

# The Blunt Truth

## *Exploring the Impacts of Cannabis Regulation: A Colorado Perspective*

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# Disclosures

- Travel & lodging accommodations by Eurad & FORUT

# Objectives

1. Review the history of cannabis regulation in the United States & Colorado
2. Explore the impact of cannabis regulation on youth in Colorado



**Kief**



**Marijuana**



**Hash**



**Wax**



**Dabs**



**Budder**



**Butane Hash Oil**



**Shatter**

# Background of Cannabis

- Relative THC concentration by preparation:
  - Marijuana: ~ 5% THC
  - Resins: ~ 20% THC
  - Oils:  $\geq$  60% THC

# Cannabis Regulation in the United States



# The Story of Cannabis Regulation in the United States

## *Medical Marijuana Legalization*

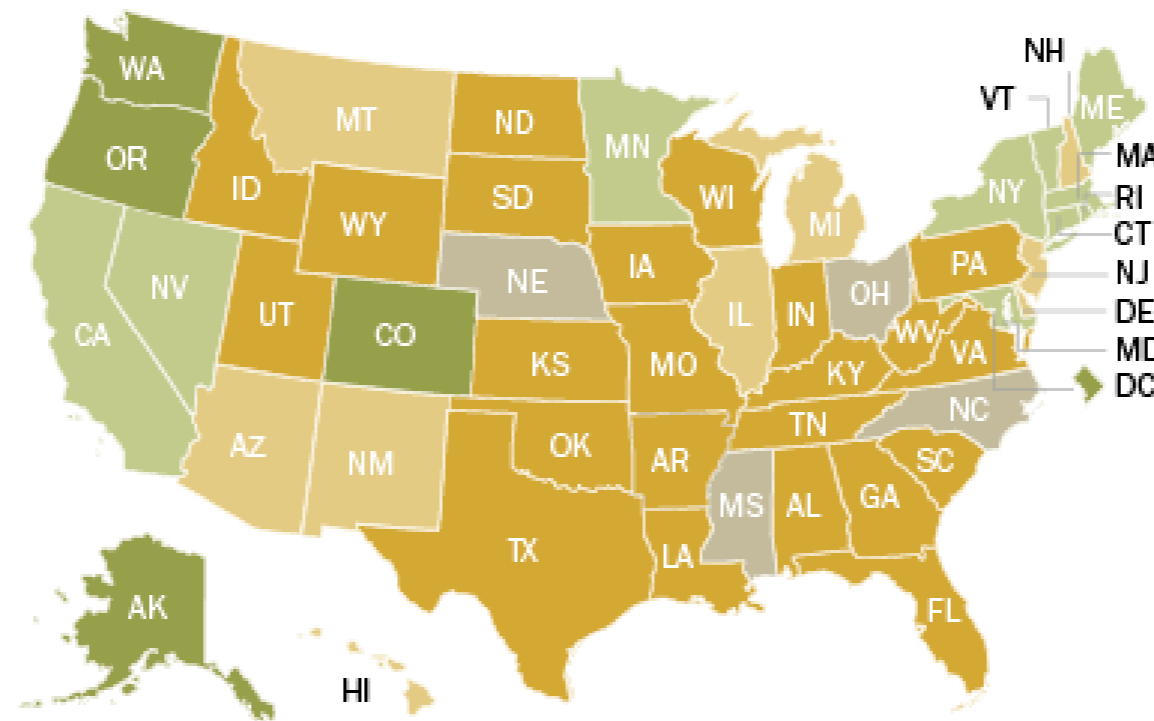
Year	State
1996	California (CA)
1998	Alaska (AK), Oregon (OR), Washington (WA)
1999	Maine (ME)
2000	Colorado (CO), Hawaii (HI), Nevada (NV)
2004	Montana (MT)
2006	Rhode Island (RI)
2007	New Mexico (NM), Vermont (VT)
2008	Michigan (MI)
2010	Arizona (AZ), New Jersey (NJ)
2011	Delaware (DE), Washington, D.C.
2012	Connecticut (CT), Massachusetts (MA)
2013	New Hampshire (NH), Illinois (IL)
2014	Maryland (MD), Minnesota (MN)

# The Story of Cannabis Regulation in the United States

## Marijuana Laws in 50 States

*Marijuana is now legal in some form or decriminalized in 27 states and the District of Columbia*

■ Legal   ■ Medicinal use only and decriminalized   ■ Decriminalized   ■ Medicinal use only   ■ Illegal



Note: Federal law prohibits the possession, selling or harvesting of marijuana. Decriminalization laws reduce the penalties associated with the use or possession of small amounts of marijuana.

Sources: National Conference of State Legislatures; National Organization for the Reform of Marijuana Laws

PEW RESEARCH CENTER

# Cannabis Regulation in Colorado



# The Story of Cannabis Regulation in Colorado

- Amendment 64 (November 2012)
  - Legalized recreational cannabis ( $\geq 21$  years of age)
  - May grow 3 immature & 3 mature plants in locked space
  - May possess up to 1 ounce cannabis in public
  - DUID:  $\geq 5\text{ng/ml}$



2000:  
Amend. 20

2009: de facto  
Legalization

2010:  
Sen. Bill 109

**2012**

# The Story of Cannabis Regulation in Colorado

Let's Talk...



2000:  
Amend. 20

2009: de facto  
Legalization

2010:  
Sen. Bill 109

2012:  
Amend. 64

2014:  
Amend. 64  
"Go Live"

Today

# Youth Cannabis Use

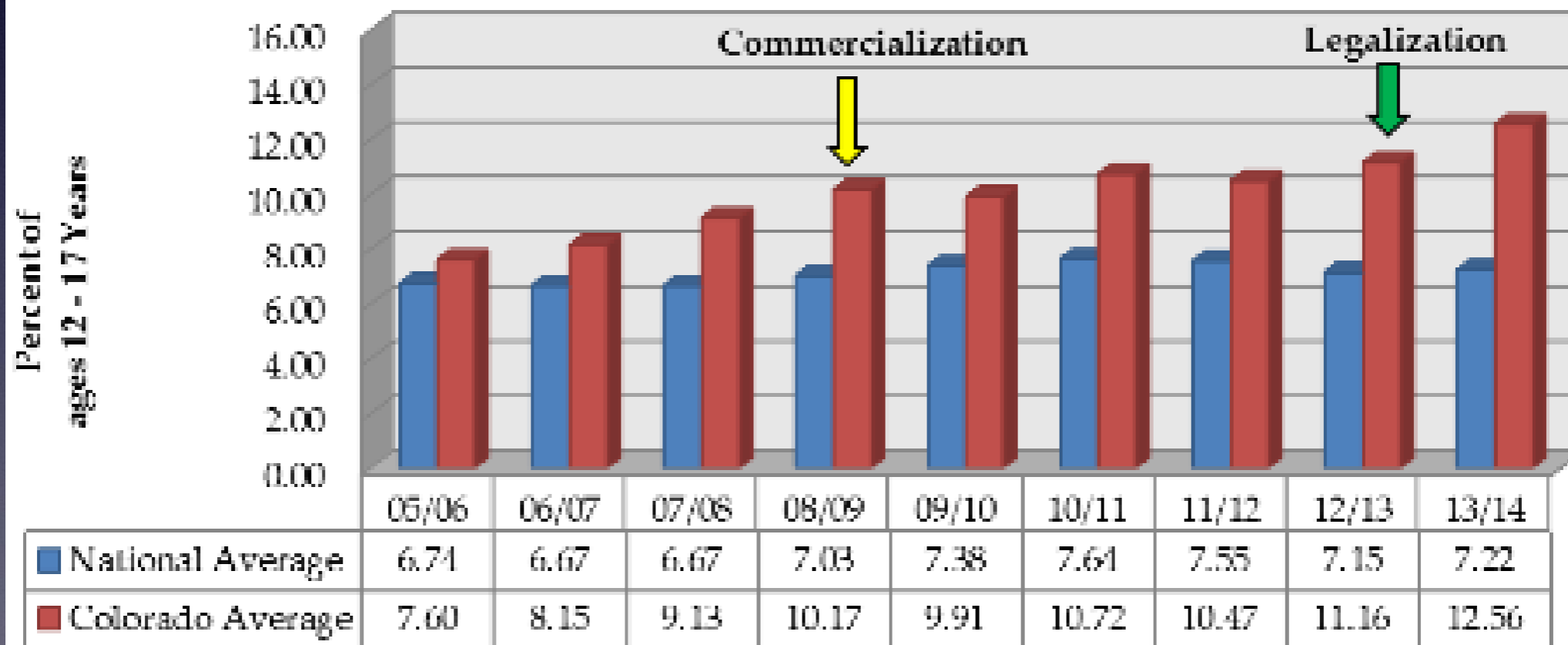


# Youth Cannabis Use

- Past Month (Current) Marijuana Use (2013-14), ages 12-17
  - National average: 7.22%
  - Colorado average: **12.56%**
    - ↑ **20%** in 2-year average post-legalization (compared to 2-year average pre-legalization)
- Colorado ranked **1<sup>st</sup>** in the nation for current marijuana use
  - 74% higher than U.S. national average
  - 2012: Colorado ranked 4<sup>th</sup> (2006: 14<sup>th</sup>)

