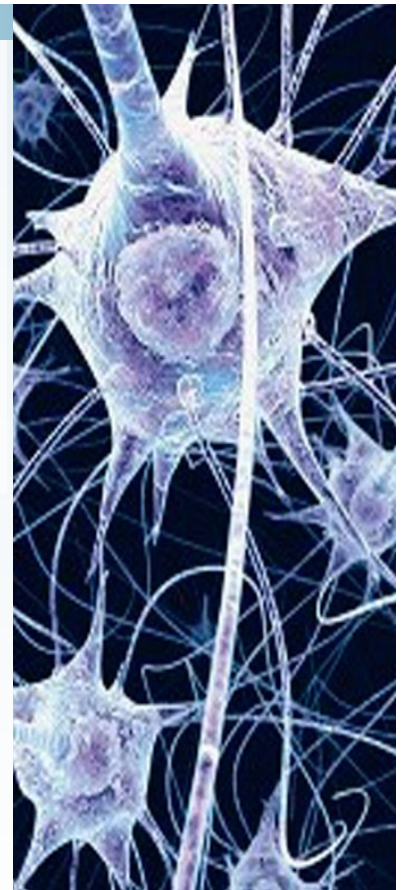
According to the National Survey on Drug Use and Health (NSDUH), marijuana use has been on the rise since 2007. In 2013, there were 19.8 million estimated users—about 7.5 percent of people aged 12 or older—up from 14.5 million (5.8 percent) just five years before. Conversely, use of most drugs other than marijuana has stabilized over the past decade. With new legislation regarding its use, research surrounding the concerns of marijuana use calls our misconception of the “non-addictive drug” into question.

The effects of marijuana can vary widely depending on the frequency and quantity a person is taking, but all forms of the drug have far-reaching effects on the human body and brain. With the prevalence of marijuana use and marijuana-induced psychosis increasing across ages as young as 12-years-old, finding a non-pharmacologic, easily accessible intervention to address the harmful effects of drugs on the brain is of particular importance.

The Neuroconnection is working to improve the outcomes of individuals with dependence to drugs like marijuana. In numerous studies, Connectivity Neurofeedback (CNFB) has been shown to reduce problematic symptoms associated with marijuana use including substance cravings, poor mental health, and impaired cognitive abilities.

In this issue of The Neuroconnection News, we'll take a closer look at marijuana to examine the effect it has on the brain, myths & misconceptions, and how Connectivity Neurofeedback can help you or your loved one recover from dependence.

For more detailed research articles on drug use or other mental health topics, please visit the research section of our website: [theneuroconnection.com/research](http://theneuroconnection.com/research)



### Inside this issue

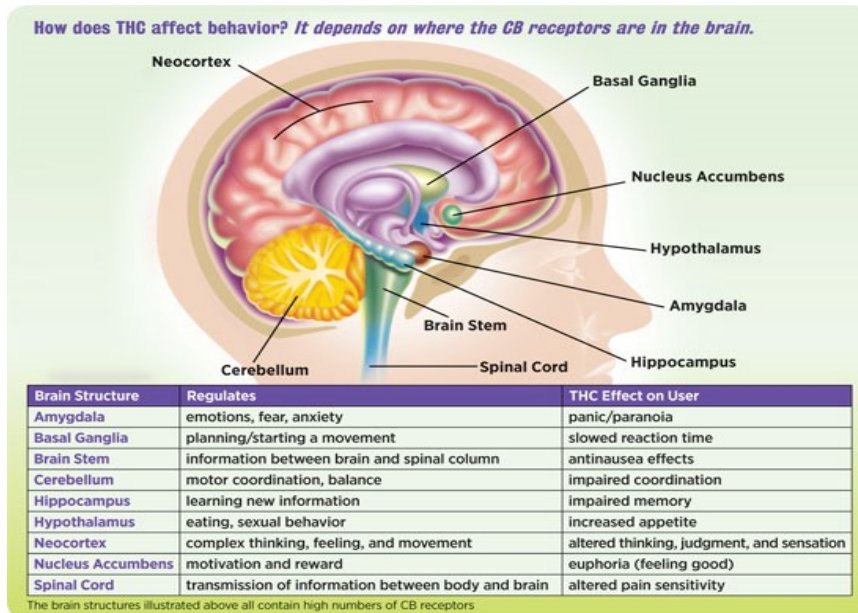
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### Special points of interest

