Marijuana Use Among Young Adults in an Era of Rapid Policy Change: Clinical and Public Health Considerations

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Conflict of interest statement:

- I have no commercial relationships to disclose
- I will not be discussing any unapproved uses of pharmaceuticals or devices

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Objectives

By the end of 90 minutes, participants will:

- 1. Assess recent marijuana policy changes and implications for college students
- 2. Discuss known long-term health and neurocognitive consequences of youth marijuana use
- 3. Utilize skills in SBIRT (screening, brief intervention, and referral to treatment) in case examples



90 minutes total:

- 5 min: Case to stimulate thinking
- 40 min: Review of the literature
- 30 min: Revisit and discuss cases
- 15 min: Questions and further discussion



Case

You are seeing a 19-year-old male who smokes marijuana most Thursdays, Fridays, Saturdays, and Sundays. He doesn't have class on Fridays, and reports that he is doing 'fine' in his coursework (he's passing everything, obtaining mostly B's). He never drives after smoking marijuana since he walks everywhere on campus and takes a cab if he needs to. He almost never drinks alcohol and does not use other drugs.

When you counsel him to cut back, he counters with, "But it's legal in a bunch of states, and it's safer than alcohol, which everyone else drinks. Plus, it's natural, unlike other drugs like stimulants or ecstasy, which are all chemicals."





Part 1 Policy Considerations





Marijuana Policies (3 Levels)

Decriminalization	Medical Marijuana	Legalization for Recreational Use
Allows individuals to possess small amounts of marijuana without prosecution	Allows individuals to possess/purchase/use marijuana for specific medical conditions as specified by physician	Allows individuals to possess/purchase/use marijuana for recreational purposes
Present in 16 states	Present in 24 states	Present in 4 states (WA, CO, OR, AK) and Washington, DC
<i>E.g.,</i> MA passed in 2008 by ballot measure	<i>E.g.,</i> MA passed in 2012 by ballot measure	<i>E.g.,</i> MA considering in 2016 by ballot measure

NORML, 2016. Available at http://www.norml.org. Accessed October 26, 2016.





Marijuana Policy in the US



Decriminalization in MA, 2008

- Allows individuals to carry up to 1 oz. without criminal penalties
 - Individuals >18 yrs fined civil penalty of \$100
 - Individuals <18 yrs fined civil penalty of up to \$1000 unless they complete drug awareness program by DYS









MA Medical Marijuana Law, 2012



"Cancer, glaucoma, positive status for human immunodeficiency virus, acquired immune deficiency syndrome (AIDS), hepatitis C, amyotrophic lateral sclerosis (ALS), Crohn's disease, Parkinson's disease, multiple sclerosis and other conditions as determined in writing by a qualifying patient's physician."



S. Galore, The Daily Chronic, January 1, 2013





MA <u>Recreational</u> Marijuana Law

1. Limits

- Only ≥21 year-olds
- Personal limit on person: 1 oz
- Personal limit at home: 10 oz
- Can be purchased in plant form, or as edibles, drinkables, oil, ointment products

3. Taxation

- Excise tax of 3.75% on all sales in addition to state's usual 6.25% sales tax
- Towns/cities can add up to 2% additional tax
- Thus, overall taxes could be 12%

2. Where Purchased

- Sales unlikely until 2018
- Medical dispensaries will have first
 opportunity at license to sell
- Will be allowed in every town/city unless a town/city votes otherwise
- No facilities within 500 ft of schools

4. Enforcement

- New Cannabis Control Commission would be established
- Would be implemented under Treasurer's Office (also oversees alcohol)
- Commission paid for by excise tax

Manning A, Vaccaro A. *The Boston Globe*, April 20, 2016. "An Initiative Petition for a Law Relative to the Regulation and Taxation of Marijuana", 2016.



Trends Are Reversing...



Monitoring the Future, University of Michigan, 2014





Prevalence: College Students



Monitoring the Future, 2016



BU School of Medicine

College Gender Differences



Monitoring the Future 2015, Published University of Michigan, 2016.



Part 2 Health Effects





Why Use Marijuana?



Conrod PJ, et al. JAMA Psychiatry, 2013;70(3):334-42





Health Effects

- Will examine health effects by system
- Since marijuana is a Schedule 1 substance, it has not been rigorously studied (and cannot be!)
 - Therefore, all data are self-reported
 - Confounding is a common problem
 - Data are sometimes from adolescents, sometimes from young adults



Respiratory: Lung Effects...?

 Occasional / low-cumulative use not associated with adverse changes in FEV₁ or FVC (N = 5,115 adults)



MJ Pletcher et al. JAMA. 2012; 307:173-81





Respiratory: Lung Effects...?

