



Average THC for Marijuana Flower by Strain		
SATIVA	HYBRID	INDICA
		
Average THC: 21.65%	Average THC: 21.35%	Average THC: 20.74%
THC Range: 14.50% - 28.28%	THC Range: 13.03% - 28.30%	THC Range: 11.30% - 26.40%

Average potency (nation) = 11.16%  
 Average potency (Seattle) = 21.24%

Concentrates average potency (nation) = 55.45%  
 Concentrates average potency (Seattle) = 72.76%

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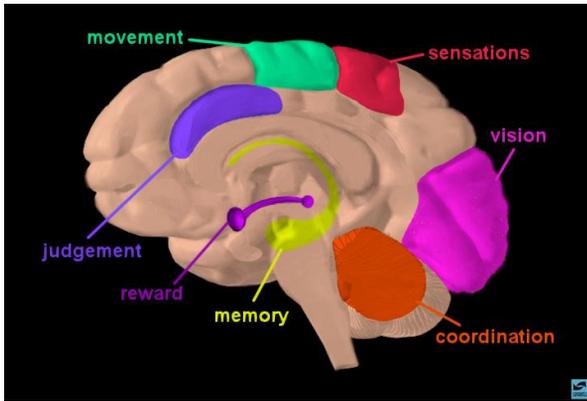
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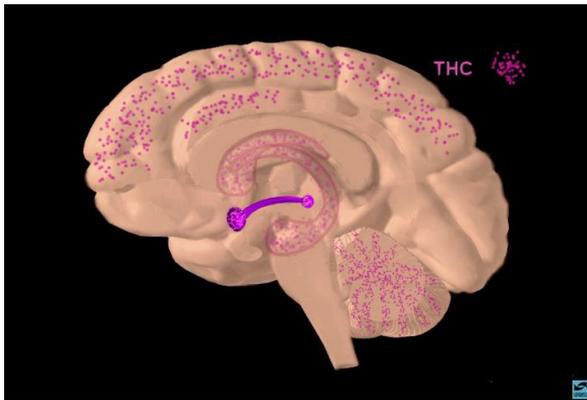
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## MARIJUANA USE – onset

- **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)

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## MARIJUANA USE – effects after use

- 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

NIDA (2012)

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## MARIJUANA USE – effects after use

- **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**

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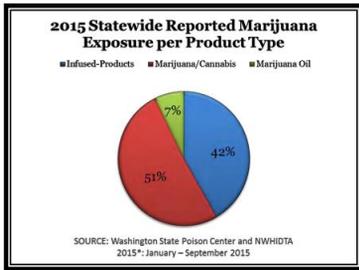
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From the date of legalization to the date of commercial sales starting, poison center calls increased 54.26%; for those under 20, calls increased 80%

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## Norms

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### Social norms: Perception versus reality

- People are influenced by their subjective interpretation of a situations rather than by the actual situation (Lewin, 1943).
- We are influenced by our perception of others' attitudes, behaviors, and expectations rather than by their actual attitudes, behaviors, or expectations.
- Our perceptions and interpretations are often inaccurate.

Source: Neighbors & Kilmer (2008)

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## Norms Clarification

- Examines people's perceptions about:
  - Acceptability of excessive behavior
  - Perceptions about the prevalence of use among peers
  - Perception about the rates of use by peers



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## NORM PERCEPTION

- 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)

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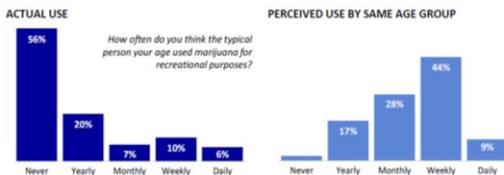
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- Although 56% do not use marijuana, only 2% get this correct. Over half (53%) estimate the typical person their age uses marijuana at least weekly



Washington Young Adult Health Survey, Cohort 1 (2014 data)

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## Substance use and sleep

## Sleep, Sleepiness, and Alcohol Use

TIMOTHY ROEHRS, Ph.D., AND THOMAS ROTH, Ph.D.

