The Psychiatric Impact of Cannabis Use in Adolescence

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Case

• A 15-year-old female is sent to the Emergency Department by her PCP with symptoms of suicidal ideation, depersonalization, derealization, confusion and paranoia. Her mother reports she began to have symptoms of irritability, anhedonia and lack of energy one month prior. The former “straight A student” is currently failing two classes due to lack of motivation. She is no longer attending to her grooming or hygiene and has gained weight due to increased appetite.
Cannabis

- Cannabis sativa
  - Energizing, uplifting

- Cannabis indica
  - Sedating, relaxing

- Contains over 500 natural compounds
  - Cannabinoids, terpenoids, flavonoids and alkaloids

- Delta-9-tetrahydrocannabinol (THC)
  - Primary psychoactive ingredient

NIDA 2018
Cannabis Products

• Dried plant
• Edibles-baked good, beverages and candies
  • Take longer to produce high=higher doses often taken
• Oil, wax, shatter, budder- extracts nearly pure THC

• Synthetics: K2, Spice
  • Can have extremely high potency and may be more dangerous
  • Often combined with or sprayed on other cannabis products to enhance effects

NIDA 2018
THC Potency

• THC responsible for psychoactive, mood altering and addictive properties

• THC (delta-9-tetrahydrocannabinol) content dramatically increasing
  • 1970s-less than 2%
  • 1990-3.74%
  • 2013-10%
  • 2018-20-25% (NIDA 2018)
Cannabidiol (CBD)

• Ingredient that may have the most medical benefit
• Not psychoactive
• Potency has remained unchanged at approximately 1% the last 30 years (NIDA, 2018)
Marijuana Legalization

- 35 states have legalized in some form
- 15 states and DC legal for recreational use
- 20 states have legalized for medical conditions (esquire.com)
Medicinal and Recreational Use

• Increasing acceptance and use
• Policy and legislative changes based on limited research in adults
• Need for research to examine impact on children and adolescents
Medicinal

• In adults only

• Pain
  • Limited evidence
  • Few quality studies
  • Evidence for clinical effects unclear (Barakj, 2019)
    • Did not separate out from placebo
    • Does not appear to be a good substitute for opiates for pain control in cancer patients
Cannabis Contaminants

• Microbial
  • Improper preparation and storage
  • Bacterial: Salmonella, Enterobacter, Streptococcus and Klebsiella
  • Fungal: Aspergillus and Cryptococcus
    • Production of aflatoxins (carcinogenic)

• Heavy Metal
  • Absorption through soil (phosphate fertilizers containing cadmium)
  • Cross contamination during processing
  • Post process - metals added to increase weight/street value (lead-95 cases of poisoning)

• Pesticides
  • Insecticides, fungicides, miticides and herbicides (up to 84.6% legalized cannabis tested in Washington state)

(Dryburgh-2018)
Use in Teens

• Most widely used illicit drug
  • 3.8% of world population uses regularly
  • 20.9% of adolescents used in the past month (Gobbi 2019)

• Daily use-teens in the U.S.
  • 0.7% - 8th graders
  • 3.4% - 10th graders
  • 5.8% - 12th graders

• Cannabis Use Disorder
  • 1.5% of Americans (NIDA 2018)
Intoxication and Withdrawal

**Intoxication**
- Euphoria
- Anxiety
- Disinhibition
- Paranoia
- Time perceptual disturbance
- Conjunctival injection
- Impaired judgment
- Social withdrawal
- Increased appetite
- Dry mouth
- Hallucinations (visual, auditory)
- Amotivational syndrome
- Hyperemesis syndrome

**Withdrawal**
- Irritability
- Depression
- Insomnia
- Nausea
- Anorexia
- Peaks in 48 hours
- Acute symptoms may continue for 5 - 7 days
- Detectible in the urine for up to 1 month after last use
Consequences of Daily Use

• Addiction
• Increased motor vehicle accidents
• Chronic bronchitis
• EVALI-E-cigarette/Vaping Associated Lung Injury
• Weight gain
• Neuropsychological decline
• Cyclic vomiting
Cannabis Use for the Treatment of Mental Disorders

• No evidence to suggest cannabinoids improve depressive disorders, anxiety disorders, or ADHD

• High quality studies are needed prior to using cannabinoids to treat any psychiatric disorders (Black, 2019)
AACAP (2019)

• “Recreational marijuana use by children and teenagers is not legal anywhere in the United States.”

• “There is very limited research supporting use of medical marijuana in children or teens…”

• “Marijuana is not regulated and therefore not checked for ingredients, purity, strength, or safety.”

• “For now CBD is only FDA approved in children for specific forms of epilepsy and in adults for chemotherapy induced nausea and vomiting.”

