Marijuana in College: Effects, Prevention, and Challenges in a Changing Legal Climate

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Substance Use Data from Monitoring the Future Study

- Any illicit drug
  - 37.3% report past year use
- Marijuana
  - 34.9% report past year use
- Any illicit drug other than marijuana
  - 17.1% report past year use
  - 11.1% Amphetamines
  - 9.0% Adderall
  - 5.8% Ecstasy (MDMA)
  - 5.4% Narcotics other than heroin

Impact on sleep (and, importantly, subsequent days)

Health and Mental Health
n = 76,481 undergraduate students at 141 institutions

- Factors affecting academic performance:
  - 30.5% Stress
  - 22.0% Sleep difficulties
  - 21.0% Anxiety
  - 16.8% Cold/Flu/Sore throat
  - 14.3% Work
  - 14.2% Internet use/computer games
  - 12.8% Depression
  - 11.7% Concern for a troubled friend/family member
  - 11.1% Participation in extracurricular activities
  - 10.9% Relationship difficulties

American College Health Association, 2012

Absorption and Oxidation of Alcohol

- Factors affecting absorption
  - What one is drinking
  - Rate of consumption
  - Effervescence
  - Food in stomach

- Factors affecting oxidation
  - Time!
  - We oxidize .016% off of our blood alcohol content per hour

Time to get back to .000%

- .08%
  - 5 hours
    - (.080%....064%....048%....032%....016%....000%)

- .16%
  - 10 hours
    - (.160%....144%....128%....112%....096%....080%....064%....048%....032%....016%....000%)

- .24%
  - 15 hours
    - (.240%....224%....208%....192%....176%....160%....144%....128%....112%....096%....080%....064%....048%....032%....016%....000%)
Next day, increase in:
- Daytime sleepiness
- Anxiety
- Irritability
- Jumpiness
With marijuana, two things happen...

Extension of Stage 4 or "deep" sleep and REM deprivation

Next day, just like with alcohol, increase in:

• Daytime sleepiness
• Anxiety (note that there is a Cannabis Induced Anxiety Disorder)
• Irritability
• Jumpiness
Impact on attention, concentration, and memory

Marijuana and cognitive abilities

- Effects on the brain
  - Hippocampus
    - Attention, concentration, and memory
  - Research with college students shows impact on these even 24 hours after last use (Pope & Yurgelun-Todd, 1996)
  - After daily use, takes 28 days for impact on attention, concentration, and memory to go away (Pope, et al., 2001)
  - Hanson et al. (2010):
    - Deficits in verbal learning (at 3 days, not 2 weeks or 3 weeks)
    - Deficits in verbal working memory (at 2 weeks, not 3 weeks)
    - Deficits in attention (still present at 3 weeks)
Marijuana use trajectories: relationship to “discontinuous” enrollment

Chronic/Heavy marijuana users were 2.0 times as likely as “minimal users” to have discontinuous enrollment... even after controlling for demographics, personality, and high school GPA.

Source: Arria, 2013

DUI risk

Impaired driving and duration of effects

- Effects on the brain
  - Reaction time is impacted
  - DUI implications
- Grotenhermen, et al., (2007) suggest it takes 3 hours for THC levels to drop to 4.9 ng THC/ml among 70 kg men
- From a public health standpoint, Hall (2013) recommends waiting up to 5 hours after use before driving
A Quick Word About Mental Health

Cannabis Use Associated with Risk of Psychiatric Disorders (Hall & Degenhardt, 2009; Hall, 2009; Hall 2013))

- Schizophrenia
  - Those who had used cannabis 10+ times by age 18 were 2.3 times more likely to be diagnosed with schizophrenia
  - “13% of schizophrenia cases could be averted if cannabis use was prevented (Hall & Degenhardt, 2009, p. 1388)”
- Depression and suicide
  - “Requires attention in cannabis dependent (Hall, 2013)”
- Screening suggestions

Counseling can impact retention

- Turner and Berry (2000) demonstrated that retention rates are higher for college students who get counseling than for those who do not


Counseling can impact retention

• Wilson, Mason, & Ewing (1997) followed 562 students who requested counseling
  ▫ Excluding those who specifically requested counseling for retention-related concerns
• 79% of those seen in 1-12 sessions were retained or graduated 2 years since their counseling request
• Only 65% of those who requested services but had not received them were retained or graduated at 2 years

