MARIJUANA USE IN TEENS:
SHIFTING THROUGH THE WEEDS

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ETIOLOGY FOR DRUG USE AND ABUSE

• Adolescent substance abuse is a complex phenomenon.

• There is increasing information that addiction is a central nervous system disease with specific structural and/or functional changes within the brain that are genetically determined but triggered by particular substances.
Substance Use Facts

- Adolescent substance use while not normative is prevalent
- Most often adolescent drug use is co-occurring
- Adolescents have a higher likelihood of dependence with use
- Substance use impacts normal development and academic achievements
- Alcohol and marijuana are the most used illicit/licit substances worldwide
- Marijuana use has been linked with first episode psychosis in at-risk adolescents and young adults
Monitoring the Future is an annual survey of 8th, 10th, and 12th graders conducted by researchers at the Institute for Social Research 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 how teens report their drug, alcohol, and cigarette use and related attitudes in 12th graders nationwide; 8th and 10th graders were added to the survey in 1991.

42,531 students from 396 public and private schools participated in the 2019 survey.
### Last 12 Months

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<tr>
<td>8th</td>
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<td>36.8%</td>
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U.S. Students Reporting Any Past-Year Illicit Drug Use*

*Illicit drug use in this survey was defined as use of marijuana, LSD, other hallucinogens, crack, other cocaine, or heroin; or any use of narcotics other than heroin, amphetamines, sedatives (barbiturates), or tranquilizers not under a doctor’s orders.

Source: 2021 Monitoring the Future Survey

nida.nih.gov
ILLEGAL DRUG USE

ILLEGAL DRUG USE STEADY
Past year use among 12th graders

Any illicit drug 38.0%
Any illicit drug NOT including marijuana 11.5%

PAST YEAR ILLEGAL DRUG USE
Past year use among 12th graders

35.7% Marijuana
3.6% LSD
3.3% Synthetic Cannabinoids
2.2% Cocaine
2.2% MDMA
0.4% Heroin

NIH
National Institute on Drug Abuse

DRUGABUSE.GOV
Gradual Decline in Alcohol Use Slows

Long-term trend of decreasing alcohol use among all grades levels off.

**Binge Drinking**

*5 or more drinks in a row in the past two weeks*

<table>
<thead>
<tr>
<th>Year</th>
<th>8th Graders</th>
<th>10th Graders</th>
<th>12th Graders</th>
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<tbody>
<tr>
<td>2010</td>
<td>16.8%</td>
<td>9.6%</td>
<td>4.5%</td>
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<tr>
<td>2015</td>
<td>16.8%</td>
<td>9.6%</td>
<td>4.5%</td>
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<tr>
<td>2020</td>
<td>16.8%</td>
<td>9.6%</td>
<td>4.5%</td>
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**Past-Year Alcohol Use**

<table>
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<tr>
<th>Year</th>
<th>8th Graders</th>
<th>10th Graders</th>
<th>12th Graders</th>
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<tbody>
<tr>
<td>2010</td>
<td>55.3%</td>
<td>40.7%</td>
<td>20.5%</td>
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<tr>
<td>2015</td>
<td>55.3%</td>
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<td>20.5%</td>
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</table>

NIH National Institute on Drug Abuse

drugabuse.gov
Alcohol: Trends in 12 Month Prevalence of Use in Grades 8, 10, and 12

- 8th Grade
- 10th Grade
- 12th Grade

Percentage (%)
Surge of Nicotine Vaping Levels Off, but Remains High

Past-Year Nicotine Vaping Held Steady

- 2017: 16.6%
- 2018: 30.7%
- 2019: 34.5%
- 2020: –

8th graders
10th graders
12th graders
Any Vaping: Trends in 12 Month Prevalence of Use in Grades 8, 10, and 12
Past-Year Marijuana Vaping Holds Steady

**Past-Year Marijuana Vaping**

- 2017: 8.1%
- 2018: 19.1%
- 2019: 22.1%
- 2020: 8.1%

**Daily or Near-Daily Marijuana Vaping Decreases Significantly Among 10th Graders**

- 8th graders:
  - 2019: 3%
  - 2020: 0.8%
- 10th graders:
  - 2019: 1.7%
  - 2020: 0.7%
- 12th graders:
  - 2019: 3.5%
  - 2020: 2.5%

NIH National Institute on Drug Abuse
drugabuse.gov
Marijuana Use Remains Steady

Past-Year Marijuana Use
- 2010: 11.4%
- 2015: 28%
- 2020: 35.2%

Daily Marijuana Use
- 2010: 1.1%
- 2015: 4.4%
- 2020: 6.9%

8th graders, 10th graders, 12th graders

NIH National Institute on Drug Abuse
drugabuse.gov
What is Marijuana (Cannabis)?

