Marijuana Use in Adolescents

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Marijuana Use in Adolescents

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Marijuana Use in Adolescents

• Goals:
  – 1. Provide data about cannabis
  – 2. Review adolescent brain development
  – 3. Delineate specific concerns re cannabis in young populations
  – 4. Review synthetic marijuana
Marijuana Use in Adolescents

• Cannabis
  – Genus of flowering plants with 3 species: Cannabis sativa, Cannabis indica and Cannabis ruderalis
  – Contains several cannabinoids and several isomers of THC (delta-9-tetrahydrocannabinol)
  – THC: principal psychotropic substance (@20% by wgt)
  – Medical marijuana debate in Iowa: Medical treatment with cannabidiol for epilepsy (Dravet syndrome)
Marijuana Use in Adolescents

• Cannabis
  – Synonyms: Marijuana, pot, reefer, buds, grass, weed, dope, ganja, herb, boom, gangster, Mary Jane, sinsemilla, shit, joint, blow, blunt, green, kilobricks, Thai sticks; Marinol®
  – Synonyms: Hash, hash oil, hashion oil butane hash oil, BHO, wax, shatter, crumble, honey oil, dabs, budder
Marijuana Use in Adolescents

• Cannabis Consumption
  – Smoked as dried flowers and seeds:
    • Joints or Blunts: wrapped in paper like cigarettes
    • Smoked in a pipe, bong or vaporizer
  – Ingested as food product (eg, brownies, truffles)
  – Medical Marijuana: Marinol (dronabinol), Sativex (THC/CBD oramucosal spray)
Marijuana Use in Adolescents

TOP 10 WEED VAPORIZERS

1. VOLCANO
2. ARIZER EXTREME
3. SILVER SURFER
4. DA BUDDHA
5. HOT BOX
6. HERBALIAIRE
7. VAPR ONE (PORTABLE)
8. IOLITE (PORTABLE)
9. VAPOLUTION
10. EASY VAPE
Marijuana Use in Adolescents

• Cannabis Consumption
  – Dabbing:
    • Inhalation of BHO (butane hash oil) that is heated with a blowtorch on a glass or titanium rod
    • BHO = waxy, concentrated hashish oil created through “blasting” dried cannabis trimmings with butane to extract THC
    • AKA honeycomb, budder, earwax

https://www.youtube.com/watch?v=ngAkaQXTPfo
Marijuana Use in Adolescents

• THC Concentration
  – Average THC concentration in dried seeds/flowers: 3-5%
  – Average THC in hashish oil: 20%
  – “Medicinal marijuana”/Dabs: THC up to 80-90%
  – Dronabinol (Marinol) – prescription THC

Marijuana Use in Adolescents

- Pharmacokinetics
  - Highly lipid soluble
  - Plasma and urinary half-life: 3-4 days
  - Slower absorption orally, higher smoking/vaping
  - Plasma THC concentrations variable
  - Tar and CO absorbed: 3-5x > tobacco smokers
  - UDS: Positive
    - Peak levels: 100-200 ng/mL (10-25 min after smoking)
    - After 3 hours: <5 ng/mL
Marijuana Use in Adolescents

Urine Testing - Regular Use

Marijuana Use in Adolescents

- Estimated Detection Period (days)
  - Occasional Users: 4
  - Frequent Users: 10
  - Extreme Case: 67

Data: National Drug Court Institute/Ellis et al., 1985
Marijuana Use in Adolescents

Shop for containers to hide weed on Google

- Diversion Can Safe Fake Food...
  - $15.95
  - The Home Sewing Co.

- Diversion Bottle Safe Secret Container
  - $19.95
  - The Home Sewing Co.

- Aquafina Water Bottle Diversions
  - $13.99
  - Etsy

- FireKing Hercules Container
  - $27.99
  - Wayfair

- Barbasol Household Can
  - $18.95
  - The Home Sewing Co.
Marijuana Use in Adolescents

• Cannabis Drug Interactions
  – THC and amphetamines/cocaine: HTN, tachycardia, possible cardiotoxicity
  – THC and BZD/BBT/EtOH/Opioids/Antihistamines/Muscle relaxants/CNS depressants: Sedation and CNS depression
  – Significantly higher rate of fatal MVAs with combined THC and EtOH

Stout. Drug Metabolism Reviews. 2014.
Marijuana Use in Adolescents

• Cannabis Drug Interactions
  – Probable Interactions through CYP-450 2C9/3A4:
    • Ketaconazole – Increased THC concentration
    • Rifampin – Decreased THC concentration
    • Theophylline – Increased theophylline clearance  Stout. Drug Metabolism Reviews. 2014.
Marijuana Use in Adolescents

- Cannabis Drug Interactions
  - Possible Interactions with Psychotropics:
    - SSRIs: Mania
    - TCAs: Tachycardia/delirium
    - Lithium: Increased lithium concentration
    - Barbiturates: CNS depression