AACAP 2019 Facts for Families
Adolescent Cannabis Exposure

• Those that use cannabis are an “at-risk” group
  • Cognitive impairment
  • Psychiatric morbidity (Levine, 2017)

• There is a strong correlation between teen cannabis exposure and persistent negative neuropsychiatric outcomes in teens and adults (Levine, 2017)
Neuroanatomical Changes

• Interferes with pruning
• 30 MRI studies
  • Increased grey matter density
    • Temporal lobe
    • Posterior cingulate
    • Cerebellum (Burggren, 2019)
• Decreased volume
  • Hippocampus
  • Amygdala
  • Prefrontal cortex (Gobbi, 2019)
Grey Matter Volume Increase

• Journal of Neuroscience (January 2019)
• Voxel Based Morphology
• Compared 14-year-olds with and without cannabis use (N=46)
  • Medial temporal lobes
  • Posterior cingulate
  • Lingual gyri
  • Cerebellum
Cannabis

- Induces and exacerbates psychiatric conditions
  - Anxiety
  - Depression
  - Psychosis (induction of schizophrenia, cannabis induced psychosis)
  - Amotivational syndrome
  - Decreased concentration, working memory, processing speed and IQ
  - Paranoia
  - Hallucination
  - Panic
  - Increases risk of violence and aggression
  - Reduced school performance
  - Reduced life satisfaction
  - Impulsivity
Cannabis Use in Adolescents and Risk

• Gobbi et al (2019)
  • Neuroanatomic differences in regions with type 1 cannabinoid receptors
    • Decreased volume of hippocampus, amygdala, prefrontal cortex
  • The younger users of cannabis were at significantly higher risk of suicidal behavior

• The younger the onset of use the higher the risk
  • Depression, anxiety, psychosis, academic and vocational functioning
  • Quitting cannabis by the end of adolescence did not protect people from most of the serious effects
Risk of Addiction

- Cannabis Use Disorder
  - Physical dependence
    - Cravings
    - Tolerance
  - Withdrawal
    - Irritability, insomnia, decreased appetite, anxiety, cravings
- Risk of addiction 10% in most studies—equal to alcohol (range 9-30%) of those who use regularly
- Use before age 18 increases the risk of Cannabis Use Disorder by 4-7 times (NIDA 2018)
Gateway Hypothesis

• Early cannabis use is linked to greater risk of developing another substance use disorder
  • Cocaine, methamphetamine and opiates (Levine 2017)

• Long-term adolescent exposure to THC
  • Dopamine neurons less responsive to stimulating action of cannabinoids
  • Long lasting cross tolerance for morphine, cocaine and amphetamines (Gobbi 2018)
Depression and Cannabis Use

• CNS depressant
• Lancet 2017 study of monozygotic twins
  • Increased risk of MDD
  • Increased risk of suicidal ideation (Agarwal, 2017)
• Gobbi et al
  • Cannabis use during adolescence associated with later depression in young adulthood
Depression and Cannabis

• Use increases symptoms
  • Anhedonia
  • Low mood
  • Amotivation
  • Appetite
  • Sleep disruption
  • Suicidal ideation
    • Disinhibition vs. long term sequelae
Cannabis and Anxiety

• Increases
  • Panic (intoxication and withdrawal)
  • Rebound anxiety
  • Depersonalization
  • Derealization
Cannabis and Psychosis

- Increases risk of development of psychotic disorders
- Increases risk of earlier onset of psychotic disorder
- Cannabis induced hallucinations
- Cannabis induced delusions (paranoia)
- Cannabis induced brief psychotic episode
- Cannabis induced psychotic disorder
  - Heavily associated with future schizophrenia (Pearson, 2019)
Cannabis and Psychosis

• Cannabis Induced Psychosis
• Heavily associated with future schizophrenia diagnosis (Pearson, 2019).
  • High prevalence in those that develop psychotic disorders (up to 75% develop chronic psychotic disorder)
  • Early heavy use increases risk
  • Risk highest in those with genetic predisposition
  • But also risk in those without predisposition (increased 2.2% compared to general population (Lavine 2017))
Does Cannabis Use Cause Psychosis?

https://silverhillhospital.org/wp-content/uploads/2020/08/addiction-treatment-texas-
Cannabis and Psychosis

• Early heavy use of cannabis more likely seen in individuals with psychosis (Ksir, 2016)

• Psychotic disorders more common in cannabis users than nonusers

• Cannabis users with psychotic disorders
  • Have an earlier onset of psychotic disorder
  • Higher rates of relapse of psychotic symptoms
  • More hospitalizations
  • More prominent positive symptoms (Hasan, 2020)
Dose-dependent Risk