Also known as:

-Blunt, Boom, Bud, Gangster, Ganja, Grass, Green, Hash, Herb, Joint, Pot, Reefer, Sinsemilla, Skunk, & Weed

-Marijuana is the dried leaves and flowers of the Cannabis sativa or Cannabis indica plant.

-Of the more than 500 chemicals in the Marijuana plant species, the active chemical delta-9-tetrahydrocannabinol, known as THC, is responsible for many of the drug’s psychotropic properties (mind-altering effects that make a person high)
Cannabis

- Sativa, Indica, Ruderalis

Over 60 Known Cannabinoids
- Cannabinols, cannabidiols
- Delta 9 tetrahydrocannabinol

Popular strains
- Girl Scout Cookies
- Blue Dream
- Dutch Treat
- Gorilla Glue
- Sour Diesel
- OG Kush
- Grape Ape
- Cinex
- Green Crack
- White Tahoe Cookies
The amount of THC in marijuana has increased over the past few decades.

In the early 1990s, the average THC content in marijuana was less than 4%—now about 15% & much higher in some products such as oils & other extracts growing more potent strain called sinsemilla

THC negatively impacts brain development
A shift in cannabis landscape

- The legalization of cannabis for medical and recreational uses has increased over the past decade.
- This policy change has been motivated by the growing social acceptability.
LEGAL STATUS OF MARIJUANA

As of 2021:

- 48 out of 50 States and the District of Columbia have passed laws that permit use of marijuana for medical purposes;-- Michigan is one of them (2008)
- 18 states (Alaska, California, Colorado, Illinois, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont, South Dakota, Montana, New Mexico, Washington, District of Columbia, New York, New Jersey, Virginia, have fully legalized (medical and recreational) marijuana use.
- 31 out of the 50 have undergone some decriminalization of marijuana laws
- Nonetheless, marijuana possession, sale and use remains illegal by federal law, making its status ambiguous.
• Federal Controlled Substances Act – Marijuana is a Schedule I Drug, meaning “no currently accepted medical use.”
• Under the Obama administration the U.S. Department of Justice had agreed to not enforce Marijuana laws in states that have a “robust regulatory scheme for medical marijuana.” This policy was reversed by the Trump administration in 2018.
LEGALIZATION DAY

As of Dec. 6, Michigan is the first state in the Midwest to legalize adult-use recreational marijuana.

- Adults 21 and up are permitted to possess and consume marijuana.
- Up to 2.5 ounces can be possessed and transported at any time.
- Up to 10 ounces can be kept at home; amounts higher than 2.5 ounces must be locked away.
- Up to 12 marijuana plants can be grown in the home; more with a proper license.

- Driving under the influence of marijuana is prohibited.
- Consumption of marijuana in public is prohibited.
- Municipalities may ban retail sales of marijuana, but cannot ban consumption by adults 21 and up.

Note: Marijuana retail sales are not expected to begin until 2020.
A shift in Marijuana landscape

- Perceptions that marijuana use involves a great risk have declined.

- The prevalence of marijuana use has increased among all age groups.

Perceived Great Risk from Smoking Cannabis Once a Month among People Aged 12 or Older, by Age Group

AAP- MARIJUANA

- The AAP opposes legalization of marijuana because of the potential harms to children and adolescents.

- The AAP advocates for decriminalization of marijuana- Decriminalization is distinct from legalization.

  Decriminalization means reduced penalties for use and possession of MJ to misdemeanor (civil offense instead of criminal).

- In states where marijuana is sold legally, either for medicinal or recreational purposes, regulations should include strict penalties for those who sell marijuana to people younger than 21 years. Regulations should be in place to ensure marijuana is distributed in child-proof packaging to prevent accidental ingestion.

- The AAP discourages adults from using marijuana in the presence of children because of the influence of role modeling by adults on child and adolescent behavior.