Cannabis Drug Interactions

- Possible Interactions with Other Medications:
  - Anticholinergics: Sedation
  - Disulfiram: Hypomania
  - Protease Inhibitors: Decreased effectiveness
  - Sildenafil: Myocardial infarction

Resources for Information:
PubMed

PubMed comprises more than 24 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.
Resources for Information: NIDA

• NIDA: National Institute on Drug Abuse
• Mission: Bring the power of science to bear on drug abuse and addiction
• 1. Strategic support and research across a broad range of disciplines
• 2. Ensure rapid and effective dissemination and use of research results to improve prevention and treatment and inform policy
1. Marijuana addiction
   - A. Does not exist
   - B. Occurs only in connection with addiction to other drugs, such as alcohol/cocaine
   - C. Occurs in 1 in 11 people who use it
   - D. Has a causal relationship with psychosis

   » USDHSS. NIDA. Drugs: Shatter the Myths. 2011.
NIDA Drug IQ Challenge

1. Answer - C and D

- Addiction Statistics:
  - 9% of all marijuana users addicted
  - 17% of adolescent users addicted
  - 33-50% of daily users addicted

- Increasing numbers seek treatment

1. Answer - C and D, cont.
   – Marijuana users develop tolerance
   – Marijuana Withdrawal Syndrome
     • Irritability, sleeplessness, decreased appetite, anxiety and drug craving
     • Begins 1 day after abstinence, peaks 2-7 days, subsides 1-2 weeks

NIDA Drug IQ Challenge

2. Smoking marijuana regularly can be especially harmful to teens. Why?
   - A. It can lower IQ
   - B. It can affect your ability to drive safely
   - C. It can make you less motivated to do well in school
   - D. All of the above

USDHSS. NIDA. Drugs: Shatter the Myths. 2011.
NIDA Drug IQ Challenge

2. Answer – D. All of the above

- Psychoactive drugs impact developing brains
  - Regular teen use can lower IQ
  - 14% of fatal MVAs involve THC in blood
  - Multiple studies and meta-analyses: Causal effect between cannabis abuse and psychosis

USDHSS. NIDA. Drugs: Shatter the Myths. 2011.
Marijuana Use in Adolescents

• NIDA: Monitoring the Future Annual Survey
  – Adolescent marijuana use: Direct correlation with teen perception of safety
  – Previous decade: Use among teens dropped dramatically
  – After medical marijuana legalization(2007-2013): prevalence of teen MJ users doubled: 12.4% to 23%

USDHSS. NIDA. Drugs: Shatter the Myths. 2011.
Marijuana Use in Adolescents

Figure 2.7  Past Month Use of Selected Illicit Drugs among Youths Aged 12 to 17: 2002-2013

* Difference between this estimate and the 2013 estimate is statistically significant at the .05 level.
Marijuana Use in Adolescents

Figure 2.8 Past Month Use of Selected Illicit Drugs among Youths Aged 12 to 17: 2013

Note: The prevalence of past month cocaine use among youths aged 12 or 13 rounds to less than 0.1 percent and is not shown.
Marijuana Use in Adolescents

• Factors influencing teen opinion re marijuana:
  – Past decade:
    • CO, AK, OR, WA and DC have legalized recreational and medical marijuana
    • 19 other states have legalized medical THC
  – Surveys indicate views of marijuana as safe increase with legalization  
2015 States with Legalized Medical/ Medical and Recreational Marijuana

Information below is current as of June 19, 2015.
Marijuana Use in Adolescents

• Scientific Evidence re Marijuana Medical Uses
  – Low-to-Moderate-Quality Evidence:
    • Chronic Pain (Sativex/THC capsules): Diabetic neuropathic and cancer pain
    • Multiple Sclerosis/Paraplegia (Sativex): Spasticity and neuropathic pain

Marijuana Use in Adolescents

• Scientific Evidence re Marijuana Medical Uses
  – Low-Quality Evidence:
    • Nausea associated with Chemotherapy: (Dronabinol/ Nabiximols/Smoked marijuana): Marijuana > dronabinol BUT paradoxically, repeated use caused hyperemesis  Volkow. NEJM. 2014.
    • Psychosis (Cannabidiol)
Marijuana Use in Adolescents

• Scientific Evidence: Marijuana Medical Uses
  – Very-low Quality Evidence:
    • Depression (Nabiximols)
    • Anxiety (Cannabidiol)
    • Sleep Disorder (Nabilone/Nabiximols)  Whiting. JAMA. 2015.
Marijuana Use in Adolescents

• Scientific Evidence re Marijuana Medical Uses
  – No evidence:
    • Glaucoma (THC/Cannabidiol/Sativex): Intraocular pressure
    • AIDS-associated Anorexia/Wasting Syndrome (Dronabinol/ Marijuana (smoked or ingested): Improved appetite reported but no change in weight gain

