

Teen Brains: Neurobiology of Substance Abuse

Presented by

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Muir Wood

ADOLESCENT AND FAMILY SERVICES

COCAINE HOOKAHS SYNTHETICS ALCOHOL
PRESCRIPTIONS CIGARETTES COLD MEDICINES
ECSTASY CRACK ADDERALL MARIJUANA STEROIDS RITALIN
"BATH SALTS" INHALANTS E-CIGARETTES
HEROIN SEDATIVES TRANQUILIZERS
CRYSTAL METHAMPHETAMINES
K2/SPICE SALVIA VICODIN

TEEN DRUG USE

MONITORING THE FUTURE 2016



Monitoring the Future is an annual survey of 8th, 10th, and 12th graders conducted by researchers at the University of Michigan, Ann Arbor, under a grant from the National Institute on Drug Abuse, part of the National Institutes of Health. Since 1975, the survey has measured drug, alcohol, and cigarette use and related attitudes in 12th graders nationwide; 8th and 10th graders were added to the survey in 1991.

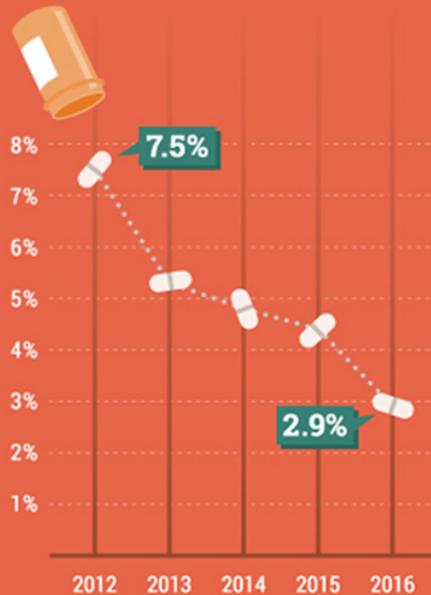
45,473 STUDENTS FROM 372 PUBLIC AND PRIVATE SCHOOLS PARTICIPATED IN THE 2016 SURVEY.



DRUGABUSE.GOV

PRESCRIPTION/OVER-THE-COUNTER VS. ILLICIT DRUGS

VICODIN®

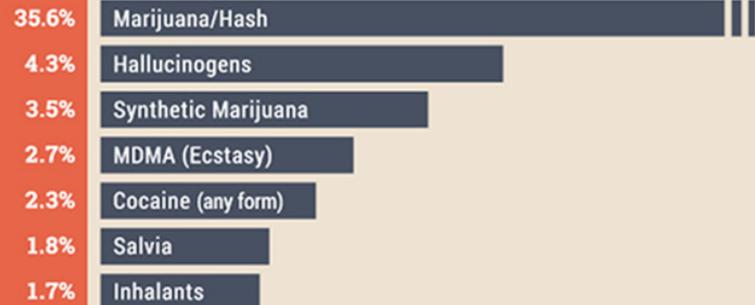


Past-year misuse of Vicodin® among 12th graders has dropped dramatically in the past 5 years. So has misuse of all Rx opioids among 12th graders despite high opioid overdose rates among adults.

PRESCRIPTION/OTC



ILLICIT DRUGS



Past-year use among 12th graders

STUDENTS REPORT LOWEST RATES SINCE START OF THE SURVEY

Across all grades, past-year use of inhalants, heroin, methamphetamine, alcohol, cigarettes, and synthetic cannabinoids are at their lowest by many measures.

Marijuana is viewed as the “safe drug”

- Danger is minimized due to the non-lethal nature of the drug
- Negative impact of marijuana isn't seen immediately, it occurs over time
- Marijuana use is seen as the “least bad option” to parents and often part of the rite of passage of adolescence
- Implicit/explicit messaging: It's ok, so long as you use it responsibly