- Observational studies often confounded by cigarette smoking
- Still, marijuana contains many of the same irritants / carcinogens as cigarette smoke at similar or higher levels
- Regular marijuana users more likely to experience wheezing, cough, mucus production



R Mehra et al. *Arch Intern Med.* 2006; 166:1359-67. D Moir et al. *Chem Res Toxicol*, 2008;21:494-502.



CV: Risk for Long-Term Harm...?

- <u>No established</u>
 <u>association</u> with adverse cardiovascular outcomes among adolescents
- Among adults, elevated mortality among cannabis smokers who have had a prior myocardial infarction



Mukamal, et al., *Am Heart J*, 2008;155(3):465-70. Thomas, et al., *Am J Cardiol*, 2014;113(1):187-90.





GI: Cannabis Hyperemesis Syndrome



- Case series (*n* = 98):
 - Nausea/emesis (100%)
 - Morning Sx (71%)
 - Abdominal pain (86%)
 - Epigastric (61%)
 - Periumbilical (23%)
 - Diarrhea (23%)
 - Relief with shower (91%)

DA Simonetto et al. Mayo Clin Proc. 2012;87(2):114-119





Endo: Effects on Reproduction

- Among men, results in dose-related decrease in testosterone levels
- Associations with erectile dysfunction, oligospermia, and inhibition of orgasm in men
- Association with gynecomastia among men has been reported, but poorly characterized

Gorzalka & Dang. *Endocrinology*, 2012;153(3):1016-24. Smith, et al., *J Sex Med*, 2010;7(2):787-93.





Neuro: Addiction, A Brain Disease

- Normal development during young adulthood:
 - Brain development (white matter)
 - Impulse control and decision-making
 - Social development
 - Coping skills, interpersonal relationships
 - The fact that this development is not yet complete means college students are *at risk*
 - 2. Substance use during this critical time permanently alters the processes



(top view)

http://www.nytimes.com, 2008





Neuro: Vulnerability of Youth

- Neurodevelopment continues into mid-20s
- THC is lipophilic
 - Crosses blood-brain barrier and placenta
 - THC concentrates in fatty tissues (*e.g.*, brain!)
 - Long half-life of elimination
- Endocannabinoid system: plays role in modulating neurodevelopment



JP Schact. *Neuropsychopharmacology.* 2012;37(11):2368-76 A Zolesky. *Brain.* 2012;135(7):2245-55



Neuropsychiatric Effects

- Younger / longer term MJ use linked to:
 - Decline in IQ (~8 points for persistent cannabis dependence)
 - Decline was not reversible among those that stopped using
 - 2. Higher overall risk of psychosis (41% increase in odds), as well as earlier onset
 - 3. Lots of brain structure / function changes

S Dragt et al. *Acta Psychiatrica Scandanavica.* 2012;125:45-53 MH Meier et al. *Proc Natl Sci U S A.* 2012;109:e2657-64 TH Moore et al. *Lancet.* 2007;370(9584):319-28



Behavioral: Odds of MVA

	No of events/Total								
Study	Case	Control			Odds ratio (95% Cl)		v	Veight (%)	Odds ratio (95% Cl)
Bedard 2007	1106/19 511	541/13 032				•		18 .0 1	.39 (1.25 to 1.54)
Blows 2005	32/552	5/587						7.9 7.	16 (2.77 to 18.52)
Drummer 2004	51/1214	5/376			-			8.1 3	.25 (1.29 to 8.21)
Laumon 2005	322/3972	100/2793						17.0 2	.38 (1.89 to 2.99)
Longo 2000	21/1038	23/937		-	-	-		12.0 0	.82 (0.45 to 1.49)
Mathijssen 2005	6/108	148/3571						9.0 1	.36 (0.59 to 3.15)
Mura 2003	49/321	21/310						12.8 2	.48 (1.45 to 4.24)
Terhune 1982	13/129	4/161					-	6.2 4.	40 (1.40 to 13.84)
Terhune 1992	16/541	9/258			-	_	_	9.1 0	.84 (0.37 to 1.93)
Total (95% CI)	1616/27 286	856/22025				-		100.0 1	.92 (1.35 to 2.73)
Test for heterogenei	ty: $\tau^2 = 0.18$, $\chi^2 = 4$	2.74, df=8,							
P<0.001, ² =81%			0.05	0.2	1	5	20		
Test for overall effec	t: z=3.63, P<0.00	1	Collision lower wi tetrahyd	ı risk th Irocannabinol		Collisior higher tetrahydrocanna	risk with binol		

M Asbridge et al. BMJ. 2012;344:e536.





To Summarize...