Marijuana Use in Adolescents

• Scientific Evidence re Marijuana Medical Uses
  – Ongoing Research:
    • Inflammation (Rheumatoid arthritis, Crohn’s DZ, Ulcerative colitis): THC & cannabidiol induce apoptosis, inhibit cell proliferation, suppress cytokines
    • Epilepsy: Cannabidiol decreased seizures in children in one survey of parents

Volkow. NEJM. 2014.
Marijuana Use in Adolescents

- Scientific Evidence re Marijuana: Adverse Effects
  - Short-term Use:
    - Impaired short-term memory
    - Impaired learning / retention of information
    - Impaired motor coordination with increased MVAs in teens
    - Altered judgment with increased risky sexual behaviors
  - High Doses: Paranoia and psychosis

Volkow. NEJM. 2014
Marijuana Use in Adolescents

• Scientific Evidence re Marijuana: Adverse Effects
  – Long-term Use:
    • Addiction: 9% all users, 17% adolescent users, 25-50% daily users
    • Altered brain development
    • Poor educational outcome with increased likelihood of dropping out of school
    • Cognitive impairment
    • Lower IQ among frequent users in adolescence

Volkow. NEJM. 2014.
Marijuana Use in Adolescents

• Scientific Evidence re Marijuana: Adverse Effects
  – Long-term Use:
    • Diminished life satisfaction and achievement
    • Chronic bronchitis
    • Increased risk of chronic psychotic disorders, including schizophrenia, primarily in persons with vulnerabilities and/or heavy users Volkow. NEJM. 2014.
Marijuana Use in Adolescents

[Diagram with labels such as Love Lobe, Rebellious Center, Judgement Gland, Balance & Coordination Levels, Communication Skills, etc.]
Marijuana Use in Adolescents
Adolescent Development

• Physiological Changes: Delayed sleep and awakening

• Pubertal Changes: Primary and secondary sex characteristics

• Cognitive Changes: Increased emotionality and risk taking, especially in early/middle adolescence

• Social Changes: Distancing from parents and increased time with peers  
Adolescent Brain Development

- Adolescent Brain Processes:
  1. Proliferation
  2. Pruning
  3. Myelination

- Processes enable functional maturation of neural pathways in cortex and subcortical areas

  » Alcohol. 2010. 44:15-26
Adolescent Brain Development

• Proliferation: Rapid growth of gray matter and formation of new connections
  – Maximal Frontal/Parietal Lobe Gray Matter Volume
    • 10-11 yrs in females, 12 yrs in males
  – Maximal Temporal Love Gray Matter Volume
    • 16.7 yrs in females, 16.5 yrs in males
  – Maximal Prefrontal Cortex Gray Matter Volume
    • Occurs in late adolescence (>21yrs)

Trends in Neuroscience. 2006
Adolescent Brain Development

• Pruning: Gray matter maturation in which new synaptic connections are formed and others are eliminated
  – Inverted U-shaped developmental curve from childhood to adolescence to adulthood
  – Decreased gray matter volume, especially in PFC
  – Influenced by environmental experiences

» Trends in Neuroscience. 2006
Adolescent Brain Development

• Myelination: Progressive enclosure of axons with myelin to speed communication among neurons and stabilize connections
  – Significantly increased cortical white matter from adolescence and into adulthood
  – Increased connectivity of subcortical regions (hippocampus, amygdala, areas with high sex steroid receptors)

Guerri. Alcohol. 2010.
Adolescent Brain Development

• Brain development progresses from
  – Lower to higher brain centers
  – Brain stem to the cerebral cortex
  – Caudal to rostral direction

• In adolescence, “mismatch” occurs
  – “Bottom-up” thinking trumps “top-down” thinking
  – “Reward” areas of brain trump “decision-making” areas

  » Casey and Jones. JAACAP. 2010.
Adolescent Brain Development

Figure 1
Cartoon model of ventral striatal and prefrontal cortex (PFC) interactions across development. Deeper color indicates greater regional signaling. Line represents functional connectivity, with solid line indicating mature connection and dotted line indicating immaturity (from [123]).
Adolescent Development

**FIGURE 2** Illustration of different developmental courses for sensation-seeking and impulsivity. Note: (A) Plot of sensation-seeking and impulsivity as a function of age (adapted from Steinberg et al.43). (B) Plot of patterns of activity in brain regions sensitive to reward outcomes during a cognitive control task across development (adapted from Galvan et al.6 and Galvan et al.16). fMRI functional magnetic resonance imaging.
Adolescent Development