- The AAP strongly supports research & development of pharmaceutical cannabinoids & supports policies promoting research on the medical use of Marijuana

(COMMITTEE ON SUBSTANCE ABUSE, COMMITTEE ON ADOLESCENCE- Pediatrics March 2015, 135 (3) 584-587; DOI: https://doi.org/10.1542/peds.2014-4146)
Marijuana Regulation

Licensing, Tracking & Regulatory Responsibilities

Andrew Brisbo, MRA Executive Director
www.michigan.gov/MRA
MI Marijuana Regulatory agency put restrictions

• Edibles cannot be sold in packages that are attractive to children or confused with non-marijuana candy brand

• Packaging must be opaque, resealable, child-resistant; CO defines and limits serving size

• Retailer cannot be within 1000 feet of a school
Research has shown that brain development continues into the second decade—early twenties.

**Adolescence: Vulnerabilities**

- There is a peak in sensation seeking
  - Sensation seeking can lead to risk-taking behaviours
- Substance abuse, unprotected sex, extreme sports, suicide
- Most drugs of abuse lead to a general blunting of dopamine release which contributes to poor outcomes
Growing a Grown-up Brain

Scientists have long thought that the human brain was formed in early childhood. But by scanning children’s brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don’t finish the pruning process until the early 20s.

Adolescent Brain Development

- Continues to develop into early adulthood
- Additional connections between nerve cells
- Pruning of existing connections
- Prefrontal cortex and amygdala remodeling
THC’s chemical structure is similar to the brain chemical anandamide. Similarity in structure allows drugs to be recognized by the body and to alter normal brain communication.
Brain Cannabinoid System

- Brain has cannabinoid receptors (CB1 and CB2)
- Anandamide is brain endocannabinoid
- This system involved in
  - Brain growth
  - Regulation of other neurotransmitters
  - Executive functioning skills, memory, reward processing
- Plant THC stronger and longer lasting effect than anandamide
- Brain “adolescence” continues into mid-20s and not at age 21
The Long Term Effects of Marijuana on the Teen Brain
Marijuana’s Effects on the Brain

HYPOTHALAMUS
Controls appetite, hormonal levels and sexual behavior

NEOCORTEX
Responsible for higher cognitive functions and the integration of sensory information

BASAL GANGLIA
Involved in motor control and planning, as well as the initiation and termination of action

HIPPOCAMPUS
Important for memory and the learning of facts, sequences and places

VENTRAL STRIATUM
Involved in the prediction and feeling of reward

CEREBELLUM
Center for motor control and coordination

AMYGDALA
Responsible for anxiety, emotion and fear

BRAIN STEM AND SPINAL CORD
Important in the vomiting reflex and the sensation of pain

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.
Cannabis Changes the Brain

Long-term effects of marijuana use on the brain

Francesca M. Filbey, Sina Aslan, Vince D. Calhoun, Jeffrey S. Spence, Eswar Damaraju, Arvind Caprihan, and Judith Segall

- Multiple studies show link between cannabis use and changes in both brain anatomy and function
- Many of these show evidence that link between MJ and cognitive problems mediated through these brain changes
- Evidence of functional compensation
- Effect strongest for earlier use
  - Abnormal brain pruning

Fig. 1. Group comparison of the gray matter volume by SPM8 plus DARTEL analysis demonstrates significant reduction of gray matter volume in bilateral orbitofrontal gyri (AAL atlas) in marijuana users compared with controls. Right side of the image represents the right hemisphere in axial view.

Neurobiology of Disease
Cannabis Use Is Quantitatively Associated with Nucleus Accumbens and Amygdala Abnormalities in Young Adult Recreational Users

Psychological Medicine, Page 1 of 14. © Cambridge University Press 2015
doi:10.1017/S0003063217000242

Effect of high-potency cannabis on corpus callosum microstructure
## Acute Effects

<table>
<thead>
<tr>
<th>Increased heart rate</th>
<th>4.8 fold increase in chance of having a heart attack within 1st hour after using drug</th>
<th>Euphoria, relaxation, change in pain sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distorted sensory perception</td>
<td>Thought and time distortion</td>
<td>Slowed reaction time to stimuli</td>
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<tr>
<td>Hallucinations, paranoia, anxiety, psychosis</td>
<td>Memory impairment</td>
<td>Excessive vomiting</td>
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ADVERSE EFFECTS OF HEAVY MARIJUANA USE

- 9% of individuals who use marijuana will become dependent on it (Lopez-Quintero et al, NESARC, 2011).

- Adolescents using marijuana before the age of 18 years, are 4-7x more likely to develop cannabis use disorder (CUD) than adults.

