Marijuana’s Effects On and Off the Playing Field: Discussing Marijuana with Intercollegiate Athletes

Jason R. Kilmer, Ph.D.
University of Washington
Assistant Professor
Psychiatry & Behavioral Sciences
Assistant Director of Health & Wellness for Alcohol &
Other Drug Education
Division of Student Life

Substance Use Data from Monitoring the Future Study

- Any illicit drug
  - 38.9% report past year use
- Marijuana
  - 35.5% report past year use
- Any illicit drug other than marijuana
  - 19.0% report past year use


- Important to keep abstainers abstaining
  - 12.8% who first tried marijuana at age 14 or younger meet criteria for dependence or abuse, compared to 2.6% who first used after 18 (SAMHSA, 2011)

Norm Perception

- In survey of 5990 participants, 67.4% of students said the 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)
Consider the following as it applies to you as leaders...

• We know that student perceptions of the substance use decisions made by peers impacts that student’s own use
• However, student perceptions of substance use decisions by leaders are even more impactful
• What does this mean for you as a leader on your campus?
Drugs tend to work in one of two ways...
MARIJUANA USE – onset

- When smoked...
  - Effects begin immediately
  - Last 1-3 hours

- When consumed in food or drink...
  - Effects begin 30-60 minutes
  - Last up to 4 hours

NIDA (2012)
Feel euphoric or "high" due to action in the reward system of the brain
- After euphoria passes, may feel sleepy or depressed
- Occasionally produces anxiety, fear, distrust, panic

MARIJUANA USE – effects after use

NIDA (2012)

With high doses, may experience acute toxic psychosis
- Hallucinations
- Delusions
- Depersonalization
- Seem more likely when high dose is consumed in food/drink rather than smoked
- Specific causes of symptoms unknown

Impact on sleep (and, importantly, subsequent days)
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
Next day, increase in:
• Daytime sleepiness
• Anxiety
• Irritability
• Jumpiness
Next day, feel:
• Fatigue

With marijuana, two things happen...
Extension of Stage 4 or "deep" sleep and REM deprivation

Sleep impairment documented as persistent effect of marijuana use
NIDA (2012)
REM
Stage 1
Stage 2
Stage 3
Stage 4

Next day, just like with alcohol, increase in:
• Daytime sleepiness
• Anxiety (note that there is a Cannabis Induced Anxiety Disorder)
• Irritability
• Jumpiness

Next day, feel:
• Fatigue

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 3 days, at 2 weeks, not 3 weeks)
    - Deficits in attention (still present at 3 weeks)

Marijuana use trajectories: relationship to “discontinuous” enrollment

Source: Arias, 2013

<table>
<thead>
<tr>
<th>Marijuana Use Trajectory</th>
<th>Cumulative Stop-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic/Heavy users</td>
<td>40.8%</td>
</tr>
<tr>
<td>Inrequent users</td>
<td>30.1%</td>
</tr>
<tr>
<td>Infrequent users</td>
<td>26.2%</td>
</tr>
</tbody>
</table>

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

Reaction time and implications for driving
Impaired driving and duration of effects

- Effects on the brain
  - Reaction time is impacted
    - DUI implications – getting set at 5 ng THC/ml of blood
    - Why 5 ng? Same deficits behind wheel of car that we see at .08% for alcohol
    - How long does it take to drop below 5 ng?
    - 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

Driving (among 18-25 year olds who reported using at least once in the past 30 days)

- OBSERVED
  - Driving within 3 hours of using
    - 0 times 52.5%
    - 1 time 14.2%
    - 2-3 times 12.7%
    - 4-5 times 6.4%
    - 6 or more times 14.2%

- WEIGHTED
  - Driving within 3 hours of using
    - 0 times 50.59%
    - 1 time 14.13%
    - 2-3 times 13.28%
    - 4-5 times 6.43%
    - 6 or more times 15.57%

Source: Washington Young Adult Health Survey
UW CSHRB & Washington DBHR
PI: Kilmer (March, 2015)

Impact on lungs and heart
Marijuana’s impact on the body...

- Effects on heart rate and blood pressure
  - Increases heart rate  
    - On average, 29 beats per minute increase
  - Raises blood pressure

- Effects on lungs
  - Vital lung capacity  
    - Symptoms of chronic bronchitis
  - Carcinogen exposure
    - 70% more benzopyrene in mj smoke than tobacco smoke
    - 50% more polyaromatic hydrocarbons in mj smoke than tobacco smoke

Motivation

Marijuana’s impact on the body...

- A word about impact on motivation
  - Definitely hard to measure but it could be any one (or more) of the following (or a yet to be determined additional factor)...
    - Hippocampus impacts motivation
    - Marijuana’s impact on sleep
    - Block passage of nutrients between cells
“The Munchies”

Marijuana’s impact on the body...

• “The munchies” (Mahler et al., 2007)
  • Stimulation of anandamide

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)

Motivations for Use

Lee, Neighbors & Woods (2007)

Motivations for Use

Lee, Neighbors & Woods (2007)

Motivations for Use

Lee, Neighbors & Woods (2007)
Withdrawing: Cannabis

Diagnostic Criteria

• Withdrawal of cannabis use has been heavy and prolonged (i.e., usually daily or almost daily use over a period of at least a few months).

• These (or similar) or the following signs and symptoms develop within approximately 1 week after criteria B:

1. Irritability, anger, or aggression.
2. Nervousness or anxiety.
3. Sleep difficulty (e.g., insomnia, disturbing dreams).
4. Decreased appetite or weight loss.
5. Medication increase.
6. Depressed mood.

• At least one of the following physical symptoms causing significant discomfort:

   a. Abdominal pain, shakiness/shivers, sweating, fever, chills, or headache.
   b. The signs or symptoms in Criterion B cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
   c. 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.

Final thing...  
Marijuana and drug testing...

• UAs test for THC-COOH

• Depends on potency of what was used, way in which it was used, and how often the person uses.

• Maximal detection time in urine (as documented in the published literature)?

• NINETY-FIVE DAYS (Verstraete, 2006)

• Maximal detection time referenced on websites?

• Up to six months

As we move forward on college campuses...lessons learned and emerging needs

• DFSCA – clarify expectations early

• Are “smoke free” policies enough?
  ▫ Edibles, vaporizers, e-cigarettes
  ▫ What focus do we need to put (if any) on messages about food at parties (e.g., we warn about not accepting a drink when students don’t know what’s in it)?

• Students are hungry for information/education/prevention – provide it!

• What message about enforcement are students getting (and are they seeing mixed messages)?

• What are effective prevention and education approaches?
Future directions

• Look at what the science says...it's out there!
• Realize that any one thing you do (or any one drug you target) is part of an overall prevention puzzle
• If there’s a teammate or friend 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”

Thank you!

Special thanks to Holly Deering and Susie Bruce

Jason Kilmer
jkilmer@uw.edu