• What happens when a potentially vulnerable adolescent brain is exposed to substances?
• Research shows:
  – 1. Gateway Drug Theory
  – 2. Serious Biopsychosocial Consequences
  – 3. Disconnect between Adolescent Views and Parental/Guardian Views
Gateway Theory

• Definition: Use of a less deleterious drug leads to use of and dependence on harder drugs

• Younger age of onset of alcohol/tobacco/MJ use leads to:
  • Increased probability of alcohol dependence as adult
  • Increased probability of cannabis dependence as adult
  • Increased probability of progression to “party” drugs or “hard” drugs

NIH Longitudinal Alcohol Epidemiologic Survey. 1992
Gateway Theory

• Controversial due to Confounding Factors:
  • Parental substance use
  • Parental divorce
  • Gender of child
  • Childhood sexual abuse
  • Disruptive behavior diagnoses (ADHD/ODD/CD)
  • Peer influences
  • Socio-cultural influences  NIH Longitudinal Alcohol Epidemiologic Survey. 1992
Gateway Theory: Supporting Evidence

• Twin Studies:
  – Australian Twin Register
    • Volunteer sample of twins born between 1964-1971
    • Interviewed by phone re lifetime substance use/dependence, age of onset and comorbidities
    • 4010 pairs in 26-34 yo range
    • 622 MZ and DZ same-sex twins discordant for THC use <17yo (adjusted for
      – 74 MZ / 84 DZ female pairs
      – 62 MZ / 91 DZ male pairs)
Gateway Theory: Supporting Evidence

– Australian Twin Register: Results
  • Rates of concordance for early THC use: significantly higher in MZ>DZ (p=0.005)
  • Twin with early cannabis abuse relative to co-twin:
    – Elevated lifetime rates of other drug use: OR 2.34-5.15
    – Elevated lifetime illicit drug abuse/dependence: OR 1.96-3.98
    – Elevated lifetime alcohol dependence: OR 1.85

Gateway Theory: Supporting Evidence

• Twin Studies, cont.
  – Netherlands Twin Register
    • 6228 twins (75% born between 1965-1980)
    • 1800 completed surveys in 1995 and 2000 re substance use, aggression, and Achenbach
    • Early onset cannabis use in 12.5% of twins
      – 219 (40.3%) from discordant same-sex twin pairs
        » 45 MZ / 63 DZ male pairs
        » 65 MZ / 46 DZ female pairs
Gateway Theory:
Supporting Evidence

• Twin studies, cont.
  – Netherlands Twin Register: Results:
    • Twins with early cannabis users reported 5.1% regular use of party drugs (LSD, Ecstasy) cf 6.4% regular use of hard drugs (cocaine/heroin)
    • Outcomes adjusted for early tobacco and alcohol use and aggressive behaviors
      – Party drug use: OR=7.4, 95% CI 2.3-23.4
      – Hard drug use: OR=16.5, 95% CI 2.4-111.3
      – Regular cannabis abuse: OR=1.34, 95% CI 0.3-5.1
Gateway Theory: Supporting Evidence

• Netherlands Twin Register Results:
  – At time of interviews, THC was legal in Netherlands but not in Australia
  – Therefore, associations between THC and drug use outcomes NOT solely due to legal status
  – Possible sociocultural factors, eg lifetime THC use
    • Netherlands 12.3%
    • US 28.8%
Gateway Theory: Supporting Evidence

• Christchurch, NZ, Study
  – 25-year Longitudinal Study
    • Birth cohort of 1265 Christchurch, NZ, children born in 1977
    • Studied at birth, 4 mo, annually from 1-16 yrs, and at 18, 21, and 25 years
    • Retention rate @75%
Gateway Theory: Supporting Evidence

- Christchurch, NZ, Study, cont.
  - Data Collected at ages 18, 21, 25 yrs:
    - Illicit drug use/abuse/dependence
    - Parental illicit drug use/criminality/alcohol problems
    - Childhood sexual abuse/physical abuse/interpersonal violence
    - Gender
    - Novelty seeking on personality questionnaire
    - Dx of ADHD/ODD/CD
    - Frequency of cannabis/tobacco/alcohol use (16-25 yrs)
    - Substance-using peers (16-25yrs)

Gateway Theory: Supporting Evidence

- Christchurch, NZ, Study Results:
  - Multivariate regression model predictors of illicit drug use/dependence
    - Childhood sexual abuse (p<.0001)
    - Gender (p<.01)
    - Novelty seeking (p<.0001) **
    - CD between 7-13 yrs ((p<.05)
    - Parental illicit drug use (p<.05)

** Still significant after analyses with fixed and time-dynamic covariates

Gateway Theory: Supporting Evidence

• Christchurch, NZ, Study Conclusions:
  – Association between THC and illicit drug use: dose dependent
  – Younger users more susceptible to THC effects
    • Ages 16-17: OR=92.20  95% CI 46.5-182.7
    • Ages 24-25: OR=7.53  95% CI 4.5-12.4
  – Novelty-seeking plays a significant role in transition to illicit drug use  
Marijuana Use in Adolescents
Biopsychosocial Consequences of Adolescent THC Use