- Symptoms of CUD:
  - Impairment in functioning.
  - Tolerance and cravings for cannabis.
  - Withdrawal symptoms: sleeplessness, nervousness, anger, depression.

- Only 24.3% of individuals with lifetime CUD participated in a 12-step program or professional treatment.
Marijuana Consumption

- **Blunt**
  Cannabis is rolled in a cigar that is cut, removed of tobacco, and resealed.

- **Bong**
  Combusted cannabis is bubbled through water, then resulting smoke is inhaled.

- **Dabbing**
  Cannabis products are chemically dissolved in vapors of flammable solvent, such as butane or isopropyl alcohol, which is then inhaled.

- **G-Pen**
  Cannabis is concentrated into wax, oil or hash and vaporized through an e-cigarette.

- **Hookah**
  Cannabis is mixed with flavored tobacco, burned with charcoal. Smoke bubbles through water and is inhaled.

- **Joint**
  Cannabis is rolled in paper and smoked like a cigarette.

- **Pipe**
  Cannabis product is lit and smoked in a glass pipe.

- **Vaporizer**
  Cannabis is heated to about 338°F, below burning temperature, and vapors are inhaled.
Smoking Cannabis: Joints & Blunts

- **Joint:** cannabis flowers in a thin paper made for rolling cigarettes

- **Blunt:** cannabis flower in cigar tobacco leaf

- 5-10 seconds to feel the effect

- High lasts 30 minutes to several hours

- THC concentration depends on cannabis flower used
Inhalation

- Smoke is inhaled deep into the lungs
- Damages the respiratory system
- Blunts introduce nicotine, which is extremely addictive
- “Vaping” cannabis is not a safe alternative
Aerosolizing or “Vaping”

- THC concentrate is aerosolized
- 5-10 seconds to feel the effect
- High lasts 30 minutes to several hours
- THC concentration depends on liquid; often mislabeled
- Not harmless
Pipes and Bongs

- Pipe: cannabis flower is burned and its smoke is inhaled
- Bong: flower is burned, its smoke is cooled through water then inhaled
- 5-10 seconds to feel the effect
- High lasts 30 minutes to several hours
- THC concentration depends on cannabis flower used
Dabbing

- Concentrated THC wax is heated, the aerosol is then inhaled
- 5-10 seconds to feel the effect
- High lasts 30 minutes to several hours
- ~80% THC concentration
- One of the methods most associated with emergency room visits
Edibles

• Cannabis infused foods and drinks
• 20 min – 2 hours to feel the effects
• High typically lasts for hours
• THC concentration varies greatly and is difficult to measure accurately
• Very easy to over consume
Sprays, Tinctures, Capsules

- Sprays & tinctures: oil or alcohol-based liquids containing cannabis
- Capsules/pills: contain cannabis, usually floating in an oil
- 15 min – 2 hours to feel the effects
- Effects typically last for hours
- These products are not closely regulated, so there is no way to really know what they really contain.
CASE REPORTS - CANNABINOID HYPEREMESIS SYNDROME (CHS)

- In the adult literature, similar presentations of recurrent cyclical vomiting, nausea and abdominal pain have been seen in chronic cannabis users.

- This link between cyclic vomiting & chronic cannabis use has led to the recognition of a new syndrome – cannabinoid hyperemesis syndrome (CHS):
  - Recurrent nausea, cyclic vomiting, & abdominal pain
  - Often associated with chronic marijuana use and relief of symptoms with hot showers

- First described in Australia by Allen et al. in 2004.
  - Subsequently, more than 100 reported cases of CHS as a cause of cyclic vomiting in adults however, few published cases of CHS in pediatric population.

THE AAP RECOMMENDS THAT PEDIATRICIANS:

- Become knowledgeable about all aspects of substance use, brief intervention, and/or referral to treatment algorithm (SBIRT) through training program curricula or continuing medical education that provide current best-practices training.

- Screen all adolescent patients for tobacco, alcohol, and other drug use with a formal, validated screening tool, such as the CRAFFT screen, at every health supervision visit and appropriate acute care visits, and respond to screening results with the appropriate brief intervention.

- Develop close working relationships with qualified and licensed professionals and programs that provide the range of substance use prevention and treatment services, including tobacco cessation, that are necessary for comprehensive patient care.

(Committee on Substance Abuse Pediatrics 2011;128:e1330-e1340)
THE CRAFFT SCREENING INTERVIEW FOR SUBSTANCE USE

• Begin: “I’m going to ask you a few questions that I ask all my patients. Please
  • be honest. I will keep your answers confidential.”