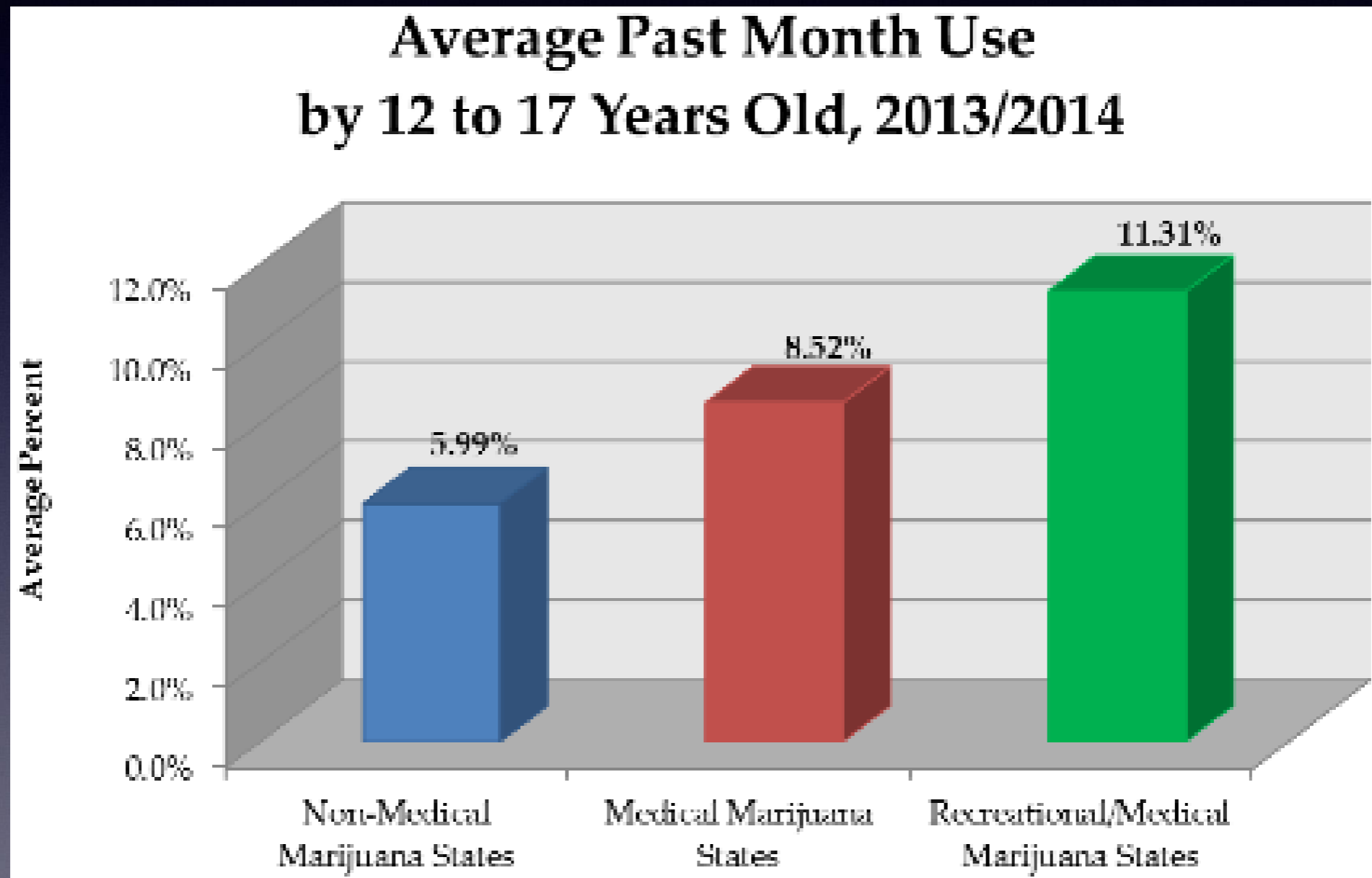
# Youth Cannabis Use

## Youth Ages 12 to 17 Years Old Past Month Marijuana Use National vs. Colorado



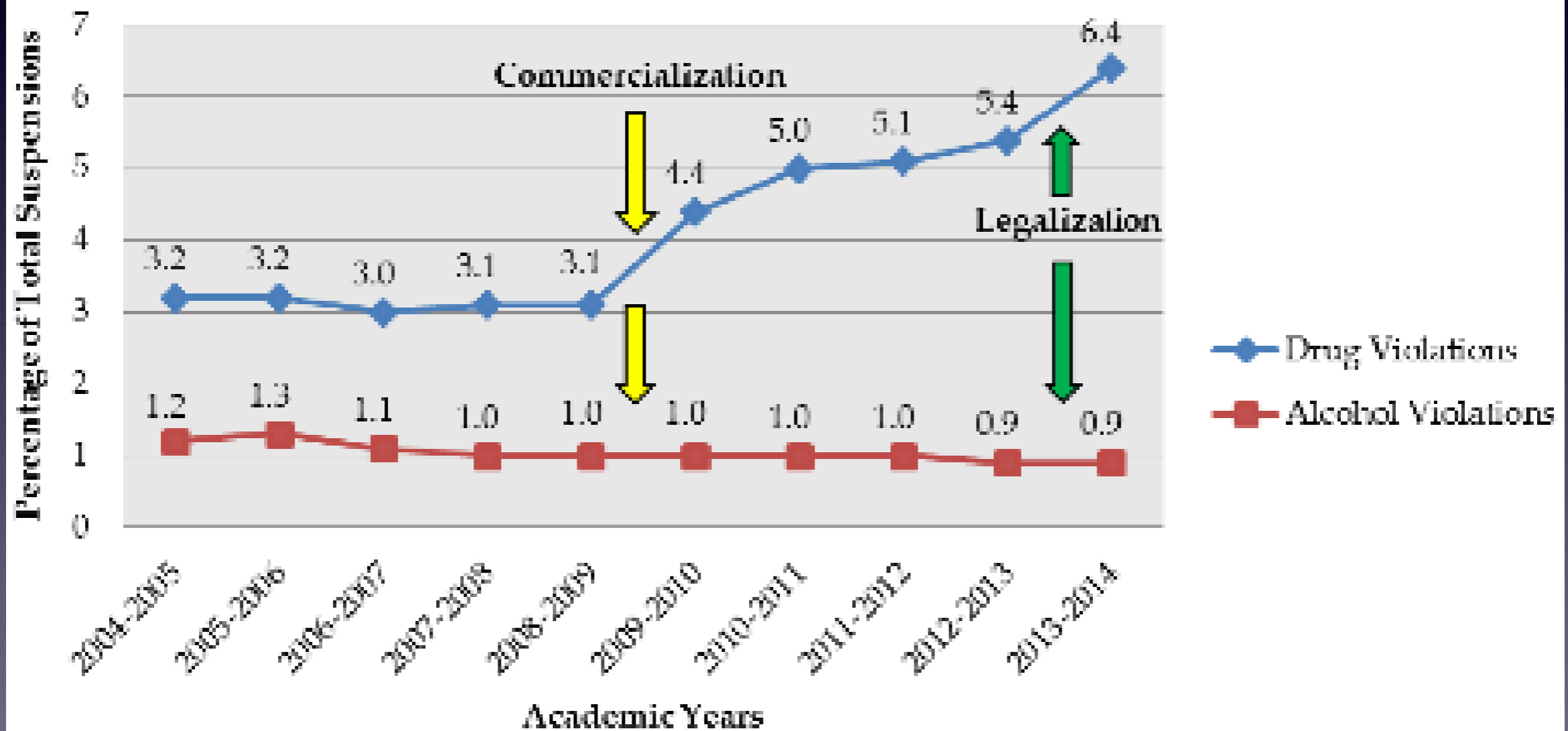
Annual Averages of Data Collection

# Youth Cannabis Use



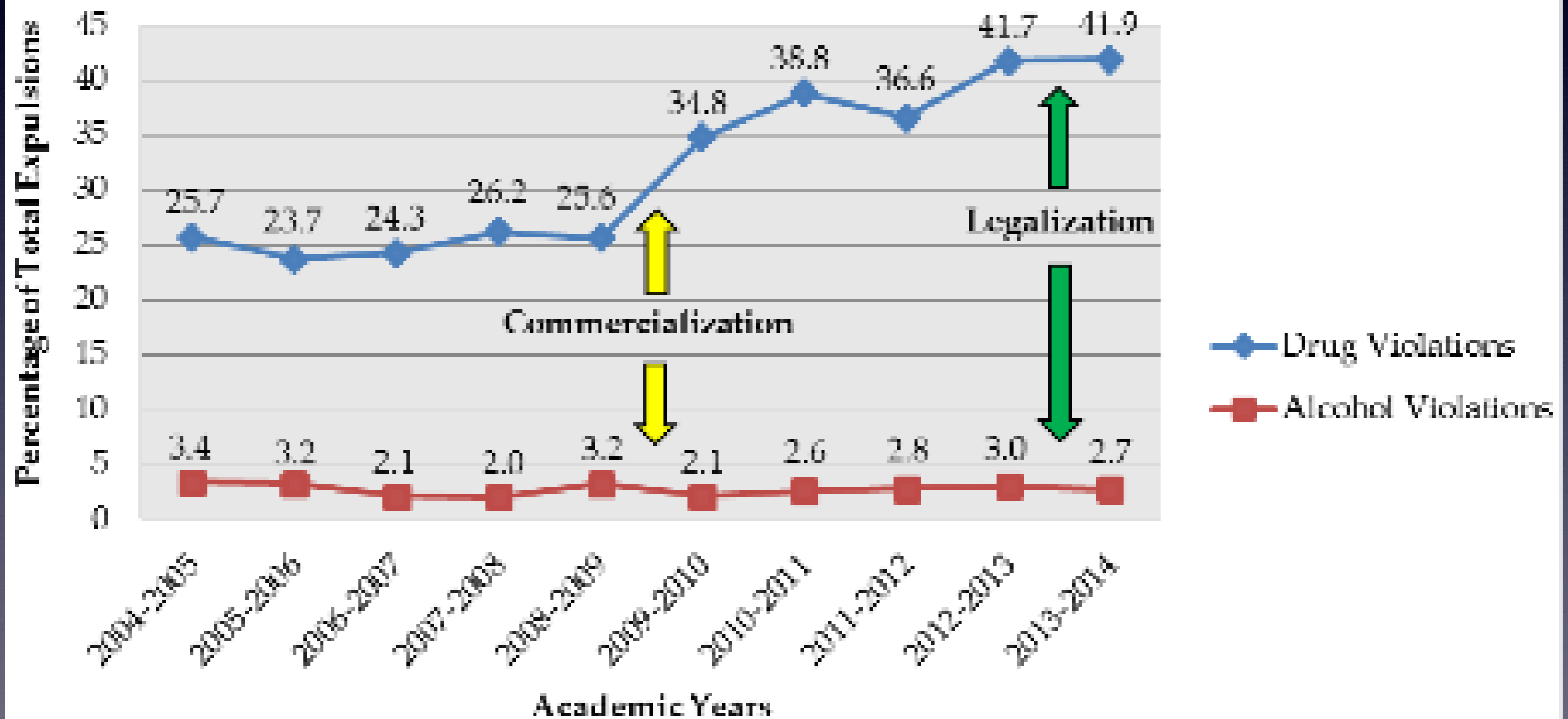
# Youth Cannabis Use

## Percentage of *Total Suspensions* in Colorado from 2004-2014 School Years



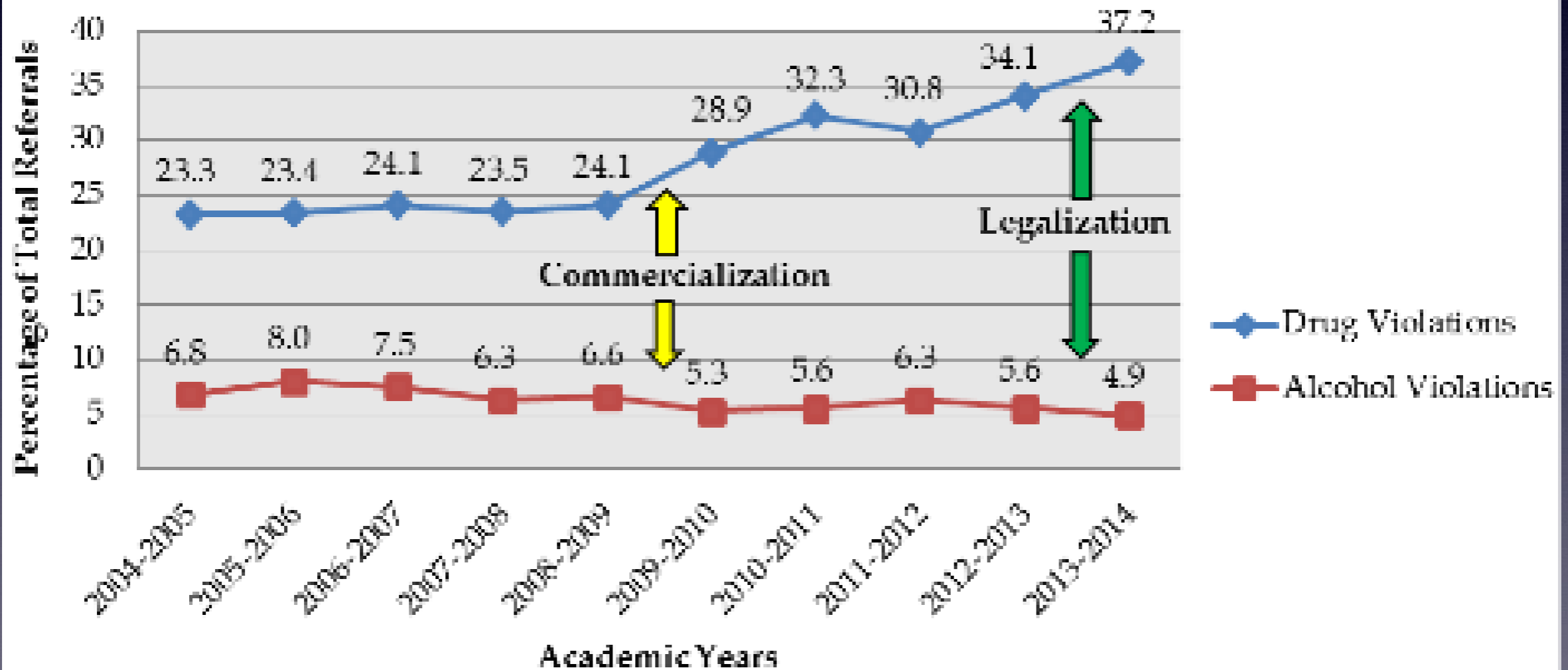
# Youth Cannabis Use

## Percentage of *Total Expulsions* in Colorado from 2004-2014 School Years



# Youth Cannabis Use

**Percentage of Total Referrals to Law Enforcement in Colorado from 2004-2014 School Years**



# Young Adult Cannabis Use

**SUMMIT WELLNESS**  
 HIGHEST GRADE MEDICINE IN COLORADO INCLUDING  
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 MULTIPLE FLAVORS OF TINCTURES, HASH,  
 HAND ROLLED JOINTS, CLONES

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 OR SILVER MAYER VAPORIZER  
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 3RD DRAWING WILL RECEIVE A \$500 STORE CREDIT

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--	--	--	--

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 12-5 on Sundays

NOTES: Generally used during the day, Sativa dominant strains provide effects described by a sense of energy, confidence and well-being. These strains stimulate serotonin, a neurotransmitter, which acts in the central nervous system and is responsible for appetite, mood, and overall function.