• Consequences of Marijuana Intoxication:
  – Euphoria and disinhibition
  – Anxiety/Agitation
  – Altered sense of time
  – Distorted perceptions/Derealization
  – Impaired coordination/reaction time
  – Difficulty with thinking/problem solving
  – Problems with learning/memory
  – Mistrust/Paranoid delusions/Hallucinations
Biopsychosocial Consequences of Adolescent THC Use

• Consequence of Teen Marijuana Dependence:
  – Decreased motivation
  – Increased likelihood of dropping out of school/job
  – Persistent problems with learning and memory
Biopsychosocial Consequences of Adolescent THC Use

• Possible Physical Consequences from THC:
  – Cannabinoid Hyperemesis Syndrome
  – Tachycardia, arrhythmias, HTN
  – Deaths from cardiac/cerebral ischemia
  – Chronic bronchitis, COPD
  – Elevated visceral fat deposition/insulin resistance
  – Gingival proliferation
  – Nasopharyngeal tumors

Hoch. Dtsch Arztebl Int. 2015.
Biopsychosocial Consequences of Adolescent THC Use

- Regular adolescent cannabis users: More likely to
  - Use other illicit drugs
  - Perform poorly in schools
  - Experience depression and poorer mental health than peers
  - Report psychotic symptoms

Biopsychosocial Consequences of Adolescent THC Use

- Marijuana Use and Hospitalization:
  - Retrospective study of 64,657 members of CA HMO between 1979-1985
  - Self-reported THC use and hospitalizations for all-cause injury (adjusted for age/tobacco/alcohol):
    - Males using THC: OR 1.58, 95% CI 1.29-1.94
    - Females using THC: OR 1.55, 95% CI 1.12-2.10

Biopsychosocial Consequences of Adolescent THC Use

• Marijuana Use and Hospitalization
  • MVA rates for THC users: 2.31, 1.44-3.72
  • Assaults for THC users: 2.63, 1.56-4.46
Biopsychosocial Consequences of Adolescent THC Use

• Marijuana and Driving in Adolescence
  • 2/3 of US trauma center admissions: MVAs with 60% of patients positive for drugs and/or alcohol  Ronen. Accid Anal Prev. 2010.
  • Rates of DUI highest in young drivers (<19 years) – 6.3% in 2009 USDHSS. NIDA. InfoFacts. 2011.

• Marijuana
  – Most frequently detected illicit drug in drivers injured or killed in MVAs  Kelly et al. Drug and Alcohol Review. 2004.
Biopsychosocial Consequences of Adolescent THC Use

• Marijuana and Driving
  – Epidemiological data from numerous nations: Risk of involvement in MVA after cannabis use increases 2-fold
  – Combination of alcohol and THC: Increased collisions relative to use of EtOH/THC alone
  – Driving features most impacted by MJ: Reaction time/Divided-attention tasks/Lane-positioning

Biopsychosocial Consequences of Adolescent THC Use

• Marijuana and Driving:
  – One low-potency THC blunt equivalent to BAC 0.05
  – Executive function decline correlates with increasing potency of THC
  – Newer data shows longer driving deficit in chronic users
Biopsychosocial Consequences of Adolescent THC Use

• Marijuana and Driving:
  – CO statistics
    • 2000-2009: Increase in registered medical MJ users from 10,000 to 250,000
    • Legal limit for impaired driving with MJ: 5ng/ml
Biopsychosocial Consequences of Adolescent THC Use

• Marijuana and Driving:
  – WA statistics
    • 2009-2013: Number of positive THC/carboxy-THC screens increased from 19-28% to 25-40%
    • 56% of positive results were >5ng/ml
    • MJ: Only drug to show increased frequency in positive screens requested by police/physicians  
Biopsychosocial Consequences of Adolescent THC Use
Biopsychosocial Consequences of Adolescent THC Use

• Cannabis and Psychosis: Early Research

  – Moreau de Tours, French psychiatrist, 1845:
    • Experimented at the Club de Haschischins
    • Published results of ingesting several hundred mg canabis
    • Reported “acute psychotic reactions, generally lasting but a few hours, but occasionally as long as a week”

Biopsychosocial Consequences of Adolescent THC Use

• Cannabis and Psychosis: Early Research
  – FA Ames in 1950s:
    • Exposed medical staff to controlled doses of cannabis
    • Delusions/VH at lower doses
Biopsychosocial Consequences of Adolescent THC Use

• Cannabis and Psychosis: Early Research
  – D’Souza et al.
    • DB RCT
    • Administered 2.5 and 5 mg THC by IV
    • Dose-dependent transient psychotic symptoms