• Part A
  • During the PAST 12 MONTHS, did you: Yes or No

  • 1. Drink any alcohol (more than a few sips)?
  • (Do not count sips of alcohol taken during family or religious events.)
  • 2. Smoke any marijuana or hashish?
  • 3. Use anything else to get high?
  • (“anything else” includes illegal drugs, over the counter and
  • prescription drugs, and things that you sniff or “huff”)
THE CRAFFT SCREENING TOOL

- **C** Have you ever ridden in a **CAR** driven by someone (including yourself) who was "high" or had been using alcohol or drugs?
- **R** Do you ever use alcohol or drugs to **RELAX**, feel better about yourself, or fit in?
- **A** Do you ever use alcohol/drugs while you are by yourself, **ALONE**?
- **F** Do you ever **FORGET** things you did while using alcohol or drugs?
- **F** Do your family or **FRIENDS** ever tell you that you should cut down on your drinking or drug use?
- **T** Have you gotten into **TROUBLE** while you were using alcohol or drugs?
Abstinence challenge.

I, ____________________________, agree to not drink alcohol, use drugs, or take anyone else’s medication for the next _____ days. I also will not provide drugs, alcohol, or prescription medications for anyone else during this time. In addition, I agree to not drive a motor vehicle while under the influence of drugs or alcohol, nor will I ride with a driver who has been drinking or using drugs.

I will come to my follow-up appointment with ________________ on ___________.

Signed, _________________________

Date: _______________________

Committee on Substance Abuse Pediatrics 2011;128:e1330-e1340
"Talk. They Hear You."

Planning, Promotional, & Media Tools

Share the "Talk. They Hear You."® campaign in your community using these guides on planning and evaluating your implementation efforts, planning events, working with the media, and more.
MARIJUANA AFFECTS YOUR BRAIN. Tetrahydrocannabinol (THC), the chemical responsible for most of marijuana's psychological effects, affects brain cells throughout the brain, including cells in circuits related to learning and memory, coordination, and addiction.

MARIJUANA AFFECTS YOUR SELF-CONTROL. Marijuana can seriously affect your sense of time and your coordination, impacting things like driving.

MARIJUANA AFFECTS YOUR LUNGS. Marijuana smoke deposits four times more tar in the lungs and contains 50 percent to 70 percent more cancer-causing substances than tobacco smoke does.

MARIJUANA USE IS NEGATIVELY LINKED WITH OTHER ASPECTS OF YOUR HEALTH. Chronic marijuana use has been linked with depression, anxiety, and an increased risk of schizophrenia in some cases.

MARIJUANA IS NOT ALWAYS WHAT IT SEEMS. Marijuana can be laced with substances without your knowledge. “Blunts”—hollowed-out cigars filled with marijuana—sometimes contain crack cocaine.

MARIJUANA CAN BE ADDICTIVE. Not everyone who uses marijuana becomes addicted, but some users develop signs of dependence.

THE BOTTOM LINE: Marijuana affects the development of teen brains. Talk to your parents, a doctor, a counselor, a teacher, or another adult you trust if you have questions.

LEARN MORE:
Get the latest information on how drugs affect the brain and body at teens.drugabuse.gov.

TO LEARN MORE ABOUT MARIJUANA, CONTACT:
SAMHSA
1-877-SAMHSA-7 (1-877-726-7727)
(English and Español)
TTY 1-800-487-4889
www.samhsa.gov
store.samhsa.gov
MARIJUANA USE AND DRIVING DON’T MIX.

It increases the risk of being in a car crash.

1) AAP: Role Play Simulations for Clinical Training- interactive role-play simulations where health professionals build and assess their skills to have real-life conversation with adolescent patients about substance use and/or mental health concerns.
   - website;  https://aap.kognito.com/

2) COMMITTEE ON SUBSTANCE ABUSE, COMMITTEE ON ADOLESCENCE
   Pediatrics March 2015, 135 (3) 584-587; DOI: https://doi.org/10.1542/peds.2014-4146

3) National institute on Drug Abuse:  https://www.drugabuse.gov/

4) Lara Marijuana Regulatory Agency ; https://www.michigan.gov/mra
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6) Smart Approaches to Marijuana - SAM website: www.learnaboutsam.org

7) Substance Abuse and Mental Health Services Administration, http://www.samhsa.gov


9) KidsHealth