Wilson, Mason, & Ewing (1997)

Prevention

Tier 1: Evidence of Effectiveness Among College Students

• Combining cognitive-behavioral skills with norms clarification and motivational enhancement interventions.
  ▫ Reductions in drinking rates and associated problems (e.g., ASTPI)
• Offering brief motivational enhancement interventions.
  ▫ Reductions in drinking rates and associated problems (e.g., BASICS)
• Challenging alcohol expectancies.
  ▫ Reductions in alcohol use

From: "A Call to Action: Changing the Culture of Drinking at U.S. Colleges," NIAAA Task Force
Finding potential hooks, change talk, and behavior change strategies: An Example

- “What are the good things about marijuana use for you?”
- “What are the ‘not-so-good’ things about marijuana use?”
- “What would it be like if some of those not-so-good things happened less often?”
- “What might make some of those not-so-good things happen less often?”

CONSEQUENCE MEASURES

- Most college student marijuana consequence measures adapted from established alcohol measures
- May not adequately capture experiences of students
- Particularly important to capture unwanted effects if hoping to provide feedback on “consequences” in motivational enhancement programs.
- Students (n=207) were asked to identify up to five effects of marijuana use that “may not have been so good”
  - 805 separate effects identified
  - 193 students listed at least one consequence/effect
  - 88% of these listed 3 or more consequences

Sample list of consequences offered by students in open-ended survey

<table>
<thead>
<tr>
<th>Top 10 Endorsed Marijuana Consequences: Study 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Eating (e.g., eating too much)</td>
</tr>
<tr>
<td>2. Sleep problems</td>
</tr>
<tr>
<td>3. Productivity, apathy, motivation issues, or boredom</td>
</tr>
<tr>
<td>4. Cognitive abilities, attention, or concentration problems</td>
</tr>
<tr>
<td>5. Memory problems</td>
</tr>
<tr>
<td>6. Problems with lungs or coughing</td>
</tr>
<tr>
<td>7. Feeling antisocial or experiencing social awkwardness</td>
</tr>
<tr>
<td>8. Physical difficulties outside of lungs, cough, mouth, or throat (e.g., feeling dizzy, sick, uncoordinated, etc.)</td>
</tr>
<tr>
<td>9. Not getting things done</td>
</tr>
<tr>
<td>10. Spending too much money</td>
</tr>
</tbody>
</table>

Notes: Preliminary analyses suggested that among the top ten types of consequences generated by participants, only five (not getting things done and financial impact) were reflected in items from the RACE, and these two were the ninth and tenth most mentioned consequences.

Walter, Kilmer, Logan, & Lee (2012)
Lee, Kilmer, Neighbors, Walters, Garberson, & Logan (in prep)
Personalized Feedback Interventions


**Participants**

- Two public PNW universities/colleges
- Screening criteria:
  - 5+ days use MJ past month
- Demographics (N = 212)
  - 45.3% Female
  - 74.8% White
- Mean Use at Screening
  - 7.6 joints per week / 14.2 days past month (Campus 1)
  - 10.5 joints per week / 18.3 days past month (Campus 2)

**individualized** College Health for Alcohol and Marijuana Project (R21DA025833)

**iCHAMP**

- 1712 Screened
- 242 Invited to trial
- 212 Enrolled
Procedures

Screening / Baseline
*Randomized to condition post baseline
(106 control, 106 intervention)

In-person Personalized Feedback Intervention
*If unable to complete in-person, option
for mailed feedback (85% received in-person or mailed)

3- and 6-month follow-up
85.4% completed 3 mos.
82.5% completed 6 mos.
Consequences Associated with Marijuana Use

**Consequences You Denied**
There are a few consequences you may experience:

- **Social/Threat**: Missed out on other things because you spent too much money on marijuana.

**Academic/Performance**
- Need more time to complete school work.
- May feel inebriated or under-the-influence.
- Risk of reduced ability to perform tasks requiring concentration and coordination.
- Delayed abilities to do things.

**Medical/Health**
- Risk of heart attack or anorexia.
- Insomnia, male impotence, or depression.
- Risk of death.

In all, you took and used marijuana in a monster-related consequence felt at least in the past 30 days.

**Consequences Related to Abuse/Dependence**
The consequences below are positive signs that a pattern of use could be associated with marijuana abuse or marijuana dependence.