- 19.8 million Americans, ages 12 and older, are active marijuana users
- Marijuana *can* become addictive and lead to symptoms of depression, anxiety, OCD, and even psychosis
- Clients completing an average of 20 CNFB sessions showed a 54% decrease in symptoms of depression and a 63% decrease in anxiety symptoms

# The Science of Marijuana

While common misconceptions tell us there are limited or no risks to smoking marijuana, scientific research demonstrates otherwise. When a person uses marijuana, a mind-altering chemical, THC, travels quickly from the lungs, to the bloodstream, and attaches to receptors in the brain. Depending on where THC attaches in the brain, marijuana can produce a wide-range of consequences on cognition and behavior.



THC is known to alter functioning of areas in the brain that enable a person to form new memories, perform complicated tasks, learn new information, and more. The drug not only causes immediate, short-term impairment within the brain, but also affects the brain's ability to maintain and build connections for further development. Resulting side-effects can include:

SHORT-TERM EFFECTS	LONG-TERM EFFECTS
Altered senses (visual, sense of time, etc)	Impaired brain development
Changes in mood	Decreased motivation
Impaired body movement	Increased anxiety
Difficulty thinking & problem-solving	Depression
Impaired memory	Poor memory
Delusions or hallucinations (when taken in high doses)	IQ Decline <sup>2</sup>

Contrary to popular belief, **marijuana use can lead to the development of a substance use disorder**, a mental illness in which a person is unable to stop using despite repercussions to their daily life. Those who use marijuana long-term and attempt to quit often report mild to severe withdrawal symptoms that make quitting difficult including fatigue, increased anxiety, low appetite, and poor sleep. Fortunately, with emerging research in neuro-imaging, experts have developed and validated techniques aimed at bringing treatment for marijuana use directly to it's source in the brain. *See page 3 to find out how neurofeedback training has been shown to successfully help the brain unlearn addictive patterns and processing in recovering addicts.*

Further Reading:

1. Substance Abuse Center for Behavioral Health Statistics and Quality. Results from the 2018 National Survey on Drug Use and Health: Detailed Tables. SAMHSA.
2. Meier MH, Caspi A, Ambler A, et al. Persistent cannabis users show neuropsychological decline from childhood to midlife. Proc Natl Acad Sci U S A. 2012;109(40):E2657-E2664. doi:10.1073/pnas.1206820109.

# Neurofeedback Treats Symptoms Associated with Marijuana Use

Evidence continues to mount that marijuana use can wreak havoc on an otherwise healthy brain. Anxiety, depression, attention problems, and even symptoms of psychosis are associated with marijuana use, despite popular claims that it is safe. To date, no studies have been published on the benefits of EEG neurofeedback for marijuana-induced symptoms. However, **many studies have found that NFB helps symptoms associated with marijuana, such as anxiety, depression, attention issues, and even psychosis.** Additionally, our clinic has had success in improving the outcomes of many clients who have used marijuana in the past. The following descriptions assume a basic understanding of how neurofeedback works (see pg. 2).

## ANXIETY & DEPRESSION

Neurological symptoms, such as anxiety or depression, typically display similar “patterns” on a QEEG.<sup>1</sup> While exceptions certainly exist, anxiety symptoms generally correlate with increased beta activity, while depression symptoms are often correlated with alpha activity that is imbalanced between right and left sides of the brain. Several studies have demonstrated that NFB can be used to correct these frequency imbalances and thereby decrease problematic symptoms. Clients at The Neuroconnection have found this to be true as well. Data compiled from clients who trained in the past five years demonstrates a 54% decrease in symptoms of depression and a 63% decrease in anxiety symptoms after an average of 20 sessions of CNFB.