NOTES: Best used during non-active times during the day or evening, Indica dominant strains provide effects described by a sense of calm or serenity. These strains are used to relax and to relieve stress. They can also help reduce nausea, stimulate appetite and reduce intracranial pressure.

**Herbal Wellness inc.org**

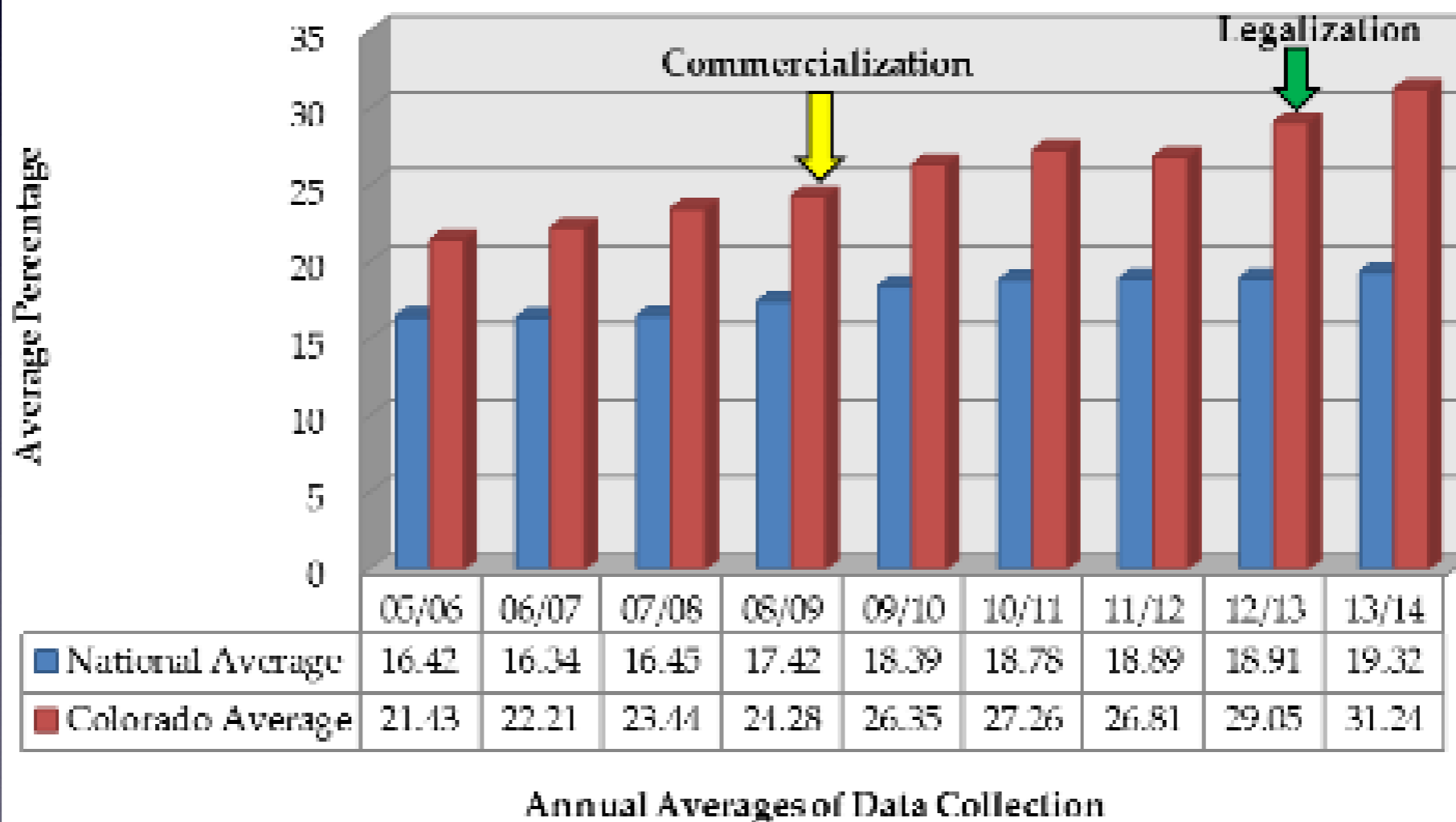
720-299-1919 3870 North Federal Blvd. • Denver, Co • 80211

# Young Adult Cannabis Use

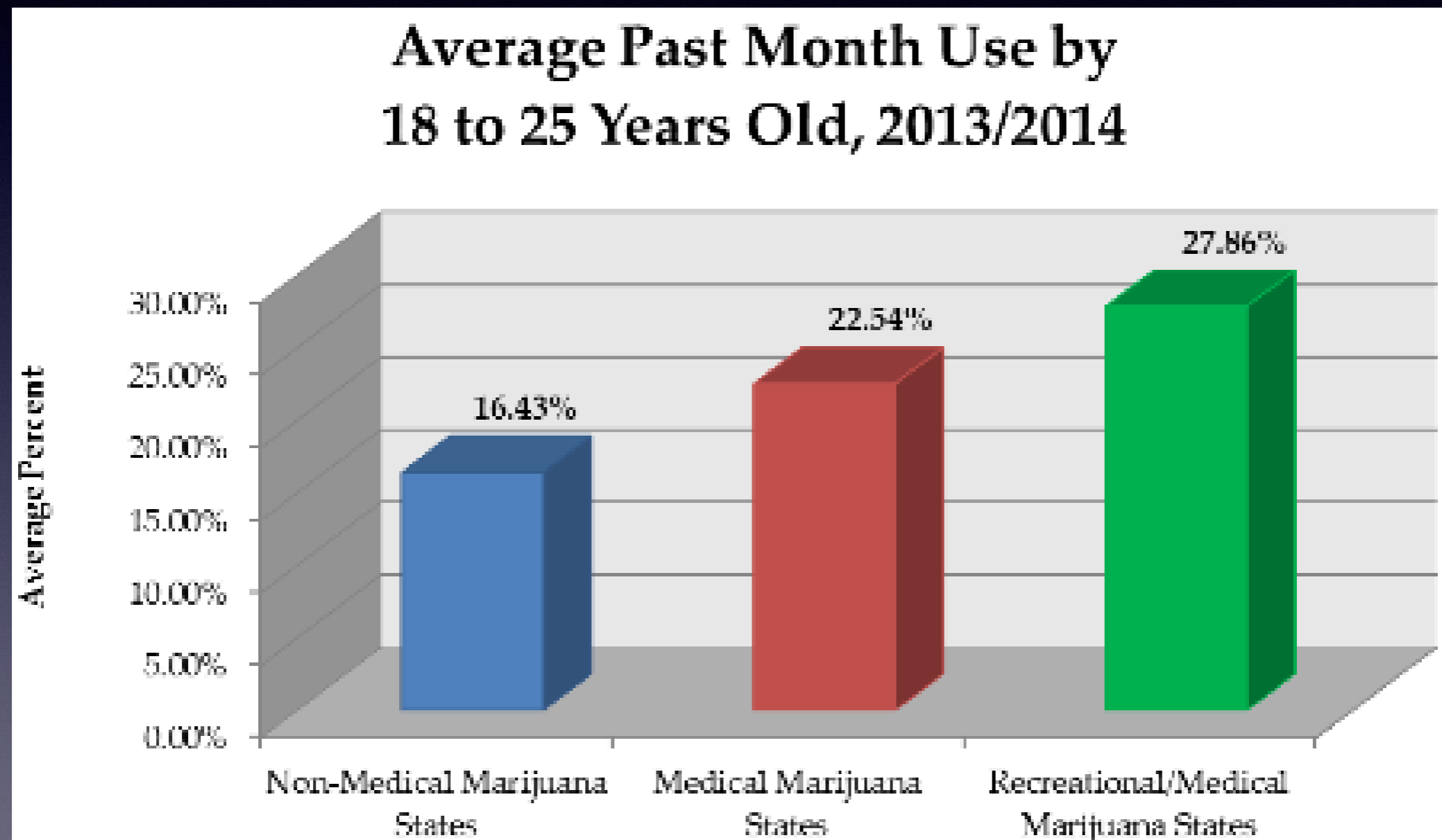
- Past Month (Current) Marijuana Use (2013-14), College Age Adults (ages 18-25)
  - National average: 19.32%
  - Colorado average: **31.24%** (↑ 17% compared to 2-year average pre-legalization)
- Colorado ranked **1<sup>st</sup>** in the nation for past month marijuana use
  - 62% higher than U.S. national average
  - 2012: Colorado ranked 3<sup>rd</sup> (2006: 8<sup>th</sup>)