To the point, you are addicted...

- **If you used marijuana, what are the signs of marijuana use?**
  - A 7 of 10 consequences which are signs of marijuana dependence, including:
    - You review those marijuana to get the same high or find the same amount did not get you as high as it did.
    - You go to places where you might purchase marijuana, the use of marijuana, feeling the effects of marijuana.
    - You are not able to stop.

**Money**
You said that in a typical month, you have approximately $450 for spending money. In a typical month, you earn $860. You spend about $620 on marijuana.

**If You Changed Your Marijuana Use**
You said you would expect the following to happen if you stopped or cut back on your marijuana use:

- Would be able to finish many chores.
- Would be able to perform more responsibilities.
- Would not need to be reminded by the marijuana.
- Would not need to use marijuana to perform.
- Would not have to use marijuana to cope.
- Would not feel so high.
- Would not have to take other drugs.
- Would not be awake all night.

**Feelings About Reducing Use or Quitting Marijuana**
You noticed feeling confident enough in reducing or not using in 3 out of 19 situations.

**Family History**
We consider your risk based on family history for lic.
Our Findings

**3 Month Outcomes**

- # Days in last 30
- # Joints per week
- Hours high per week
- Consequences

**6 Month Outcomes**

- # Days in last 30
- # Joints per week
- Hours high per week
- Consequences

At 3 months, intervention participants reported 24% fewer joints smoked per week relative to control participants.
At 3 months, intervention participants reported 21% fewer hours being high per week relative to control participants.

**Thoughts from iCHAMP**

- Very encouraging results!
- No difference in # of days used, but how students are using within day
- Six months?
  - Assessment effects?
  - Seasonal effects?
  - Need for booster sessions?
- Attendance rates
  - 85% received feedback; 55% in-person
  - How do we get non-treatment seeking, non-mandated individuals to attend an intervention?

**Challenges/questions**
Normative misperceptions

In survey of 5990 participants, 67.4% of students said they hadn’t used MJ in the past year. Thus, “most” students don’t use marijuana.

Only 2% of students got this right!

98% of students perceived the typical student to use at least once per year.

Misperceptions were related to use and consequences.

Kilmer, et al. (2006)

Considering withdrawal (and management of withdrawal)
Motivations for Use

• Research team utilized qualitative open-ended responses for using marijuana among incoming first year college students to identify which motivations were most salient to this population

Lee, Neighbors, & Woods (2007)

<table>
<thead>
<tr>
<th>Motivation Category</th>
<th>Percentage of Motivation endorsed</th>
<th>Percentage of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment (e.g., be happy, get high, enjoy feeling)</td>
<td>62.14%</td>
<td>34.65%</td>
</tr>
<tr>
<td>Social enhancement (e.g., better social relationships)</td>
<td>42.25%</td>
<td>55.80%</td>
</tr>
<tr>
<td>Therapeutic (e.g., pain relief, anxiety relief)</td>
<td>29.79%</td>
<td>6.04%</td>
</tr>
<tr>
<td>Boredom (e.g., nothing to do, nothing better to do)</td>
<td>20.73%</td>
<td>6.96%</td>
</tr>
<tr>
<td>Relocation (e.g., to escape, helps me cope)</td>
<td>20.95%</td>
<td>5.07%</td>
</tr>
<tr>
<td>Availability (e.g., easy to get, less access)</td>
<td>19.74%</td>
<td>2.22%</td>
</tr>
<tr>
<td>Relative low harm (e.g., less health risk, no hangover)</td>
<td>10.89%</td>
<td>0.98%</td>
</tr>
<tr>
<td>Allotment perception (i.e., medication) (e.g., prescribed, medical purpose)</td>
<td>7.65%</td>
<td>1.07%</td>
</tr>
<tr>
<td>Activity enhancement (e.g., music sounds better, everyday activities more enjoyable)</td>
<td>6.84%</td>
<td>0.80%</td>
</tr>
<tr>
<td>Relocation (e.g., to escape, pain relief)</td>
<td>6.11%</td>
<td>0.52%</td>
</tr>
<tr>
<td>Food enhancement (e.g., enjoy good food, food tastes better)</td>
<td>5.84%</td>
<td>0.58%</td>
</tr>
<tr>
<td>Social enhancement (e.g., to get high, feels less lonely)</td>
<td>3.07%</td>
<td>0.07%</td>
</tr>
<tr>
<td>Image enhancement (e.g., to be cool, to feel cool)</td>
<td>2.65%</td>
<td>0.12%</td>
</tr>
<tr>
<td>Celebration (e.g., special occasion to celebrate)</td>
<td>1.68%</td>
<td>0.14%</td>
</tr>
<tr>
<td>Mood (e.g., feeling good, feels a lot better)</td>
<td>0.96%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Lee, Neighbors & Woods (2007)
Motivations for Use