- Dose response relationship
  - Marconi et al 2016-high levels of use comparing users and nonusers increase risk of psychotic disorders/schizophrenia
  - Colizzi et al 2018-High potency cannabis and synthetics carry the greatest risk
  - Forti et al 2019-multicenter study Europe/Brazil
    - Daily cannabis use-increased odds of developing a psychotic disorder compared to non-users
    - 5x for daily use of high potency preparations
ADHD with Co-morbid Cannabis Use Disorder

• Difficult to make diagnosis-cannabis mimics symptoms of ADHD
• Neuropsychological testing invalid with cannabis
• Stimulants are controlled substances
  • Stimulant treatment of ADHD before the age of 10 and for 6 or more years decreases the risk of future SUD (McCabe, 2016)
  • Potential for misuse
  • Difficult to assess efficacy
  • Difficult to monitor
• Do not start controlled substance with daily or frequent use without agreement to discontinue cannabis
Cannabis vs. ADHD

**Cannabis**
- New onset problems with attention, focus and concentration
- Symptom fluctuation
- Deterioration in academic performance, mood, energy, motivation
- Increased appetite

**ADHD**
- Neurodevelopmental condition must be present by age 12
- Persistent in all environments
- Unchanged energy (may be high) and motivation
- Consistent difficulties-improved with medication and services
Cyclic Vomiting

- Regular, long-term use may result in intractable
  - Nausea
  - Vomiting
  - Abdominal pain
  - Weight loss
  - Dehydration
  - Relieved by hot shower

https://zdoggmd.com/incident-report-084/
EVALI

- February 18, 2020
  - 2,807 hospitalized
  - 68 deaths

- "tetrahydrocannabinol (THC)-containing e-cigarette, or vaping, products, particularly from informal sources like friends, family, or in-person or online dealers, are linked to most EVALI cases and play a major role in the outbreak"

- CDC and FDA recommend that people not use THC-containing e-cigarette, or vaping products

- Vitamin E acetate should not be added to any e-cigarette, or vaping, products. (CDC.gov)
Case Reports

- Ischemic CVA (Volpon, 2017)
- Orthostatic hypotension
- Seizure
- Vasculitis
- Atrial Fibrillation
- Acute Coronary Syndromes (DeFilippes, 2020)
- Inflammatory conditions

(DeFilippes, 2020)
Driving

• Impaired driving-10.3% of 12th graders drove after using in the two weeks prior to the survey (NIDA-2018)

• Cannabis impairs lane changing, reaction time, and attention

• THC is the most commonly found psychoactive substance the blood of drivers involved in MVAs

• Drivers with THC in their blood twice as likely to be responsible for a fatal crash than those without (NIDA 2016)

• Heavy cannabis use prior to age 16 may be linked to more MVAs even when not intoxicated. (Dahlgren 2016)
  • Long term effects on IQ, working memory, processing speed and attention
Identification of Cannabis Use

- Acting out of character
- New words
- Increased irritability
- Loss of interest in activities
- Peer group that is using
- Memory, attention, focus and concentration difficulties
- Paraphernalia
- Binge eating
- Scleral injection
- Stealing
Protective Factors

• Family support
• Peer acceptance
• Satisfaction with appearance
• Feeling of competence
• Supervision
• Positive peer group
Treatment Approach

• Screening
• Determine frequency of use
• Screen for comorbid psychiatric conditions
  • Attention, concentration and memory deficits
  • Depression/anxiety
  • Paranoia
  • Behavioral changes
  • Suicidal/homicidal ideation
Treatment Approach

• Abstinence is best
• Delay use as long as possible
• Provide psychoeducation on risks, benefits
  • Parents and child
• Discuss current symptoms
  • Attributed to cannabis use
  • Possible worsening of psychiatric condition
  • Obscures the physician’s ability to make psychiatric diagnosis- ADHD, MDD, Anxiety, psychosis
• Discuss addiction potential
• Discuss future goals
  • Motivational interviewing
Treatment

• Treat comorbid psychiatric conditions when possible
• Discuss cannabis and medication combination and safety
• Weigh risks and benefits of prescribing other controlled substances
  • Not advised
• Monitoring
  • MAPs
  • Urine Drug Screens
    • Random vs. scheduled
    • May remain in urine up to 30 days with regular use
Resources

- [SAMHSA’s National Helpline – 1-800-662-HELP (4357)](https://www.samhsa.gov/behavioral-health/helpline)
- Facts for Families
  - AACAP
    - AACAP Policy Statements-Cannabis in CAP with ASD, legalization, Medical Marijuana
  - Resources for Primary Care
    - [http://www.aacap.org/AACAP/Families_and_Youth/Resource_Center_s/](http://www.aacap.org/AACAP/Families_and_Youth/Resource_Center_s/)
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