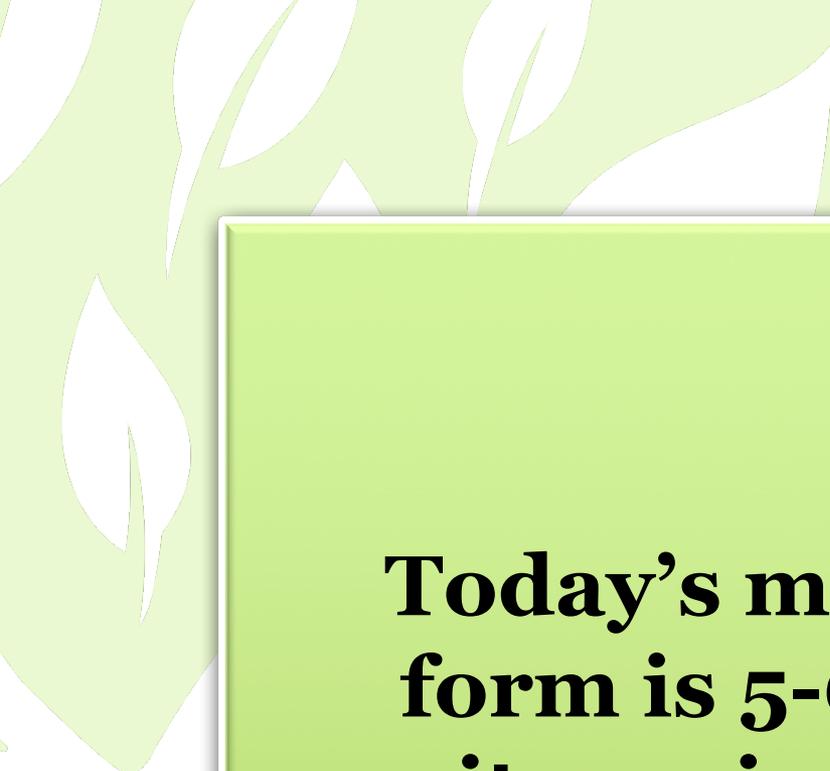


From the 1960s into the late 1990s,
marijuana potency rose from
2% to 15% concentration of THC.

In the last decade, THC content in the plant forms of marijuana has increased to 30% concentration.