## PSYCHOSIS

Perhaps one of the more unnerving side effects of marijuana use is the increase in agitation, delusions, hallucinations, paranoia, and even schizophrenia in certain individuals. Research on the use of neurofeedback to reduce these symptoms is very limited. A few preliminary case studies show promise, but no large scale studies have been published to date.<sup>2</sup> Anecdotal evidence from past TNC clients also suggest that CNFB can help individuals return to normal functioning, though there is ample room for further research on this topic.

## COGNITIVE & ATTENTION DEFICITS

Marijuana use can exacerbate or even cause ADHD symptoms in adolescents and adults. It is also associated with various cognitive deficits such as impaired memory, learning, executive functioning. NFB’s ability to improve cognitive performance is perhaps one of the more well studied areas.<sup>1</sup> Neurofeedback has been shown to improve attention to the same degree as stimulant medication, without the negative side effects. It has also been shown to improve memory and executive functioning.

## HOLISTIC OPTIMIZATION

A major benefit of QEEG-guided CNFB is the elimination of guesswork in the treatment process. The initial QEEG provides a “roadmap” to guide the practitioner to specific areas of the brain that are not functioning optimally. Because no two brains are exactly the same, individualized treatment plans ensure that training is targeted to the clients’ specific needs. Whether a person qualifies for substance abuse, has only used marijuana a few times, or never at all, a QEEG objectively shows what areas of the brain are working properly and which need a little help functioning well.

### Further Reading:

1. Simkin, D. R., Thatcher, R. W., & Lubar, J. Quantitative EEG and Neurofeedback in Children and Adolescent
2. Surmeli, T., Ertem, A., Eralp, E., & Kos, I. H. (2012). Schizophrenia and the efficacy of qEEG-guided neurofeedback treatment: a clinical case series. *Clinical EEG and Neuroscience*, 43(2), 133-144

# Marijuana: vs. Fiction

## ***Misconception #1: Marijuana is not addictive***

Fact: 1 in 10 of those who experiment with marijuana and 25-50% of daily users become addicted.<sup>1</sup> Marijuana craving activates the reward pathways in the brain associated with addiction. Stronger activation of these structures is associated with more severe cannabis related problems.<sup>2</sup> While marijuana is less addictive than other substances, experts now recognize marijuana induced withdrawal syndrome symptoms that make it more difficult for a person to stop using and making relapse more likely. Typical withdrawal symptoms include anxiety/depression, headaches, insomnia, and shaking.

## ***Misconception #2: Marijuana does not cause long-term cognitive impairments***

Fact: Marijuana decreases cerebral blood flow globally and particularly in the hippocampus.<sup>3</sup> This is associated with impaired learning and memory. Marijuana use is also associated with lower IQ, lower grades in school, and decreased executive functioning. These effects are present even after discontinuing and research suggests that normal functioning may not fully recover in those who begin using in adolescence.<sup>4,5</sup>

## ***Misconception #3: Marijuana helps anxiety***

Fact: While marijuana may seem to provide temporary relief from anxiety symptoms, discontinuation is associated with an increase in anxiety.<sup>6</sup> This is true even with infrequent use, and more frequent use is related to increased symptoms of anxiety and depression. In addition to generalized anxiety symptoms, 40% of weekly users reported experiencing panic attacks in association with marijuana use.

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*Neurofeedback has been shown effective for improving symptoms associated with marijuana use, such as cravings, anxiety, and cognitive impairment.*

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## ***Misconception #4: Marijuana is harmless***

Fact: Numerous longitudinal studies have shown that cannabis use is associated with an increase in symptoms of psychosis or psychotic illness.<sup>7</sup> This may include agitation, depression or manic episodes, delusions, hallucinations, or paranoia. Ongoing research also suggests that marijuana use can initiate and/or exacerbate the course of illness in patients with schizophrenia.

