

MARIJUANA USE & THE JUVENILE JUSTICE SYSTEM

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1

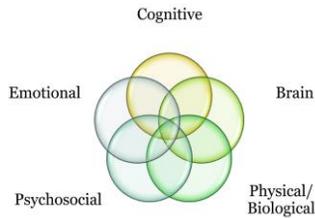
OUTLINE

- Adolescent Development
 - Normative Development
- Statistic of Juvenile Marijuana Use
- Effects of Marijuana use on Juvenile development
 - Cognitive Effects
 - Emotional/Psychological Effects
 - Brain Morphology Effects
- What should I be looking for?
- Summary and Resources



2

NORMATIVE ADOLESCENT DEVELOPMENT



3

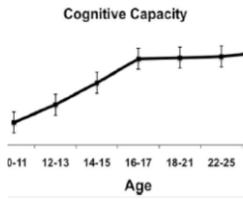
KEEP IN MIND



- Age is not an indicator for level of development
- Development is Dynamic
- Don't confuse normal behavior with socially acceptable behavior

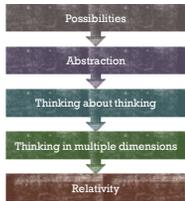
4

Laurence Steinberg, Adolescent Development and Juvenile Justice, 5 ANN. REV. CLINICAL PSYCHOL. 47 (2009)



5

Major Cognitive Changes in Adolescence



6

BRAIN DEVELOPMENT

- > By 6 brain is 90-95% of its size
- > Born with most neurons
- > Development is back to front
 - Prefrontal cortex is last to develop



- Planning
- Prioritizing
- Organizing
- Impulse control/regulation of emotions
- Weighing of consequences



7

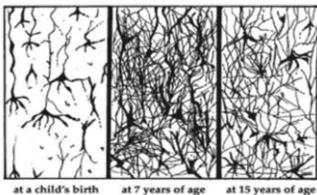
BRAIN DEVELOPMENT

- > Brain maturation completes at approximately age 25
- > Adolescence is known to be one of two times of neural pruning or change
- > White matter volume and integrity increases throughout childhood and adolescence into adulthood.
 - Associated with improvements in IQ and working memory performance
- > Grey matter volume undergoes particularly substantial decreases in frontal and temporal grey matter during adolescence
 - Associated with improvements in working memory better problem solving, planning and verbal learning
- > Social cognition changes
 - significant maturation of perspective taking and face processing



8

SYNAPTIC PRUNING



9

THE SOCIO-EMOTIONAL SYSTEM

- Responsible for processing emotions, social information, reward and punishment.
- Undergoes major changes in early adolescence that are related to hormonal changes.
- Changes result in:

- Increased sensation-seeking
- Increased/easier emotional arousal
- Increased attentiveness to social information

10

THE COGNITIVE CONTROL SYSTEM

- Responsible for deliberative thinking – weighing costs and benefits, thinking ahead, regulating impulses:
- Develops gradually from preadolescence well into the mid-20s.
- Changes result in:

- More impulse control
- Better emotion regulation
- More foresight
- More planning ahead
- Better reasoning

11

ABNORMAL DEVELOPMENT OR DISRUPTIONS IN DEVELOPMENT



12

DISABILITIES AFFECTING NORMAL DEVELOPMENT IN ADOLESCENCE

- Learning Disabilities: Average intelligence but deficits in learning compared to others.



13

OTHER COGNITIVE/DEVELOPMENTAL DISORDERS

- Attention Deficit Hyperactivity Disorder (ADHD)



- 20-30% of juvenile justice vs 3-5% in society

14

OTHER COGNITIVE/DEVELOPMENTAL DISORDERS

- Autism Spectrum Disorder (ASD)



- 5-24% of juvenile justice vs 0.5% in society

15

OTHER COGNITIVE/DEVELOPMENTAL DISORDERS

• Traumatic Brain Injury (TBI)

Physical Impairments	Cognitive Impairments	Emotional Impairments
speech	short term memory deficits	mood swings
vision	impaired concentration	denial
hearing	slowness of thinking	self-centeredness
headaches	limited attention span	anxiety
motor coordination	impairments of perception	depression
spasticity of muscles	communication skills	lowered self-esteem
paresis or paralysis	planning	sexual dysfunction
seizure disorders	writing	restlessness
balance	reading	lack of motivation
fatigue	judgment	difficulty controlling emotions

- According to CDC two age groups at greatest risk for brain injury are age 0-4 and 18-19