# Young Adult Cannabis Use

**College Age (18 to 25 Years Old)  
Past Month Marijuana Use**



# Young Adult Cannabis Use



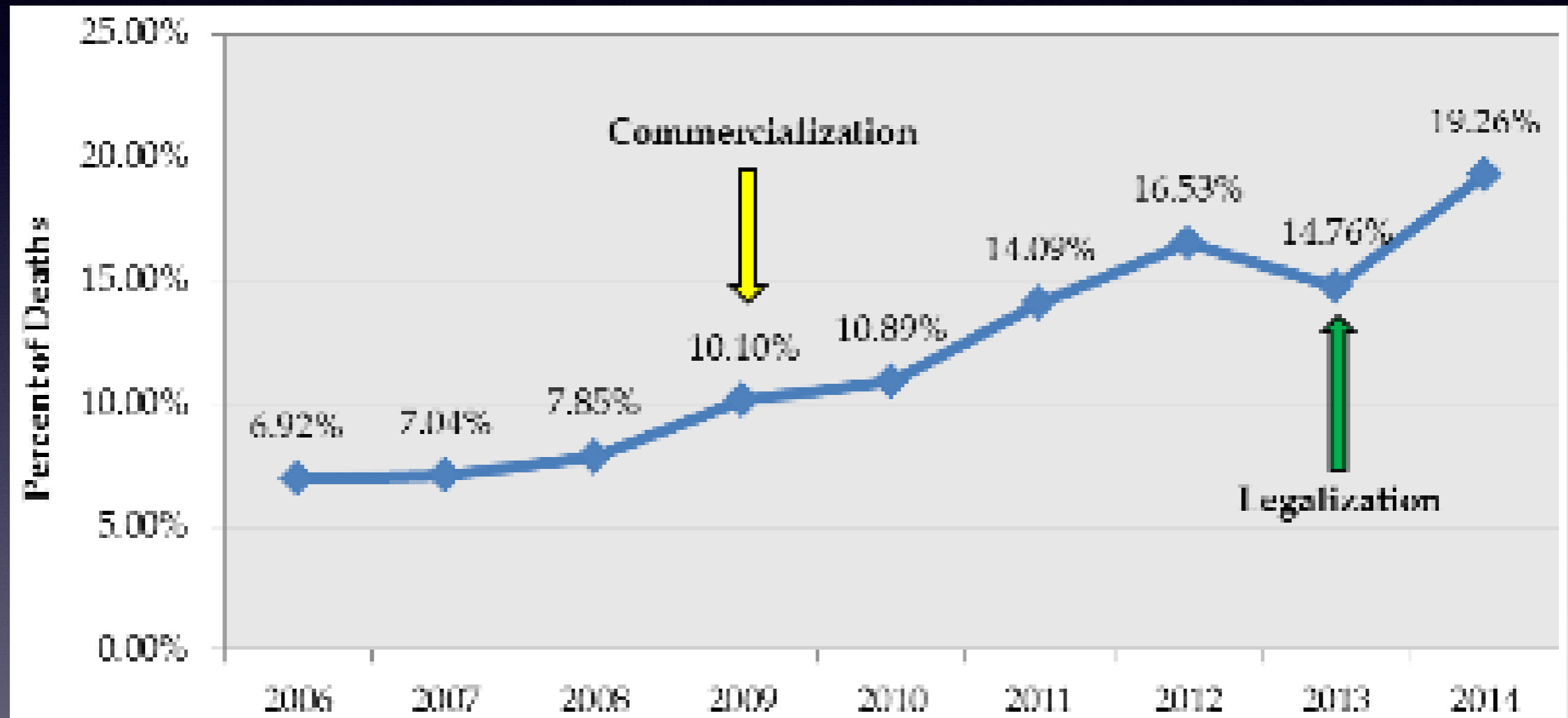
**Cannabis-Related  
Deaths**

**Traffic**

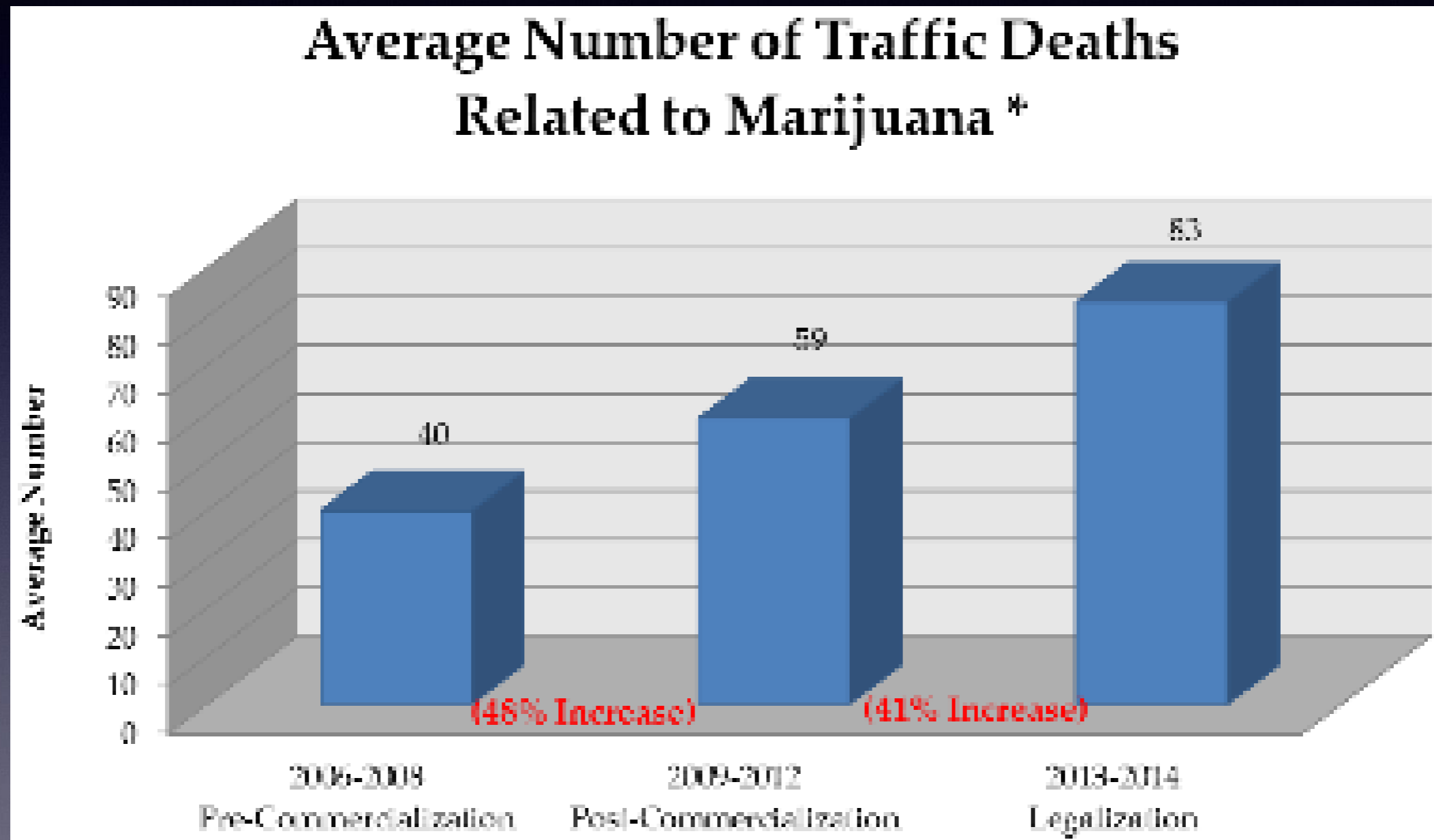
# Cannabis-Related Traffic Deaths

<b>Crash Year</b>	<b>Total Statewide Fatalities</b>	<b># Cannabis (+)</b>	<b>% Total Fatalities (Cannabis)</b>
2006	535	37	6.92%
2007	554	39	7.04%
2008	548	43	7.85%
2009	465	47	10.10%
2010	450	49	10.89%
2011	447	63	14.09%
2012	472	78	16.53%
2013	481	71	14.76%
2014	488	94	19.26%

# Cannabis-Related Traffic Deaths



# Cannabis-Related Traffic Deaths



# Summary & Take-Home Points

- Cannabis is a harmful substance that can have serious consequences on the mind and body
- Legalization/commercialization of a substance can have profound impacts on vulnerable populations
- Prevention/Education are key & Treatment is available!

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# Acknowledgments

- Christian Thurstone, M.D.
- Kevin Sabet, Ph.D.