- No cardiovascular or long-term lung effects (though may exacerbate wheezing, cough, and mucus production)
- Concerning data on:
 - Male sexual function
 - Gastrointestinal function
- Lots of brain structure and function changes, with poor IQ attainment
- Double the odds of motor vehicle accident





Part 3 SBIRT, Case Studies





SBIRT: Every Provider, Every Time

Screening

Use a validated tool (ASSIST)

Brief Intervention

- Offer brief advice
- Use motivational interviewing

Referral to Treatment

 For students whose use interferes with daily functioning (school, work, relationships)





Screening

- What tools are your centers using?
- Marijuana No standard measure yet:
 - ASSIST: Alcohol, Smoking and Substance Involvement Screening Test (World Health Organization)
 - In the past three months, how often have you used marijuana?
 - Given the commonality of marijuana usage, would consider asking questions about how it is affecting functioning:
 - Ability to meet major deadlines in college, focus/concentration
 - Counsel regarding use while driving

Humeniuk R, et al. *Addiction*. 2008;103(6):1039-1047. SAMHSA, 2016.





Diagnosis: Cannabis Use Disorder

Cannabis use occurring over 12 months with ≥ 2 of:

- 1. Taken in larger amounts / over a longer period than intended
- 2. Persistent desire / unsuccessful efforts to cut down
- 3. Excess time spent in activities to obtain, use or recover from substance
- 4. Craving
- 5. Failure to fulfill major role obligations at work, school, or home
- 6. Continued use despite having persistent / recurrent social or interpersonal problems
- 7. Social, occupational, or recreational activities given up
- 8. Recurrent use in situations in which it is physically hazardous
- 9. Continued use despite knowledge of having a persistent or recurrent physical or psychological problem
- 10. Tolerance
- 11. Withdrawal

Diagnostic and Statistical Manual of Mental Disorders 5, APA, 2013.



Mild: 2-3 criteria Moderate: 4-5 symptoms Severe: ≥6 symptoms



Brief Intervention

- 'As your doctor, I recommend you stop using marijuana.'
- 'Smoking marijuana may affect your sports performance.'
- 'Marijuana directly affects your brain and can hurt your school performance and your future.'
- 'Marijuana use can cause lifelong problems for some p
- 'Please don't ever drive a callaft, using drugs even if you don't feel high.'
- 'Make grangements ah ad cutime for safe transportation.'
 - secan slowry get you into trouble with your parents, at even with the police.'
- Marijuana might be laced with other drugs; you never really know what you are getting.'
- 'Today's marijuana contains much higher THC content than in the 1960s and 1970s.'

Brooks T, Knight JR. In Addiction Medicine. 5th Ed. Lippincott Williams & Wilkins, 2014





Stages of Change







Motivational Interviewing

Express Empathy Develop Discrepancy Roll with Resistance Support Self-Efficacy





Referral to Treatment







Case

You are seeing a 19-year-old male who smokes marijuana most Thursdays, Fridays, Saturdays, and Sundays. He doesn't have class on Fridays, and reports that he is doing 'fine' in his coursework (he's passing everything, obtaining mostly B's). He never drives after smoking marijuana since he walks everywhere on campus and gets a ride if he needs to. He almost never drinks alcohol and does not use other drugs.

When you counsel him to cut back, he counters with, "But marijuana is legal in a bunch of states, and it's safer than alcohol, which everyone else drinks. Plus, it's natural, unlike other drugs like cocaine or ecstasy, which are all chemicals."





Motivational Enhancement



School of Medicine



Case

When pressed, he reveals that when his friends drive him around on weekends, they're sometimes high when they do.

 Discuss that the likelihood of a fatal crash after using marijuana is double that of someone who has not been using. Review strategies to ensure he always has a safe ride.

When asked about pros and cons of his use, he says he's thinking about getting into business school and admits his grades might not be high enough.

 Review the ways in which his weekend use might be causing a 'cognitive hangover' into the early part of the week, and affecting his completion of assignments on the weekend.

Finally, he reports that he has given up playing ultimate frisbee on the weekends, which he used to love, saying now he feels like he sometimes 'just sits around' instead.

 Set a goal to get out and play with friends, and avoid smoking on those mornings and the night before.



Being Realistic

Goals:

- Some argue to set your goals high and state them: 100% abstinence
- Others argue that realistic goals are better: reduced use and reduction of harm
- What we can all agree on:
 - We have to meet college students where they're at
 - In the end, they will choose whether to change





"I only smoke on weekends. It's not a big deal." "It's great that you're not smoking more frequently. Let's review, though, some ways your weekend marijuana use might be affecting your life more broadly."





"Marijuana is a plant. It's natural, so it's much less harmful." "Not all plants are safe – think about poison ivy. Even cocaine and heroin come from plants. The more important point is for us to focus on how marijuana might be affecting your life, and whether we can make improvements."





"Marijuana is legal in a bunch of states now." "It's true that marijuana is legal in an increasing number of states. Still, substances that are legal, like alcohol and cigarettes, can cause problems."





"Yeah, but marijuana isn't nearly as harmful as alcohol or cigarettes."

"Substances are different in the ways in which they cause harm. What I want to focus on is whether marijuana could be contributing to problems in your life, and whether we can make improvements."





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