<table>
<thead>
<tr>
<th>Motive Category</th>
<th>Percentage of respondents endorsing motive</th>
<th>Proposed of motive endorsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation (e.g., feel happy, get high, enjoy feeling)</td>
<td>24.20%</td>
<td>19.20%</td>
</tr>
<tr>
<td>Coping (e.g., feel depressed, relieve stress)</td>
<td>16.00%</td>
<td>13.00%</td>
</tr>
<tr>
<td>Medical use (e.g., help with pain)</td>
<td>10.00%</td>
<td>8.00%</td>
</tr>
<tr>
<td>Habit</td>
<td>6.00%</td>
<td>5.00%</td>
</tr>
</tbody>
</table>

Withdrawal: Cannabis

Diagnostic Criteria

292.0 (F12.00)

A. Cessation of cannabis use that has been heavy and prolonged (i.e., usually daily or almost daily use over a period of at least 3 months).
B. Threes (or more) of the following signs and symptoms develop within approximately 1 week after cessation:
1. Irritability, anger, or aggression.
2. Nervousness or anxiety.
3. Sleep difficulty (e.g., insomnia, disturbing dreams).
4. Decreased sexual appetite or weight loss.
5. Migraines.
6. Depressed mood.
7. At least one of the following physical symptoms causing significant discomfort: abdominal pain, diarrhea, cramps, sweating, fever, chills, or headache.
C. The signs or symptoms in Criterion B cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
D. The signs or symptoms are not attributable to another medical condition and are not better explained by another mental disorder, including intoxication or withdrawal from another substance.

The potential role of expectancies

Lee, Neighbors & Woods (2007)
Research questions related to a changing legal climate

• How will use by youth and adolescents be affected?
  • 19% of seniors said they would try mj or increase use if legalized

Source: Kilmer & Lee (2013)
Research questions related to a changing legal climate

- How will use by youth and adolescents be affected?
  - 19% of seniors said they would try mj or increase use if legalized
- How is DUI reliably measured, and how long after use should one wait before driving?
- Will increased availability result in increased use (regardless of age group)?

Source: Kilmer & Lee (2013)

Impact of Outlet Density for Alcohol

- Restrictions on alcohol retail outlet density.
  - Higher density of alcohol outlets is associated with higher rates of consumption, violence, other crime, and health problems.
  - Higher level of drinking rates associated with larger number of businesses selling alcohol within one mile of campus

From: "A Call to Action: Changing the Culture of Drinking at U.S. Colleges," NIAAA Task Force

Research questions related to a changing legal climate

- How will use by youth and adolescents be affected?
  - 19% of seniors said they would try mj or increase use if legalized
- How is DUI reliably measured, and how long after use should one wait before driving?
- Will increased availability result in increased use (regardless of age group)?
- What, if any, are the harm reduction guidelines for marijuana use?
- Will an illegal market truly be avoided through legalization & sales through state-regulated stores?

Source: Kilmer & Lee (2013)
Future directions

- Current grant supplement to study effects of marijuana legalization
- Continue to evaluate prevention efforts
  - Marijuana and Other Drug (MOD) workshop
    - 89% say they think differently about their pattern of substance use
    - 40% intend to change pattern of use; 45% undecided
- Realize that any one thing you do (or any one drug you target) is part of an overall prevention puzzle
- We’re all in this together – learn from successes and challenges

Wrapping Up

- Implications on campus
  - How we discuss “negative consequences” matters
  - Connecting a student who may be struggling with substance use to clinical services also matters
  - If there’s a student you’re concerned about: consider talking with him or her.
  - It’s how you have the conversation that can matter
  - Ask open-ended questions
  - Don’t judge, accuse, or label
  - Consider the impact of “planting a seed”

Best of luck for the remainder of the 2013-2014 academic year!

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