*The study of alcohol's effects on sleep dates back to the late 1930s. Since then, an extensive literature has described alcohol's effects on the sleep of healthy, nonalcoholic people. For example, studies found that in nonalcoholics who occasionally use alcohol, both high and low doses of alcohol initially improve sleep, although high alcohol doses can result in sleep disturbances during the second half of the nocturnal sleep period. Furthermore, people can rapidly develop tolerance to the sedative effects of alcohol. Researchers have investigated the interactive effects of alcohol with other determinants of daytime sleepiness. Such studies indicate that alcohol interacts with sleep deprivation and sleep restriction to exacerbate daytime sleepiness and alcohol-induced performance impairments. Alcohol's effects on other physiological functions during sleep have yet to be documented thoroughly and unequivocally.*

KEY WORDS: sleep disorder; physiological AODF effects of alcohol or other drug use, abuse, and dependence; REM (rapid eye movement) sleep; NREM (non-rapid eye movement) sleep; circadian rhythm; melatonin; prolactin; body temperature; attention; time of day; insomnia;

<http://pubs.niaaa.nih.gov/publications/arh25-2/101-109.pdf>

## 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%)

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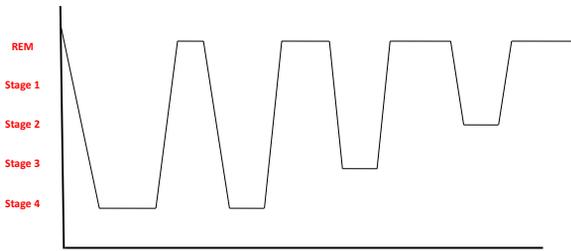
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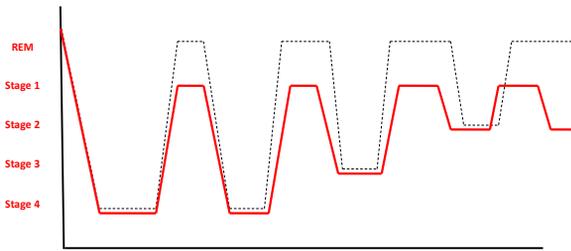
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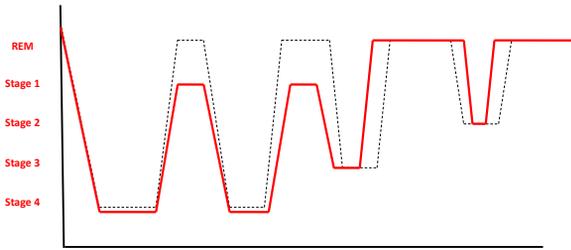
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Next day, increase in:  
 •Daytime sleepiness  
 •Anxiety  
 •Irritability  
 •Jumpiness

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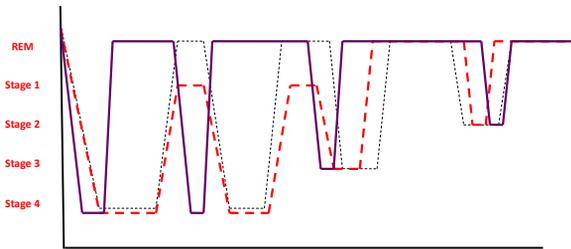
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Next day, increase in:  
 •Daytime sleepiness  
 •Anxiety  
 •Irritability  
 •Jumpiness  
 Next day, feel:  
 •Fatigue

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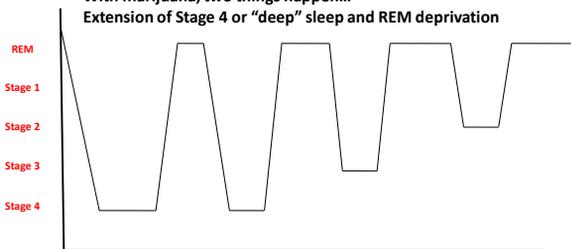
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**With marijuana, two things happen...**  
**Extension of Stage 4 or "deep" sleep and REM deprivation**