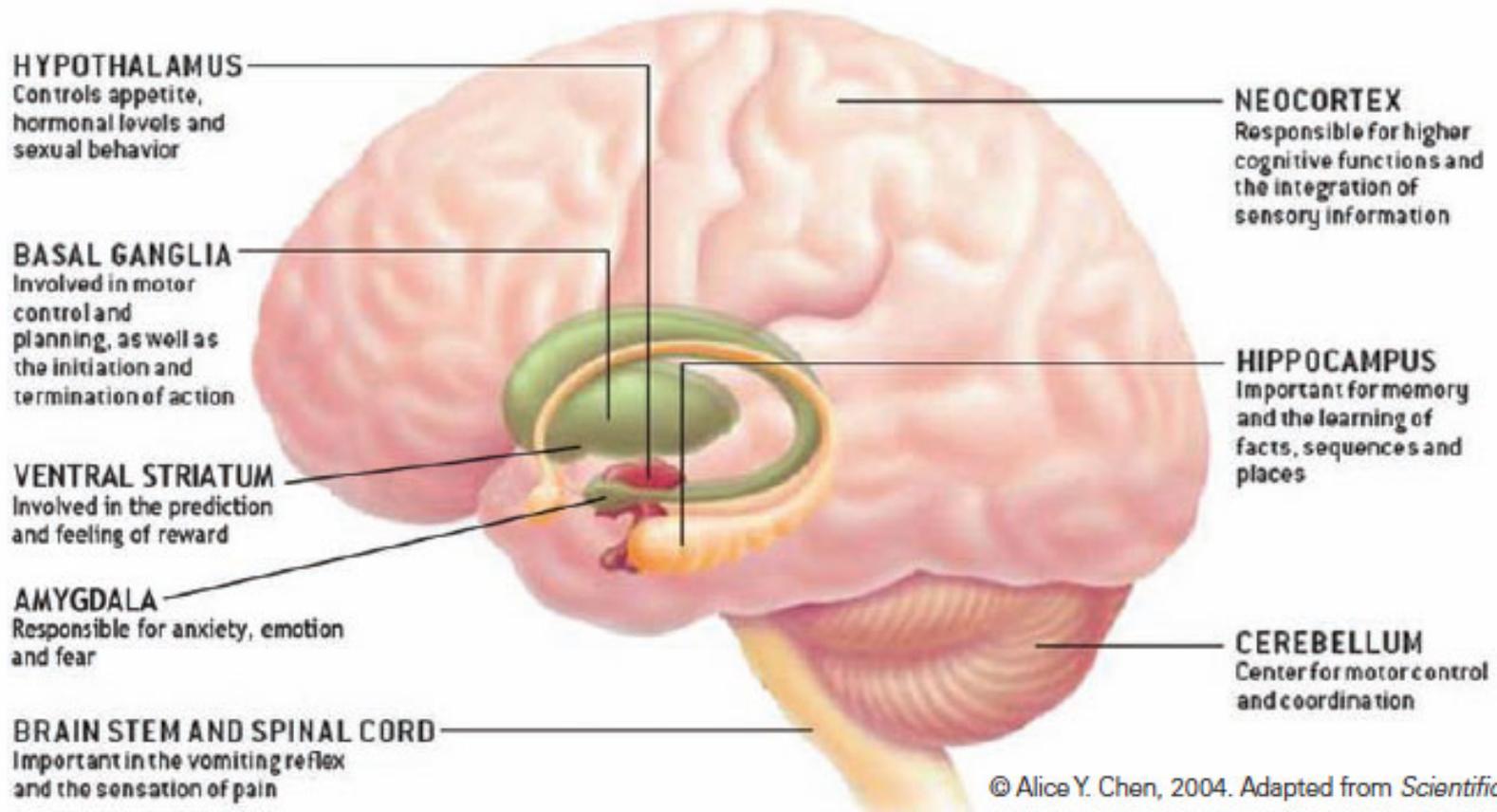


36% THC Concentration



Today's marijuana in plant form is 5-6x stronger than it was just 20 years ago.

Marijuana's Effects on the Brain

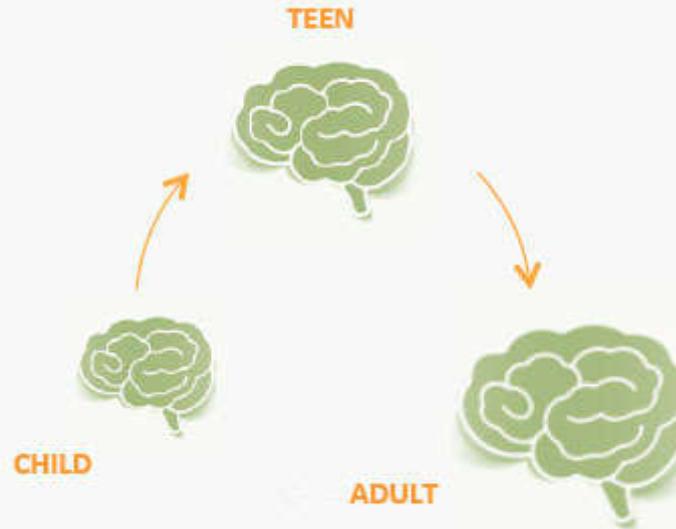


When marijuana is smoked, its active ingredient, THC, travels throughout the body, including the brain, to produce its many effects. THC attaches to sites called cannabinoid receptors on nerve cells in the brain, affecting the way those cells work. Cannabinoid receptors are abundant in parts of the brain that regulate movement, coordination, learning and memory, higher cognitive functions such as judgment, and pleasure.

- CB1 Receptors show disruption in their function when flooded by external cannabinoid exposure.
- The result of the flooded CB1 receptors is altered structure and function of brain regions that control emotion, thought, memory and social interaction.
- These changes can persist well into adulthood and increase the risk for psychiatric illness as well as other drug addiction.

MARIJUANA MAY HURT THE DEVELOPING TEEN BRAIN

The teen brain is **still developing** and it is especially vulnerable to drug use.



↓ IQ

Regular heavy marijuana use by teens can lead to an IQ drop of up to **8 points**³

HEAVY MARIJUANA USE BY TEENS IS LINKED TO⁴:

Educational Outcomes



lower
grades and
exam scores



less likely
to graduate
from HS or
college



less likely
to enroll in
college

Life Outcomes



lower
satisfaction
with life



more
likely to be
unemployed



more likely to
earn a lower
income



National Institute
on Drug Abuse

1. NSDUH, SAMHSA, 2014; 2. MTF Survey; 3. Meier et al 2012; 4. MTF Survey; Cobb-Clark et al, 2013; Silins et al 2014; Tucker et al 2005; Homel et al, 2014; Volkow et al 2014; Fergusson and Boden 2008; Brooks et al 2013

High Potency Marijuana Extracts



"Green Crack" wax



"Ear Wax"



Butane Hash Oil (BHO)

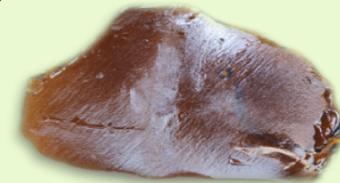


Hash Oil Capsules

"Budder"



"Shatter"