Neuropsychopharm. 2004
Cannabis and Psychosis: Supporting Evidence

• Andreasson Study (Sweden):
  – Longitudinal study of 45,570 male Swedish conscripts
  – Followed 15 years
  – Evaluated for frequency of cannabis use
  – Controlled for other psychiatric diagnoses and socioeconomic level

• Results:
Cannabis and Psychosis: Supporting Evidence

• Van Os Study (Netherlands):
  – Longitudinal population-based study 1997-99
    • 4045 individuals psychosis-free at baseline
    • 59 with psychotic symptoms at baseline
  – Any baseline use of THC predicted psychosis: OR=2.76, 95% CI 1.18-6.47 and severe psychotic symptoms: OR=24.17, 95% 5.44-107.46
  – Effect of baseline THC increased over time, with >50% of psychotic symptoms attributed to THC use
  – If baseline psychosis AND THC: Risk 54.7% cf to 2.2% without THC

Van Os. Am Jnl Epidemiology. 2002
Cannabis and Psychosis: Supporting Evidence

• Arseneault, et al Study (Dunedin, New Zealand)
  – General population birth cohort study from 1972-73
  – 1037 individuals born with 96% F/U at age 26
  – Tertiles for cannabis use at ages 15 and 18
  – Cannabis use <15 yo:
    • Four times more likely to have schizophreniform dx at age 26
    • BUT nonsignificant when controlled for psychotic sx at age 11
Cannabis and Psychosis: Supporting Evidence

• Henquet Study, Germany:
  – Four-year prospective study
  – 2,437 14-24yo rated as with or without predisposition for psychosis on M-CIDI
  – Results:
    • Increasing cannabis consumption associated with increased risk of psychosis
    • Adjusted for age, sex, SES, urbanicity, childhood trauma, baseline predisposition for psychosis, use of other drugs - OR=1.53

Cannabis and Psychosis: Supporting Evidence

• Stefanis Study, Greece
  – Longitudinal prospective study from 1983 birth cohort
  – 3500 19-yo self-reported via Community Assessment of Psychic Experiences
  – Controlled for traumatic life events
  – First use of cannabis < 16 yo associated with much stronger positive/negative psychotic symptoms than after 16 yo

Stefanis et al. Addiction. 2004
Cannabis and Psychosis: Supporting Evidence

- Adjacic-Gross et al Study, Switzerland
- Prospective community study within 1978 birth cohort
- 292 males and 299 females sampled initially at 20 yo and again at 30 yo
- Schizotypal symptoms associated with regular cannabis use in adolescence: OR=2.29, 95% CI 1.32-2.97
- Schizophrenia nuclear symptoms mainly related to alcohol: OR =1.84 or polysubstance abuse OR=2.35

Adjacic-Gross et al. Schizophrenia Research. 2007
Cannabis and Psychosis: Supporting Evidence

– Miettunen Study, Finland

• 6330 15-16yo adolescents
• Self-reported questionnaire of prodromal psychotic symptoms and drug use (PROD)
• Controlled for disruptive behavior disorders
• Cannabis abuse correlated with having >2 positive and negative symptoms of schizophrenia: OR=2.23, 95% CI 1.70-2.94
• IF onset of THC use <16yo, much stronger effect INDEPENDENT of lifetime use frequency Miettunen et al. Br J Psychiatry. 2008
Cannabis and Psychosis: Supporting Evidence

• **Meta-Analysis**
  – 11 studies of psychosis
    • 5 adult population-based cohorts
    • 2 birth cohorts
  – Conclusions:
    • Increased risk of any psychotic outcome if cannabis ever used: OR: 1.41, 95% CI 1.20-1.65 (pooled adjusted OR)
    • Results consistent with dose-response effect with most frequent cannabis use conferring OR=2.09, 1.54-2.84

Cannabis and Psychosis: Supporting Evidence

• Meta-Analysis Conclusions:
  – “The evidence is consistent with the view that cannabis increases risk of psychotic outcomes independently of confounding and transient intoxication effects...We conclude that there is now sufficient evidence to warn young people that using cannabis could increase their risk of developing a psychotic illness later in life.” Moore et al. Lancet. 2007.
Cannabis and Psychosis: Supporting Evidence


Figure 1: Forest plot showing adjusted odds ratios and 95% CI for any psychosis outcome according to ever use of cannabis in individual studies. Exposure was ever use of cannabis in all studies except for the NPMS, in which the measure was ever use over the past 1 year only. *Additional data were provided by investigators in these studies.†Results were unaltered when the 4% of cases with simplex schizophrenia were omitted.
Cannabis and Psychosis: Supporting Evidence


Figure 2: Forest plot showing adjusted odds ratios and 95% CI for any psychosis outcome according to most frequent use of cannabis in individual studies.