Sleep impairment documented as  
 persistent effect of marijuana use  
 NIDA (2012)

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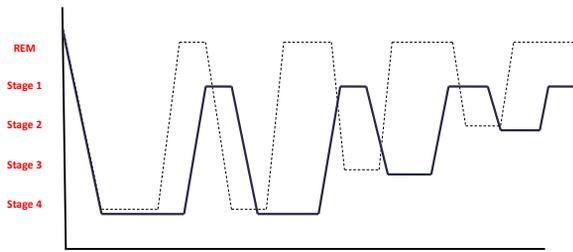
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## Impact on attention, concentration, and memory

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### *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 (no longer significant at 2 weeks)
    - Deficits in verbal working memory (no longer significant at 3 weeks)
    - Deficits in attention (still present at 3 weeks)

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## Driving after use




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## Impaired driving and duration of effects

- **Effects on the brain**
  - Reaction time is impacted
    - DUI implications – I-502 set DUI at 5 ng THC/ml of blood for those over 21 years of age
    - 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




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## Driving (among those who reported using at least once in the past 30 days)

Among the young adults who have used marijuana in the past month, almost half report they have driven a car within three hours of using marijuana




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Washington Young Adult Health Survey, Cohort 1 (2014 data)

## More pot use found in fatal crashes, data says

Originally published August 19, 2013 at 8:02pm | Updated August 20, 2013 at 2:45pm

Marijuana use appears to have increased as a factor in deadly crashes last year in Washington.

By Bob Young

Seattle Times staff reporter

Marijuana use appears to have increased as a factor in deadly crashes last year in Washington.

New data from the Washington Traffic Safety Commission shows the number of drivers involved in fatal crashes with THC in their body increased from 38 in 2012 to 73 this past year. About half those 73 drivers had active THC — the main psychoactive chemical in pot — above the level that legally determines intoxication.



## 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**
  - Revised CUDIT-r
  - <http://www.otago.ac.nz/nationaladdictioncentre/pdfs/cudit-r.pdf>



## Information for student-athletes

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29 = beats per minute increase in heart rate after marijuana use



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16 = number of tobacco cigarettes a person would need to smoke to have same impact on vital lung capacity as one joint



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### What do the scientists conclude?

**"The use of marijuana by the elite athlete prior to competition may result in danger to that particular athlete or others as a result of impairment of response or inappropriate decision making."** (Hilderbrand, 2011, p. 628)

Because of... **"decreased exercise performance, possibly secondary to increases in heart rate and blood pressure, which may alter perceived exertion, marijuana may be considered an ergolytic agent."** (Pesta, et al., 2013, p. 10)

#### ergolytic

erg·o·ly·tic (ér-gô-lít'ik)

Pertaining to any substance that impairs exercise performance.  
[ergo- + G. *lysis*, a loosening]

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**95 = number of days in which THC-COOH can be detected in urine**



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**Separating reported medical use from management of withdrawal**

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## 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

Motive Category	Proportion of participants endorsing motive	Proportion of primary motives
<b>Enjoyment/fun</b>	82.14%	24.03%
Conformity (e.g., peer pressure, friends do it)	42.81%	16.40%
<b>Social enhancement</b>	41.25%	29.36%
Experimentation (e.g., new experience, curiosity)	25.71%	8.66%
<b>Boredom</b>	25.08%	4.15%
Relaxation (e.g., to relax, helps me sleep)	24.64%	6.97%
Coping (e.g., depressed, relieve stress)	18.14%	5.10%
Availability (e.g., easy to get, it was offered)	13.74%	2.23%
<b>Altered perception</b>	10.68%	0.95%
Relative low risk (e.g., low health risk, no hangover)	10.68%	1.81%
Altered perception or perspectives (e.g., to enhance experiences, makes things more fun)	10.68%	1.81%
<b>Activity enhancement</b>	5.68%	0.80%
More interesting (e.g., music sounds better, every day activities more interesting)	5.68%	0.80%
Rebellion (e.g., rebelling against parents, thrill of something illegal)	5.21%	0.32%
Alcohol intoxication (e.g., I was drunk)	4.42%	0.47%
Food enhancement (e.g., enjoy good food, food tastes better)	3.79%	0.00%
Anxiety reduction (e.g., be less shy, feel less insecure)	3.31%	0.00%
<b>Image enhancement</b>	2.85%	0.32%
Image enhancement (e.g., to be cool, to feel cool)	2.85%	0.32%
<b>Celebration</b>	1.26%	0.16%
Celebrate (e.g., special occasion, to celebrate)	1.26%	0.16%
Medical use (e.g., alleviate physical pain, have a headache)	1.26%	0.16%
Habit (e.g., feeling was addictive, became a habit)	0.95%	0.00%