# Questions?



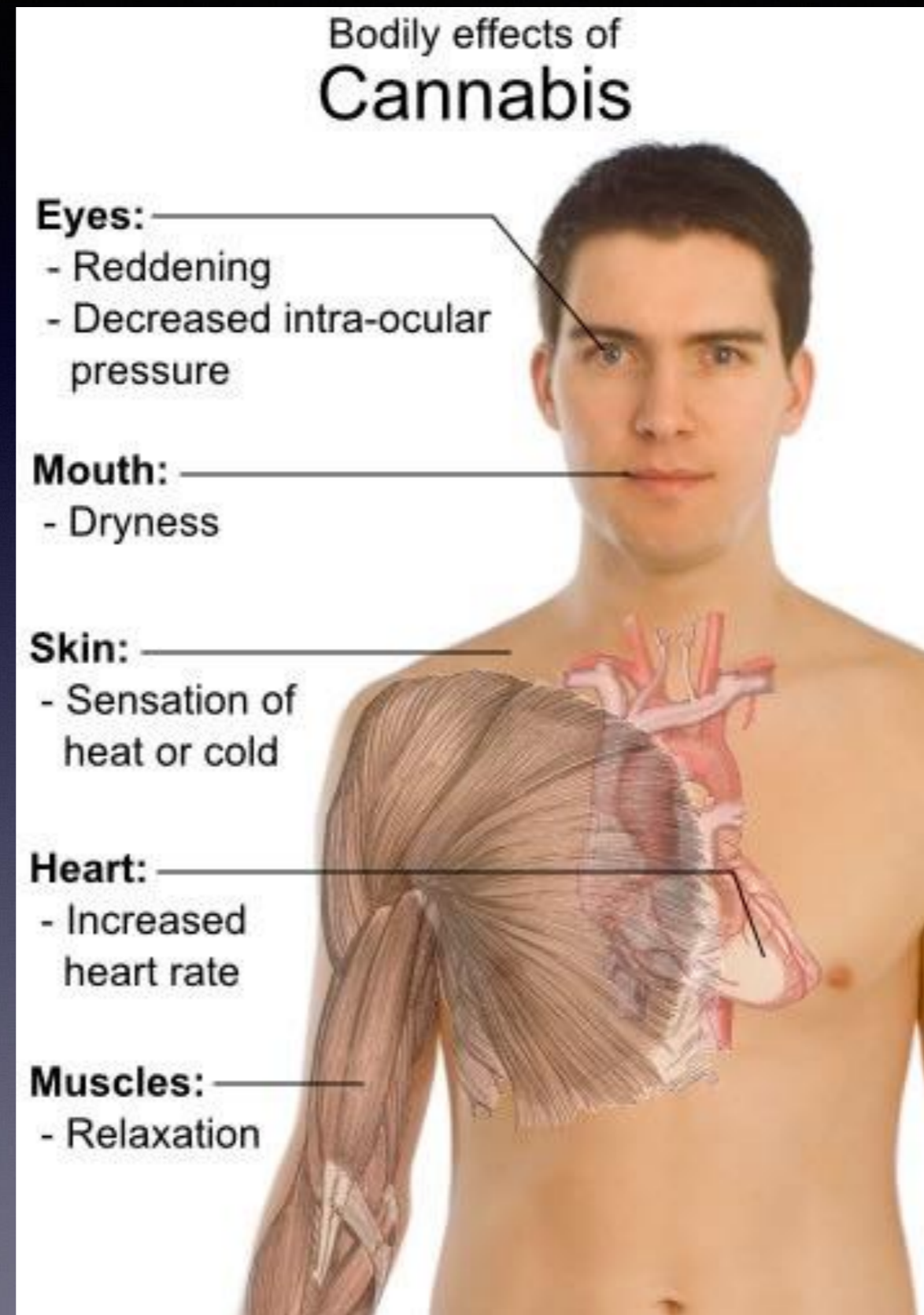
sean.lenoue@ucdenver.edu



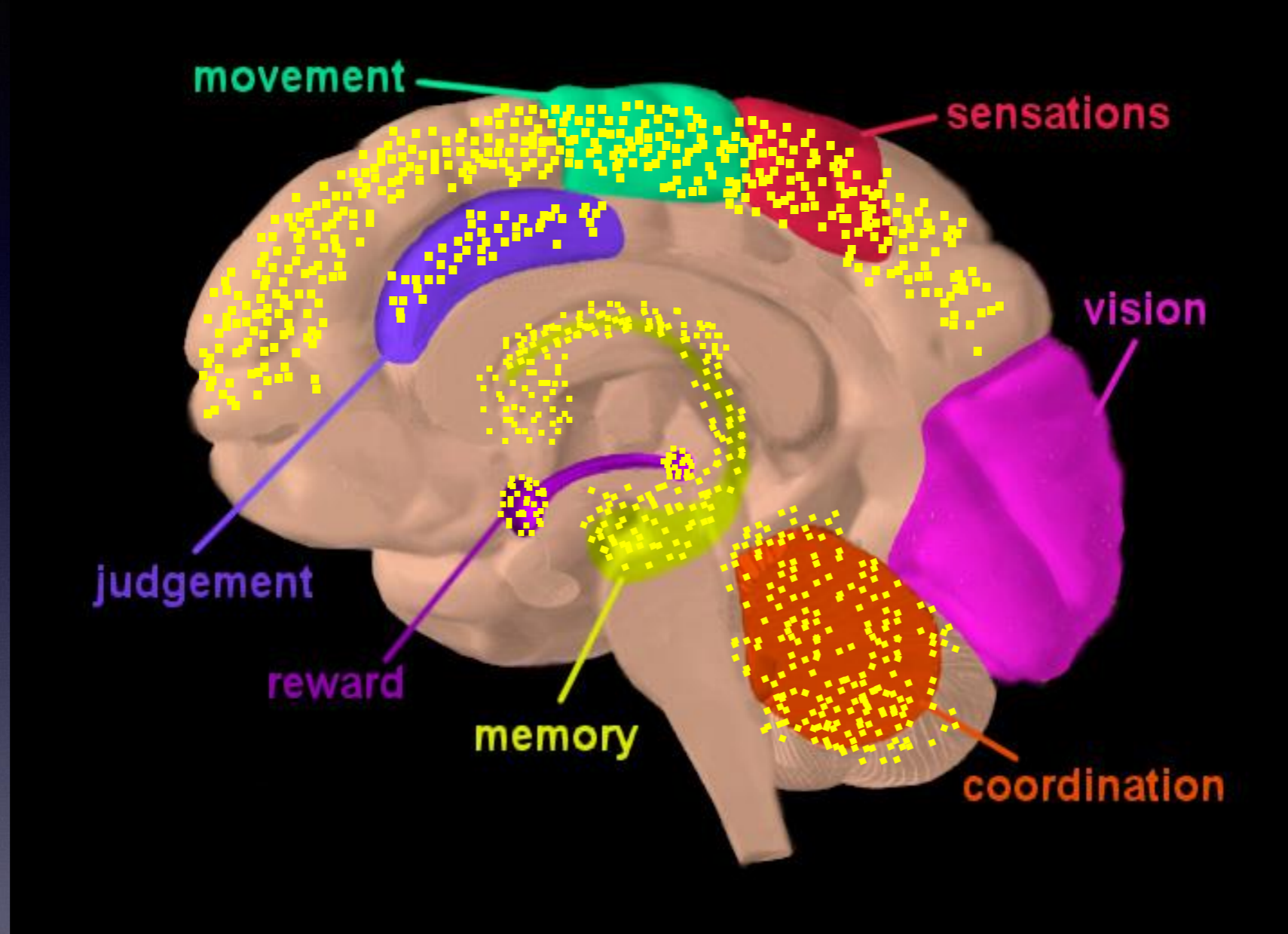
# Background of Cannabis

- History
  - Originated from central & southeast Asia
  - First noted in historical texts around 3000 B.C.
- Strains
  - Sativa, Indica, & Ruderalis
- Preparations
  - Marijuana, Kief, Hashish, Tincture, Hash Oil, & Infusions
- Consumption
  - Smoking, Vaporizing, Injecting, Teas, & Butters/Edibles
- Effects

# Effects of Cannabis on the Body



# Effects of Cannabis on the Brain



Brain Development, Appetite, Immunological Function,  
Reproduction, Pain Regulation/Analgesia



**In utero**

Infancy

Childhood

Adolescence

Adulthood

- ~ 33% THC crosses placenta (Gray et al, 2005)
- Affects fetal oxygen delivery (Marroun et al, 2010)
- Possible effects on fetal growth similar to tobacco (Marroun et al, 2009)
- Endocannabinoid, immune systems, cytoskeletal dynamics (axonal connections) (Volkow et al, 2014)
- Concern for consequences comparable to lead exposure (Canfield et al, 2003; CDC 2013)



**In utero**

Infancy

Childhood

Adolescence

Adulthood

- ↓ IQ by 5 points at age 6 (Goldschmidt et al, 2012)
- ↑ depression at age 10 (Gray et al, 2005)
- ↑ hyperactivity, impulsivity, inattention at age 10 (Goldschmidt et al, 2000)
- ↑ odds of cannabis use by age 14 & possibly heavier cannabis use later in life (Day et al, 2006)
- ↓ achievement at age 14 (Goldschmidt et al, 2012)



In utero



**Infancy**



Childhood



Adolescence



Adulthood

- Low birth weight (LBW), prematurity, poor sleep, poor self-regulation, hyper-arousal, SIDS risk
- Breastfeeding (~ 50% THC transfer)
- Case report of 13-month old admitted to hospital with lethargy, ↓ appetite, T= 38 C after 2nd hand exposure to cannabis (Zarfin et al, 2012)



In utero

Infancy

**Childhood**

Adolescence

Adulthood

- Second-hand exposure primarily
- Edibles & packaging





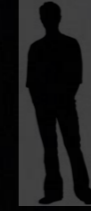
In utero



Infancy



**Childhood**



Adolescence



Adulthood

- Inadvertent ingestion of marijuana edibles in Colorado
  - Infants-12 year olds
  - 15 hospital observations/admissions from 2009-2011
  - NONE from 2007-2009



In utero



Infancy



Childhood



**Adolescence**



Adulthood

- 1 in 6 develop addiction
- ↓ IQ by 8 points when heavy use occurs from age 13-38
- Confers a 2-fold increased risk of psychosis in adulthood
- Daily use of cannabis predicts a doubling in odds of having an anxiety disorder at age 29

Hall and Degenhardt (2009), *Lancet* 374:1383-1391

Degenhardt et al. (2012), *Addiction* 108:124-133

Meier et al., (2012), *Proc Natl Acad Sci USA* 109:E2657-E2664



In utero



Infancy



Childhood



**Adolescence**



Adulthood

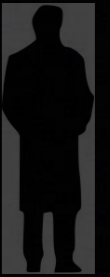
- Cannabis use by age 15:
  - 3.6x less likely to graduate from high school
  - 2.3x less likely to enroll in university
  - 3.7x less likely to obtain a university degree
- Cannabis before sex: 50% less likely to use a condom
- Association with aggression
- 2x ↑ risk of other drug use