16

FETAL ALCOHOL SYNDROME

• Cognitive and behavioral deficits caused by in utero exposure to alcohol



- 23-27% of juvenile justice vs 2-5% in society

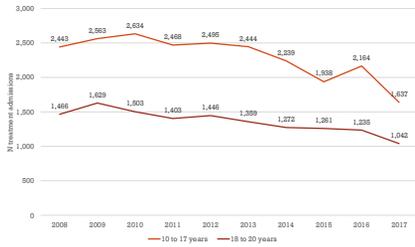
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MENTAL HEALTH DISORDERS



18

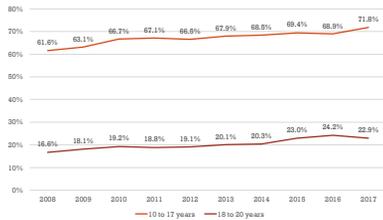
NUMBER OF TREATMENT ADMISSIONS MARIJUANA AS PRIMARY DRUG



Source: Colorado Department of Human Services, Drug-Alcohol Combined Data System (2018).

22

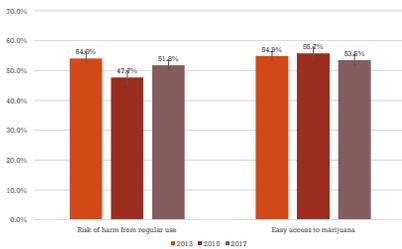
TREATMENT ADMISSIONS PERCENT REPORTING MARIJUANA AS PRIMARY DRUG OF ABUSE



Source: Colorado Department of Human Services, Office of Behavioral Health, Drug/Alcohol Coordinated Data System. Analyzed by the Division of Criminal Justice.

23

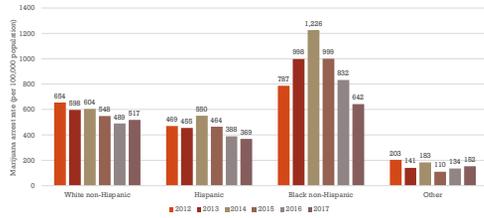
RISK OF HARM AND EASE OF ACCESS, COLORADO HIGH SCHOOLS



Source: Marijuana Health Monitoring and Research Program, Colorado Department of Public Health and Environment, Healthy Kids Colorado Survey, at <https://www.colorado.gov/jacdlr/alpha/healthy-kids-colorado-survey-data-tables-and-exports>

24

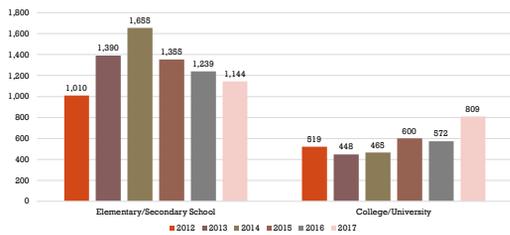
JUVENILE MARIJUANA ARREST RATES, BY RACE



Source: Colorado Bureau of Investigation, National Incident-Based Reporting System, Colorado State Office of Demography.

25

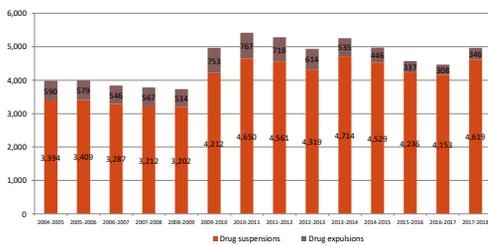
MARIJUANA OFFENSES IN COLORADO SCHOOLS



Source: Colorado Bureau of Investigation, National Incident-Based Reporting System.
 Note: Prior to 2012, school/university was a single location code. There were 228 offenses in 2012 using this more generic location code; these are not included in the totals because it is not possible to determine the specific location.

26

DRUG SUSPENSIONS AND EXPULSIONS



Note: Marijuana was reported separately for the first time in 2016-17, but data was not collected for the entire school year, making totals from the 2016-17 school year.
 Source: Colorado Department of Education.

27

COGNITIVE EFFECTS

Consistently research has found detrimental effects in cognitive domains related to:



Other Findings include poorer performance in:



34

EMOTIONAL/PSYCHOLOGICAL EFFECTS



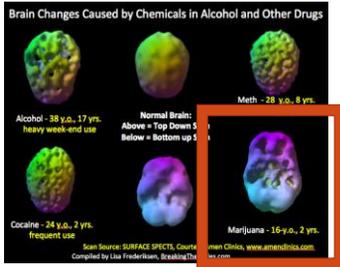
35

BRAIN MORPHOLOGY EFFECTS

- > Gray Matter
 - > May illicit premature tissue development
 - > Impose a marijuana-related effect on regressive changes (e.g., synaptic pruning, death of overproduced cells).
 - > May alter ongoing myelination of fiber tracts that are impacting gray matter estimates.
- > White Matter
 - > In general, research points to poorer white matter integrity in adolescent marijuana users
 - > Poorer white matter integrity has been found to correlate with poorer neurocognitive functioning
 - > Generally effect is more modest compared to the impact adolescent alcohol use
- > Most affected areas are:



36



37

BRAIN CHANGES EVEN WITH LOW LEVELS OF CANNABIS USE

- Sample of 14-year-old adolescents (males and females) with just one or two instances of cannabis use compared to controls
- Found increase in gray matter volume in certain parts of the adolescent brain
- The biggest differences in gray matter were Amygdala and Hippocampus
- What the increased brain matter volume means is unclear...
 - But remember the brain is supposed to be thinning at this stage not thickening so pruning is being disrupted

Source: Orr, C., Specht, P., Cao, Z., Albaugh, M., Chaarani, B., Mackey, S., ... & Bromberg, U. (2019). Grey Matter Volume Differences Associated with Extremely Low Levels of Cannabis Use in Adolescence. *Journal of Neuroscience*, 39(10), 1817-1827.

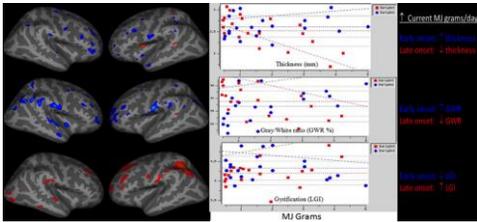
38

TIMING IS KEY

- Past research has found:
 - Use prior to age 16 predicted impaired reaction time on a task of sustained attentional processing
 - Use prior to age 17 related to poorer performance on verbal memory and fluency tasks, and verbal IQ
 - Use prior to age 18 linked to poorer performance on tasks of sustained attention, impulse control, and executive functioning
- Overall findings show poorer cognitive performance on measures of attention and learning, and memory
- Some effects persist even after abstinence
 - However, subtle cognitive effects are likely to resolve after longer-term abstinence
 - Young adult users have shown improved memory performance with long-term abstinence (8 years)
- Earlier onset also linked to stronger link to development of psychotic symptoms
 - cannabis by age 15 were 4x likely to develop psychotic symptoms

39

TIMING IS KEY



Source: Filbey, F. M., McQueeny, T., DeWitt, S. J., & Mishra, V. (2015). Preliminary findings demonstrating latent effects of early adolescent marijuana use onset on cortical architecture. *Developmental cognitive neuroscience, 16*, 18-22.

40

GENERAL DEVELOPMENTAL GUIDELINES IN THE JUVENILE JUSTICE SYSTEM

- <10: Know they are in trouble but not clear on long term effect
- 11-13: May have an appreciation for concrete consequences (go to jail), but not the long term impact
- 14+: May have a better grasp of long term effects

41

PERCEPTION OF THE COURT

- <10: Self-centered, non-adversarial and every one is there to help them
- 11-13: Concrete perspective of adversarial nature, and rights are given and taken by authority
- 14+: A sense of the adversarial nature of court and beginning to see rights as a possession

42

DECISION PROCESS IN COURT MATTERS

<10: Poor management of their options, typically cannot use facts to process decisions to their advantage, and often self-defeating

11-13: Maybe, maybe not! Often overly compliant and may agree without actually choosing but simply responding to perceived authority

14+: Capable of more complex decision processes and potential for long range thinking



43

REASONING BEHIND DECISIONS

<10: Avoid punishment

11-13: What does the authority want to hear?

14+: Blending their wants with those of others



44

RIGHT TO REMAIN SILENT

<10: You have to be quiet in court

11-13: Stay quiet or don't have to talk?

14+: Understand the choice not to talk but may not fully understand the implied issue of incrimination



45

AND IF I DON'T TALK?

<10: I will be in trouble with the judge

11-13: I will get in trouble

14+ I have the right to remain silent

46

RED FLAGS

- Is my client young? 8-12
- Is my client low IQ?
- Does my client have a special education history?
- Is there substance use issues esp. methamphetamine + Cannabis?
- Is there a psychosis or other mental health concerns
- ADHD/immaturity issues?

47

What Does It All Mean?

- > Adolescence is a time characterized by a Socio-emotional System that is easily aroused and highly sensitive to social feedback.
- > Adolescence is a time characterized by a still-immature Cognitive Control System.
- > Marijuana use in adolescent disrupts normal development and can have immediate and long term effects.
- > Adolescents in general are:
 - Less able to control impulses
 - Less able to resist pressure from peers
 - Less likely to think ahead
 - More driven by the thrill of rewards
- > Adolescent with Marijuana use are likely to have increased challenges in all areas

48

QUESTIONS?



49

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50