Lee, Neighbors & Woods (2007)

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Lee, Neighbors & Woods (2007)

## Withdrawal: Cannabis

**Diagnostic Criteria** **292.0 (F12.288)**

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 a few months).

B. Three (or more) of the following signs and symptoms develop within approximately 1 week after Criterion A:

1. Irritability, anger, or aggression.
2. Nervousness ~~or anxiety.~~
3. ~~Sleep difficulty~~ (e.g., insomnia, disturbing dreams).
4. ~~Decreased appetite~~ or weight loss.
5. Restlessness.
6. ~~Depressed mood.~~
7. At least one of the following physical symptoms causing significant discomfort: abdominal pain, shakiness/tremors, 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.

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## *Other “current events” and emerging questions*

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## *Emergence of more visible “open-air drug market”*

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## *Impact of advertisements needs to be assessed*

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## Media

Brief summary from Kilmer, J.R., Kilmer, R.P., & Grossberg, P.M.(2014). The role of media on adolescent substance use: Implications for patient visits. *AM STARS: Adolescent Medicine*, 24, 684-697.



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## Potential role of media

- **Impact of media exposure related to alcohol (including television, advertisements, and movie content)**
  - In a review of 13 studies, 12 of the 13 showed media exposure was associated with increased likelihood of:
    - Initiating drinking among abstainers
    - Increased consumption among those already drinking

Anderson P, de Bruijn A, Angus K, Gordon R, Hastings G. (2009). Impact of alcohol advertising and media exposure on adolescent alcohol use: a systematic review of longitudinal studies. *Alcohol and Alcoholism*, 44:229-243

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Posted 6:52 pm Friday, Aug 8, 2014

### Toddler found wandering alone with pot pipe

COMMENT (12) Email 1 Share 817 Tweet 44 ShortText 999



Source: KIRO, Seattle

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### What's Being Done about the Rise in Marijuana Use Among Teens?

Marijuana use among teens appears to be up, but prevention efforts are lagging  
By: Malia Jacobson | April 2016 | FROM THE PRINT EDITION



Source: Seattle Magazine

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**Opportunities and lessons learned:**

**How you talk about marijuana matters...a lot!**

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## Remember the highlights of motivational-enhancement based brief interventions

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## Brief Interventions and Motivational Interviewing

Non-judgmental	Non-confrontational	Meet people where they are
Elicit personally relevant reasons to change	Explore and resolve ambivalence	Discuss behavioral change strategies when relevant

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## Goals of a Brief Intervention

- When there are signs of potential risks and/or existing harms, provide early intervention
- If ultimately in line with what motivates the individual, prompt contemplation of change
- If ultimately in line with what motivates the individual, prompt commitment to change or even initial action
- Reduce resistance/defensiveness
- Explore behavior change strategies and discuss skills to reduce harms

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**What are the differences/challenges compared to brief interventions with alcohol?**

- Unlike alcohol, no clear guidelines for a point at which risks are minimized
- Unlike alcohol, hard to estimate standard amount, intoxication levels, potency, etc.
  - Established measures of use and consequences are much less available
  - Those that are tend to be adapted from alcohol measures
- Being “into” marijuana use may reflect much larger lifestyle/identity
- Perceived risk for future consequences, even if ones already experienced by the student, can be low

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**Discussing marijuana...word choice matters**

- “Do you smoke marijuana?”
  - A person who uses edibles daily can honestly say “no”
  - If screening with a yes/no, consider “do you use marijuana?”
- “Do you use marijuana?” or “have you used marijuana?” followed by, “What does your marijuana use look like?”