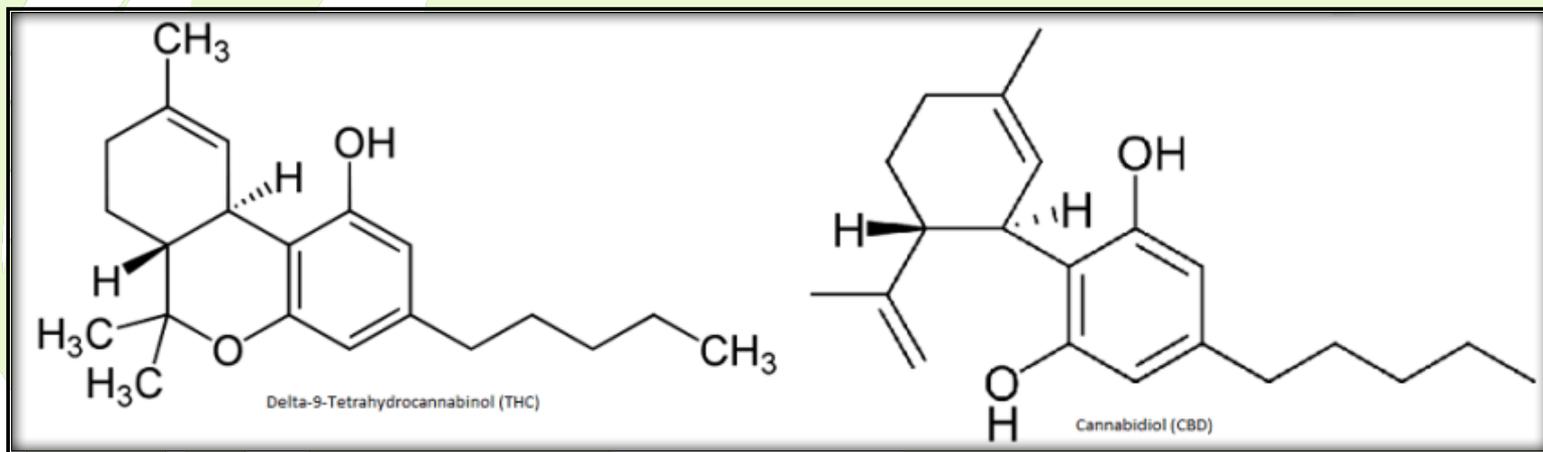


Butane Hash Oil (BHO)

- BHO is also known as...
 - Dabs
 - Budder
 - Shatter
 - Wax
- Weight wise, 1/2 (g) dabs on average, is equal in strength to 3.5 (g) of high potency plant marijuana)
- 90% THC Concentration



- When consumed using a vaporizer “pen” or e-cigarette, BHO is virtually odorless
- Allows for more frequent use
- Increased frequency of high potency extracts leads to increased risk of dependency



- THC and CBD (cannabidiol) have a synergistic effect
- CBD has been identified as having antipsychotic properties, and essentially puts a “ceiling” on the THC “high”
- Higher THC concentrations combined with low CBD levels put the user at risk for psychotic symptoms, particularly for those with genetic predisposition to mental illness



Can you tell the difference?



- The body process THC different when eaten vs. when smoked
- When consumed in edible form, THC is metabolized by the liver, which converts it to 11-hydroxy-THC. This metabolite crosses the blood-brain barrier, resulting in a more intense high.
- Because of the way edibles are metabolized, it can take anywhere from 30 minutes to 2 hours to kick in, and the effects can last several hours.
- Because of the delay between ingestion and onset of effects, it is easy to use too much and experience an “over dose” with symptoms such as:
 - Rapid heart rate or tachycardia
 - Hallucinations
 - Mental confusion
 - Panic attacks
 - Extreme paranoia

JUULing



- Each JUULpod contains 0.7mL with 5% nicotine by weight, approximately equivalent to 1 pack of cigarettes or 200 puffs
- Easily concealed and can be confused for a flash drive
- Ease of access and discreet nature allow for more frequent use than traditional cigarettes

Experimentation vs. Substance Use Disorder

Casual/Non-problematic Use

- recreational or other use that has negligible health or social impact

Chronic Dependence

- use that has become habitual and compulsive despite negative health and social impacts

Beneficial Use

- use that has positive health or social impact
- e.g. medical psychopharmaceuticals; coffee to increase alertness; moderate consumption of red wine; sacramental use of ayahuasca or peyote

Problematic Use

- use that begins to have negative consequences for individual, friends/family, or society
- e.g. impaired driving; binge consumption; harmful routes of administration

Health Officers Council of British Columbia (2005) - <http://www.cfdp.ca/bchoc.pdf>

Experimentation is exploratory in nature and some adolescents can remain within the casual/non-problematic use range

Substance Abuse is a Symptom of an Underlying Issue

- **Socializing**

- **Transitions**

- **Emotional and Psychological Pain**

Start the Conversation Earlier Than You Think You Should

- If you think it might be time to talk about substance use with your teen, it's probably too late
- Start the conversation at an early age in age appropriate ways
- Don't just discuss the substances themselves, but the reasons why people feel compelled to use them:
 - Feelings (Depression, anger, isolation)
 - Social anxiety
 - Loneliness
 - Boredom
 - Chemical Coping

Thank You



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