## ***Misconception #5: Age is just a number***

Fact: The developing brain is much more vulnerable than the mature brain, and adolescence (until ~age 21) is a critical period of myelination and maturation. Exposure to THC during active development can alter the reward sensitivity to other drugs, damage white matter connection, and impair neuronal connectivity. This can cause permanent damage to brain regions responsible for learning, memory, alertness, self-conscious awareness, executive function, inhibitory control. Early marijuana use is associated with a higher rate of addiction, and the negative cognitive and neuropsychological effects don't seem to abate after discontinuing use.

## The Potency Problem - Marijuana Use

No discussion of marijuana's effects is complete without addressing potency. This depends on the amount of THC, the psychoactive compound responsible for most of the drug's effects. In 1995, the US Drug Enforcement Administration found the potency of seized marijuana to be 4%.<sup>8</sup> By 2012, the potency increased to 12%, and a separate study in 2017 reported a potency of 17.1%. This dramatic increase, coupled with the pervasive assumption that marijuana is generally safe, has important consequences.<sup>8</sup>

### A NOTE TO OUR CLIENTS:

*Many of you have asked why we don't conduct neurofeedback sessions when a client is actively using marijuana. Cannabinoids, such as THC, interact with the brain in a variety of ways. Most importantly, they interfere with the brain's ability to learn and its ability to make new connections. Marijuana, then, is directly antithetical to the core premise of neurofeedback: to help the brain learn to function optimally and thereby reduce problematic symptoms. We ask that you abstain because you simply won't see the improvements that you're paying for, and may even cause more harm in the meantime.*

#### Further Reading on Marijuana Use & Dangers:

1. Volkow, N. D., Baler, R. D., Compton, W. M., & Weiss, S. R. (2014). Adverse health effects of marijuana use. *The New England journal of medicine*, 370(23), 2219–2227
2. Filbey, F. M., Schacht, J. P., Myers, U. S., et al. (2009). Marijuana craving in the brain. *Proceedings of the National Academy of Sciences*, 106(31), 13016–13021
3. Volkow ND, Swanson JM, et al. (2016) Effects of cannabis use on human behavior, including cognition, motivation, and psychosis: a review. *JAMA Psychiatry*; 73:292–297
4. Meier, M. H., Caspi, A., et al. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences of the United States of America*, 109(40), E2657–E2664
5. Mandelbaum, D. E., & Suzanne, M. (2017). Adverse structural and functional effects of marijuana on the brain: evidence reviewed. *Pediatric neurology*, 66, 12–20
6. Johnson, K., Mullin, J. L., et al. (2010). Exploring the mediational role of coping motives for marijuana use in terms of the relation between anxiety sensitivity and marijuana dependence. *The American Journal on Addictions*, 19(3), 277–282.
7. Murray, R. M., Quigley, H., Quattrone, et al. (2016). Traditional marijuana, high-potency cannabis and synthetic cannabinoids: increasing risk for psychosis. *World Psychiatry*, 15(3), 195–204
8. Highly Potent Weed Has Swept The Market, Raising Concerns About Health Risks. (2019, May 15). NPR. Retrieved from <https://www.npr.org/sections/health-shots/2019/05/15/723656629/highly-potent-weed-has-swept-the-market-raising-concerns-about-health-risks>





## What is Connectivity Neurofeedback?

Connectivity Neurofeedback (CNFB) is an advanced form of Neurofeedback (NFB) that allows the brain to make changes in brain wave patterns across cortical regions in order to develop more functional neuropathways. CNFB is more accurate than traditional NFB because it measures the neuronal network activity in three dimensions across regions. This is in contrast to traditional NFB which only trains specific sites. CNFB allows for improved communication within the brain and in turn decreases neurologically rooted symptoms.

