

# CBD & AUTISM

Children with autism spectrum disorder (ASD) commonly exhibit co-morbid symptoms of hyperactivity, self-injury, aggressiveness, restlessness, anxiety and sleep disorders. Conventional medical treatment includes various psychotropic medications such as atypical anti psychotics, selective serotonin reuptake inhibitors (SSRI's), stimulants and anxiolytics.

Cannabis contains numerous chemically active compounds, including  $\Delta_9$ -tetrahydrocannabinol ( $\Delta_9$ -THC), cannabidiol (CBD) and terpenoids.  $\Delta_9$ -THC activates the endocannabinoid system in the central nervous system, affecting appetite, anxiety, cognitive function and memory. In contrast, CBD is anxiolytic, anti-inflammatory, antiemetic and antipsychotic.



Studies in mice models of ASD have demonstrated the involvement of the endocannabinoid system in the pathogenesis of ASD symptoms.

# CBD & ADHD

ADHD is a neurodevelopmental disorder that affects around 6–9 percent of children and young adults, and about 5 percent of adults, globally.

When you consume CBD oil, the compounds engage with two receptors in your body. These receptors, known as CB<sub>1</sub> and CB<sub>2</sub>, have a direct effect on specific parts of your body. CB<sub>1</sub> is more abundant in the brain and is directly related to epilepsy. CB<sub>2</sub> is more abundant in the immune system. It's connected to pain and inflammation.

The compounds from CBD trigger your body to use more of the cannabinoids it produces naturally. The uptick in naturally-occurring cannabinoid use may lead to several benefits, including decreased anxiety and reduced hyperactivity.

CBD also activates serotonin receptors in the body and causes your brain to release dopamine. This is like the function of many medications for conditions like anxiety, depression, and even ADHD.

A majority of CB<sub>1</sub> receptors are in the brain and are associated with cognitive actions related to coordination, mood, thinking, memory, and appetite. The CB<sub>2</sub> receptors, on the other hand, can be found in the immune system. This makes them more responsible for the body's response to pain and inflammation.

Tetrahydrocannabinol, or THC, attaches to the CB<sub>1</sub> receptors, which explains why smoking or otherwise ingesting marijuana affects users on a cognitive level.



# CBD & TOURETTES

Tourette syndrome is a disorder characterized mainly by repeated vocal or motor tics, it can also present with several other behavioral symptoms.

Tourette syndrome is very widely misunderstood to be a behavioral or emotional condition consisting solely of tics, when in fact it is a complex neurological condition that can present in different ways in different individuals.

Tics are the symptom that every person with Tourette's syndrome must present with for an official diagnosis. Tics are categorized into 4 types; simple vocal tics (irregular breathing, coughing, throat clearing, etc.), complex vocal tics (words or phrases), simple motor tics (blinking, small hand movements, etc.), complex motor tics (large or time-consuming movements). Both motor and verbal tics must be present for Tourette's to be diagnosed.

The most common behavioral symptoms that tend to accompany Tourette's syndrome are:

- **Disinhibition:** Difficulty controlling thoughts and/or actions. Emotions that seem out of proportion to the situation.
- **Obsessive Compulsive Behaviors:** reoccurring unwanted thoughts and/or images. Repetitive compulsive behaviors
- **Difficulty handling transitions/change:** Feeling internally driven to stay in the current environment and not move on. Difficulty finishing assigned tasks.
- **Underdeveloped Social Skills:** Interrupting others/talking continuously. Tendency to interpret things in a very literal fashion
- **Rage:** Uncontrollable attacks of anger. Usually involving yelling, insults, physical violence to oneself or others and/or other irrational behaviors uncharacteristic to the individual.

While there are currently no studies directly focused on the behavioral symptoms in individuals with Tourette's, there are studies that show CBD to be helpful with symptoms such as this in individuals suffering from other conditions. Because pharmaceutical medications given for Tourette's often carry unwanted side effects, many people with Tourette's syndrome have been exploring CBD as an alternative treatment and so far, the results are very positive.

Studies from Stanley Medical Research Institute (FML) and the National Institute on Drug Abuse (DP) are proving CBD to be very helpful for drastically reducing and commonly eliminating tics. Researchers have discovered CBD is an anandamide reuptake inhibitor. In simpler terms, CBD stops the reabsorption of anandamide in your body. Anandamide is a cannabinoid-like chemical in the brain that is very powerful in its effects. By inhibiting this reabsorption, anandamide builds up in the synapses inside your brain, which in turn has neuro-protective effects against muscle spasms, seizures, and, of course, tics.