*Results were not adjusted for other drug use.
Adolescent vs Parental Views
Adolescent vs Parental Views

- Adolescent Views:
  - Adolescents generally over-estimate parental approval of EtOH and THC use
  - >68% of adolescents do NOT believe daily drinking or binge drinking represents "great risk" for harm
  - 52.5% of adolescents do NOT perceive great risk in smoking THC once or twice a week

Adolescent vs Parental Views

Figure 6.1 Past Month Binge Drinking and Marijuana Use among Youths Aged 12 to 17, by Perceptions of Risk: 2010

- Trends in substance use often coincide with trends in perceived risk. Increases in perceived risk typically precede or occur simultaneously with decreases in use, and vice versa. For example, the proportion of youths aged 12 to 17 who reported perceiving great risk from smoking one or more packs of cigarettes per day increased from 63.1 percent in 2002 to 69.7 percent in 2008, then declined to 65.8 percent in 2009; this rate remained unchanged between 2009 and 2010 (65.5 percent) (Figure 6.2). Consistent with increases in the perceived risk of cigarette smoking, the rate of past month adolescent cigarette smoking dropped from 13.0 percent in 2002 to 8.3 percent in 2010.
Adolescent vs Parental Views

- 65% of 8th graders / 84% of 10th graders rate “very easy” or “fairly easy” access to EtOH. Windle. Pediatrics. 2008.
- 48.6% of 12-17 yo rate easy access to THC.
- 19.0% of 12-17 yo rate easy access to cocaine.
- 12.9% of 12-17 yo rate easy access to LSD.
- 11.6% of 12-17 yo rate easy access to heroin. US Dept HHS. SAMHSA. NSDUH. 2010.
Adolescent vs Parental Views

- Adolescent Views:
  - 89.6% believe parents would strongly disapprove of trying MJ or hashish 1-2 times
  - 4.4% who perceive strong parental disapproval use THC
  - 32.8% who do NOT perceive strong parental disapproval use THC

Adolescent vs Parental Views


Row 1. Adolescents (12-17 year olds)

A. Great risk

B. Fairly/very easy to get

C. Somewhat/strongly disapprove

This item was not asked of adolescents

- Colorado
- Non-Med Marijuana States
Adolescent vs Parental Views


Fig. 1. Measures of marijuana-related attitudes, change across time (2003–4 to 2010–11) within Colorado (blue; diamond markers) and within 34 states without medical marijuana laws (NMMS, red; square markers). (A) Great risk to smoking marijuana 1–2 times per week. (B) Fairly/very easy to obtain marijuana. (C) Somewhat or strongly disapprove of adults trying. Row 1 represents 12–17 year olds, row 2 represents 18–25 year olds and row 3 represents those 26+ years. x-Axis indicates year, while y-axis indicates percent of respondents endorsing an item. Dashed line indicates that years 2009–10 and 2010–11 are not independent. Brackets and associated asterisk(s) indicate a significant change within Colorado across years. Asterisk below lines, just above the years (x-axis) indicate that Colorado and 34 non-medical marijuana states significantly differed (*p<0.05) (For interpretation of the color information in this figure legend, the reader is referred to the web version of the article.).
Adolescent vs Parental Views


Row 1. Adolescents (12-17 year olds)

A.i. Past year use

B.i. 20+ days use

C.i. Marijuana abuse/dependence

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Row 2. Young adults (18-25 year olds)
A.ii. Past year use *
B.ii. 20+ days use
C.ii. Marijuana abuse/dependence

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Row 3. Other adults (26+ years of age)

A.iii. Past year use

B.iii. 20+ days use

C.iii. Marijuana abuse/dependence

Fig. 2. Measures of marijuana-use-related outcomes, change across time (2003–4 to 2010–11) within Colorado (Blue; diamond markers) and within 34 states without medical marijuana laws (NMMS, red; square markers). (A) Past-year marijuana use. (B) 20+ days used in the past month among users. (C) Marijuana abuse/dependence in the past year. Row 1 represents 12–17 year olds, row 2 represents 18–25 year olds and row 3 represents those 26+ years. x-Axis indicates year, while y-axis indicates percent of respondents for marijuana use, near daily use and abuse/dependence. Dashed line indicates that years 2009–10 and 2010–11 are not independent. Brackets and associated asterisk(s) indicate a significant change within Colorado across years. Asterisk below lines, just above the years (x-axis) indicate that Colorado and 34 non-medical marijuana states significantly differed (*<0.05) (For interpretation of the color information in this figure legend, the reader is referred to the web version of the article.)
Adolescent vs Parental Views

• High-school/College Athletes:
  – Greater acceptance of EtOH abuse by peers
  – More binge/heavy drinking than nonathletes
  – More drinks provided to them, both at home and in the community
  – Male college athletes: 75-93% use EtOH
  – Female college athletes: 71-93% use EtOH