Fergusson et al. (2006), *Addiction* 101:556-569

Hendershot et al. (2010), *Psychol Addict Behav* 24:404-414

Horwood et al. (2010), *Drug Alcohol Dep* 110:247-253

Smith et al. (2013), *Drug Alcohol Depend*:63-68



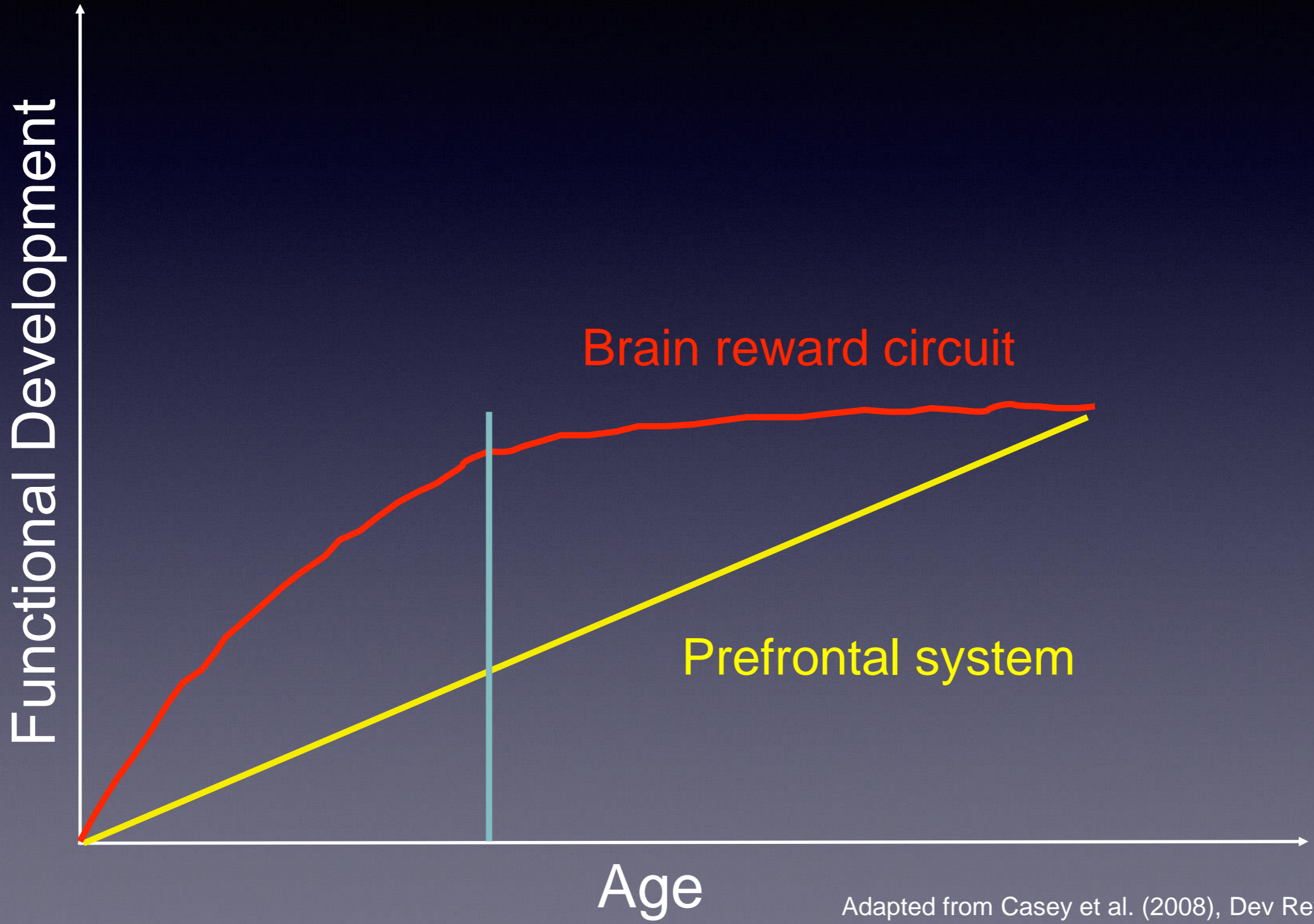
In utero

Infancy

Childhood

**Adolescence**

Adulthood





# Cannabis in the Media

The screenshot shows the BBC News homepage. The main article is titled "Making marijuana into a legitimate business" and is dated 10 March 2015. The article text states: "Cannabis has been legal for recreational use in the US states of Washington and Colorado for more than a year now. Voters have also backed legalisation in Alaska and Oregon, and are facing a new challenge - how to turn an illegal drug into a legitimate business." To the right of the article are sections for "Related video / audio" and "Most watched".

**NEWS**

Home | Video | World | US & Canada | UK | Business | Tech | Science | Magazine | Entertainment & Arts | Health | More

**Making marijuana into a legitimate business**

10 March 2015 Last updated at 21:45 GMT

Cannabis has been legal for recreational use in the US states of Washington and Colorado for more than a year now.

Voters have also backed legalisation in Alaska and Oregon, and are facing a new challenge - how to turn an illegal drug into a legitimate business.

**Related video / audio**

**PLAYING NEXT**

- Could legalising marijuana save the economy? 23 August 2012
- Profits soar in US legal cannabis trade 20 February 2014
- Cannabis goes on sale in Colorado 1 January 2014

**Most watched**

- Can Zuma end South Africa violence? 19 April 2015

**Top stories**

- 'Many dead' as migrant boat capsizes
- Can Zuma end South Africa violence?
- Saudis to pay for Yemen aid