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**Finding potential hooks: An Example**

- “What are the good things about \_\_\_\_\_ use for you?”
- “What are the ‘not-so-good’ things about \_\_\_\_\_ 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?”

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## Parents and communities matter, too

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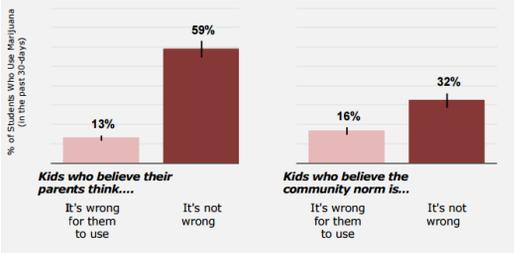
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**Relationship between Marijuana Use and Perceived Parental and Community Norms, Grade 10, 2014**



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## Implications and Opportunities for Prevention

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## How Can We Prevent & Reduce Harm from Marijuana?

- **Correct Normative Misperceptions**
  - **Most people are not using**
  - **Most people are not driving under the influence**
    - Varies by frequency of use, such that higher frequency of use is associated with higher frequency of driving within 3 hours of use
      - Those using 2-3 times per month or less: 18.7%
      - Those using weekly or more: 51.0%
  - **The more people use, the more they think others are using:**
    - Perceived percentage of people your age using marijuana:
      - Those who never use: 59.0%
      - Those who use less than 2-3 times per month: 63.8%
      - Those who use weekly or more: 69.3%
  - **Opportunity for positive community norms (e.g., Jeff Linkenbach)**

Source: Washington Young Adult Health Survey, 2016

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## How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- **Increase Risk Perception**
  - **Target consequences young people report they do not like**
    - “The Munchies”
      - Those using 2-3 times per month or less: 77.2%
      - Those using weekly or more: 95.1%
    - Low motivation
      - Those using 2-3 times per month or less: 38.2%
      - Those using weekly or more: 61.6%
    - Trouble remembering
      - Those using 2-3 times per month or less: 40.2%
      - Those using weekly or more: 64.9%
  - **Provide information relevant to their individual concerns**

Source: Washington Young Adult Health Survey, 2016

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## How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- **Reduce Motivation to Use/Misuse**
  - **Already signs of some efforts of wanting to change:**
    - **Tried to set limits on use**
      - Those using 2-3 times per month or less: 34.1%
      - Those using weekly or more: 54.0%
    - **Tried to cut down**
      - Those using 2-3 times per month or less: 27.0%
      - Those using weekly or more: 39.5%
  - **Effective coping; healthy alternatives**

Source: Washington Young Adult Health Survey, 2016

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## How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- **Increase Motivation to Change for Heavier Users**
  - [Brief Motivational Interventions show promise](#)
    - Pilots of brief interventions with mandated students (e.g., Marijuana and Other Drug workshop)
    - In-person, personalized feedback interventions with facilitators trained in motivational interviewing (e.g., Lee, et al., 2013)
  - [Chance to provide education about addiction and withdrawal](#)

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## How Can We Use This Information to Prevent & Reduce Harm from Marijuana?

- **Enforce Policy Restrictions on Access, Public Use**
  - [NIAAA's College Alcohol Intervention Matrix \(CollegeAIM\)](#) emphasizes importance of environmental approaches, including enforcement
- **Provide resources for prevention, treatment, & research**

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Thanks again to Kasey Evans, Eric Davidson, and all of you for your interest in this topic and for what you do to impact student health on college campuses!

Jason Kilmer  
[jkilmer@uw.edu](mailto:jkilmer@uw.edu)

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