Adolescent vs Parental Views

• High-school/College Athletes:
  – Swimming, tennis associated with low substance abuse
  – Rare "stimulant stacking" and steroids to enhance performance (cycling, track and field, baseball, gymnastics)
  – Higher risks for later abuse/dependence of alcohol and opioids (football, soccer, rugby)
Adolescent vs Parental Views

• >50% of parents are unaware when children are abusing substances  

• University of Michigan CS Mott Children’s Hospital Survey. May 2011: Substance abuse in children ages 13-17
  – Nationally representative (weighted to reflect population statistics) annual household survey
  – Randomly selected, stratified group of parents, N=667  mottnpch.org/reports-surveys
Adolescent vs Parental Views

- UM Mott Children’s Hospital National Poll questions:
  - 1. Nationally, what % of 10th graders do you think have used alcohol in the past 12 months (in quintiles)?
  - 2. Nationally what % of 10th graders do you think have used marijuana in the past 12 months?
  - 3. Did your [x-yo] drink alcohol in the last 12 mo?
  - 4. Did your [x-yo] use marijuana in the last 12 mo?

mottnpch.org/reports-surveys
Adolescent vs Parental Views

Figure 1. Parents’ perceptions versus teens’ report of alcohol and marijuana use

**Alcohol**
- Did your teen drink in the last year?*
  - Yes-10%
  - No-75%
  - Unsure-15%
- Teens’ self-report of drinking**
  - Yes-52%
  - No-48%

**Marijuana**
- Did your teen use in the last year?*
  - Yes-5%
  - No-85%
  - Unsure-10%
- Teens’ self-report of use**
  - Yes-28%
  - No-72%

*Source: C.S. Mott Children’s Hospital National Poll on Children’s Health, 2011 for teens 13-17 years
**Source: Monitoring the Future Study, 2010 data regarding 10th graders
Adolescent vs Parental Views
Adolescent vs Parental Views

• Parental Views:
  
  – Parents underestimate their own influence
  
  • Century Council - 2012 Report: 83% of youth cite parents as leading influence in decision to not drink or only drink occasionally, up from 55% in 2003
  
  – Parents seek information about teens' substance use and social norms from other parents

King. Amer Jnl Health Education. 2002.
Adolescent vs Parental Views

• Parental Views, cont.
  – Parents often unaware of their parenting style
  – Four basic types of parenting:
    • Authoritarian
    • Permissive
    • Uninvolved
    • Authoritative
## Adolescent vs Parental Views

<table>
<thead>
<tr>
<th>Demanding</th>
<th>Supportive</th>
<th>Unsupportive</th>
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<td>Parent is accepting and child-centered</td>
<td>Parent is rejecting and parent-centered</td>
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<td>Relationship is reciprocal, responsive; high in bidirectional communication</td>
<td>Relationship is controlling, power-assertive; high in unidirectional communication</td>
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<td>Relationship is indulgent; low in control attempts</td>
<td>Relationship is rejecting or neglecting; uninvolved</td>
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<td>little of child</td>
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<td></td>
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<td>Permissive Parenting</td>
</tr>
</tbody>
</table>
Adolescent vs Parental Views
Adolescent vs Parental Views

• Parenting Style: Authoritarian
  – Parent dictates rules
  – Parent doesn’t explain values
Adolescent vs Parental Views
Adolescent vs Parental Views

- Parenting Style: Permissive Parenting:
  - Parent provides implicit approval of substance abuse
  - Parent allows older teens to use substances at home or with friends elsewhere
  - Parent uses alone or with other adults in the home to intoxication
  - Parent provides substances in home
Adolescent vs Parental Views
Adolescent vs Parental Views

• Parenting Style: Uninvolved Parenting:
  – Parent allows teens to make own choices without interference
  – Parent unaware of events in teen’s life
  – Parent frequently does not become involved until faced with school disciplinary or legal issues

Addictive Behaviors. 2010.
Adolescent vs Parental Views
Adolescent vs Parental Views

• Parenting Style: Authoritative Parenting:
  – Parent informed about local substance abuse trends
  – Parent has regular discussions with teens about personal values
  – Parent supervises activities at home
  – Parent engages in active discussions with other parents/teachers/coaches

Adolescent vs Parental Views

• Parenting Styles:
  – Authoritarian, Permissive, and Uninvolved Styles:
    • Associated with increased disruptive behavior disorders
    • Associated with higher risk of substance abuse
  – Authoritarian Style
    • Associated with better communication/relationships
    • Associated with better self-esteem/health in teens
    • Associated with increased high school/college graduation
    • Associated with decreased substance use

Adolescent vs Parental Views
Realistic Expectations

• Valid, reliable information provided to children, adolescents, parents and the community can make a change!
Questions???