Learning disabilities, ADHD, Autism, and other problems impacting school success have specific connectivity patterns. These patterns are identified via a QEEG brain map, and they are found to improve with CNFB training. Typical functional improvements include: improved focus, attention, and cognitive abilities, improved mood and behavior, increased learning capacity and academic performance, and better sleep regulation. Because CNFB creates new neural pathways, changes in the brain are lasting and involve none of the adverse side effects that may be experienced with medications.

*“Because CNFB creates new neural pathways, changes in the brain are lasting and involve none of the adverse side effects that may be experienced with medication”*

### It's a Collaborative Effort

The professionals at The Neuroconnection understand that neuropsychological conditions, if left untreated, can adversely affect an individual's quality of life.

Our Mission at The Neuroconnection is to provide quality, personalized care using the most up-to-date and researched neurofeedback methods to empower adults and children to reach their optimum potential.

We understand the value and importance of coordinating care with other health, educational and mental health providers, and we are committed to integrating neurofeedback with other treatments and services to produce the best outcome for our clients.

## Who Can Benefit?

Training the brain with neurofeedback has resulted in dramatic and lasting improvements for the following conditions:

- |                            |                        |                                 |
|----------------------------|------------------------|---------------------------------|
| *Attention Deficit         | *Chronic Fatigue       | *Obsessive Compulsive Disorders |
| *Autism Spectrum Disorders | *Learning Disabilities | *Post Traumatic Stress          |
| *Anxiety                   | *Memory                | *Seizure Disorders              |
| *Addictions                | *Mood Disorders        | *Traumatic Brain Injuries       |

### Notable Areas of Improvement

- |                         |                               |                                   |
|-------------------------|-------------------------------|-----------------------------------|
| • Attention             | • Anxiety                     | • Handwriting                     |
| • Shifting attention    | • Behavior                    | • Spelling                        |
| • Processing speed      | • Obsessive thinking          | • Math ability                    |
| • Executive functioning | • Reading comprehension       | • Test performance                |
| • Following directions  | • Word fluency                | • Sleep                           |
| • Organization          | • Speech and language ability | • Social skills                   |
| • Sensory sensitivity   | • Grammar and writing ability | • Motor skills                    |
| • Mood                  |                               | • Phonetics and semantic language |



## More on The Neuroconnection

Upon seeing such excellent results in the past 11 years with Connectivity-Neurofeedback (CNFB), our professionals aimed to extend access to training for those outside of our geographic area or inflexible schedules. As a result, The Neuroconnection designed an @ Home Training program to offer CNFB sessions in the

convenience of your home. For eight years, we have been able to provide our expertise and therapeutic treatment to families across the world. The opportunity for daily neurofeedback training at home has brought successful results for clients living as far as Russia and India.

*Request more information from The Neuroconnection Website!*  
[www.theneuroconnection.com](http://www.theneuroconnection.com)

## Meet Our Director

Ann L. Rigby, MSW, LCSW, BCN has over 30 years of experience in the mental health field. Ms. Rigby has been providing Neurofeedback services since 2001. She founded “The Neuroconnection”, a Brain Mapping and Neurofeedback clinic that provides an advanced, research-based form of Neurofeedback known as Connectivity Neurofeedback.

Ms. Rigby is a past Board Chair for the Autism Society of Illinois. She is a fellow and Board Certified member of The Biofeedback Certification International Alliance. She is also a field placement instructor for graduate students at Benedictine University and holds memberships with the International Society of Neurofeedback and Research (ISNR), the Biofeedback Certification Institute of America (BCIA), and the National Association of Social Workers (NASW). Ms. Rigby is a frequent speaker and exhibitor at many national and regional conferences throughout the year on topics related to the benefits of Connectivity Neurofeedback.

For more info about upcoming speaking engagements, go to our website [www.theneuroconnection.com](http://www.theneuroconnection.com) and visit our News and Events tab.



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