## The New York Times

The screenshot shows an editorial from The New York Times. The title is "Repeal Prohibition, Again" and it is written by the editorial board. The text reads: "The federal government should follow the growing movement in the states and repeal the ban on marijuana for both medical and recreational use." Below this is another editorial titled "Let States Decide on Marijuana" by David Firestone. The background features a stylized American flag with marijuana leaves in the green field.

**HIGH TIME**

### Repeal Prohibition, Again

By THE EDITORIAL BOARD

The federal government should follow the growing movement in the states and repeal the ban on marijuana for both medical and recreational use.

**EDITORIAL**

### Let States Decide on Marijuana

By DAVID FIRESTONE

The logo for "the Cannabist" website. The word "the" is in a small, grey, sans-serif font, and "Cannabist" is in a large, white, cursive font. Below the logo is the URL "http://www.thecannabist.co" and a small illustration of a marijuana leaf.

*the*  
**Cannabist**

<http://www.thecannabist.co>

The logo for "THE DENVER POST" and "denverpost.com". "THE DENVER POST" is in a large, bold, serif font, and "denverpost.com" is in a smaller, bold, sans-serif font below it.

**THE DENVER POST**

**denverpost.com**



In utero



Infancy



Childhood



Adolescence



**Adulthood**

- 1 in 9-11 develop addiction
- 4x ↑ risk of MI in the hour after using
- Doubles risk of bronchitis, wheezing, & chronic cough
- May increase risk of head/neck, lung, & testicular cancers



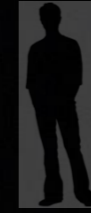
In utero



Infancy



Childhood



Adolescence



**Adulthood**

- **Chronic use:**
  - Cognitive impairment for up to 1 month
  - Psychomotor impairment for up to 3 weeks
- **Decreased fertility**
  - Disrupts menstrual cycle in women
  - Decreased testosterone, sperm quality/quantity in men



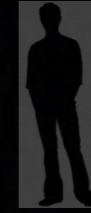
In utero



Infancy



Childhood



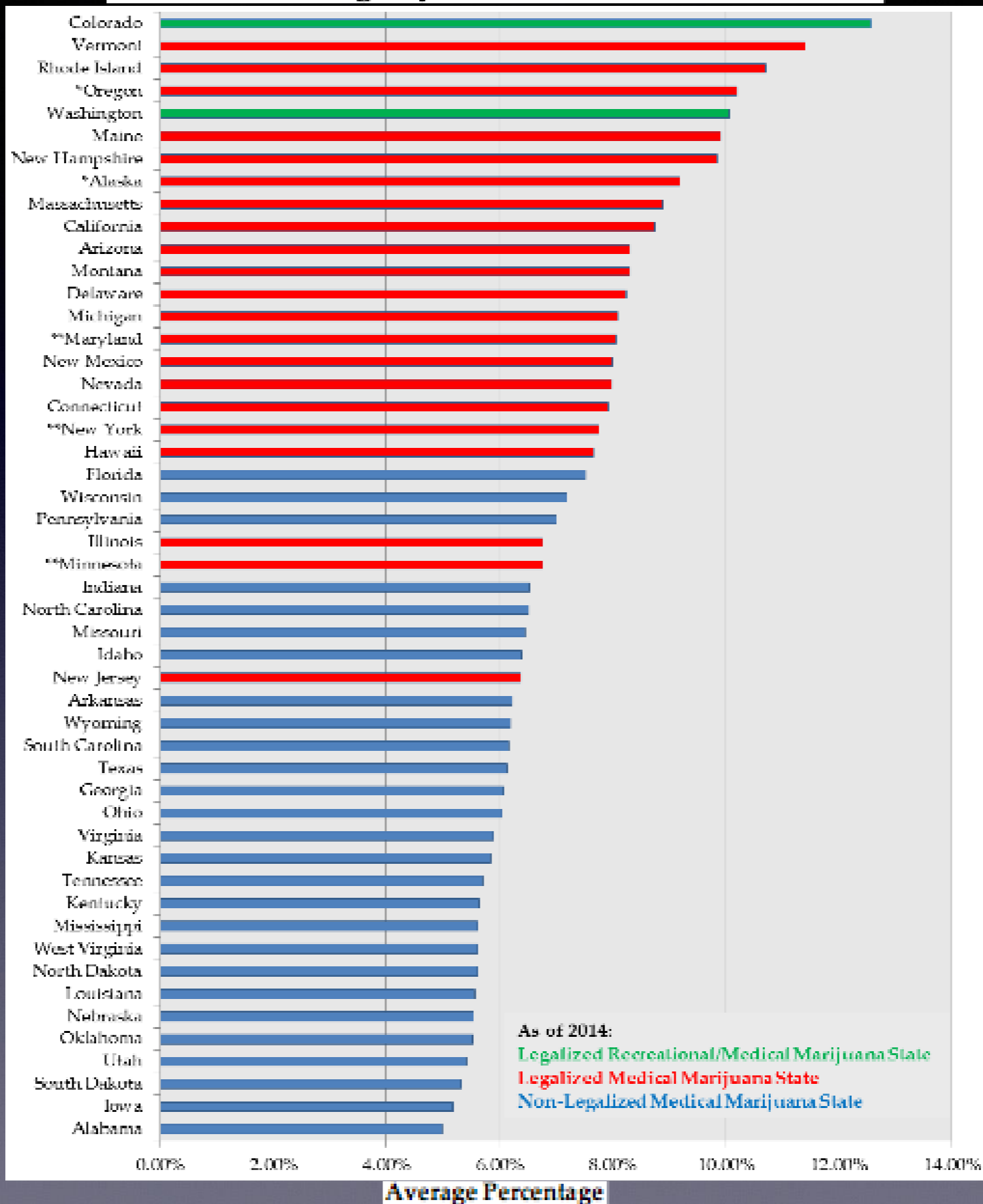
Adolescence



**Adulthood**

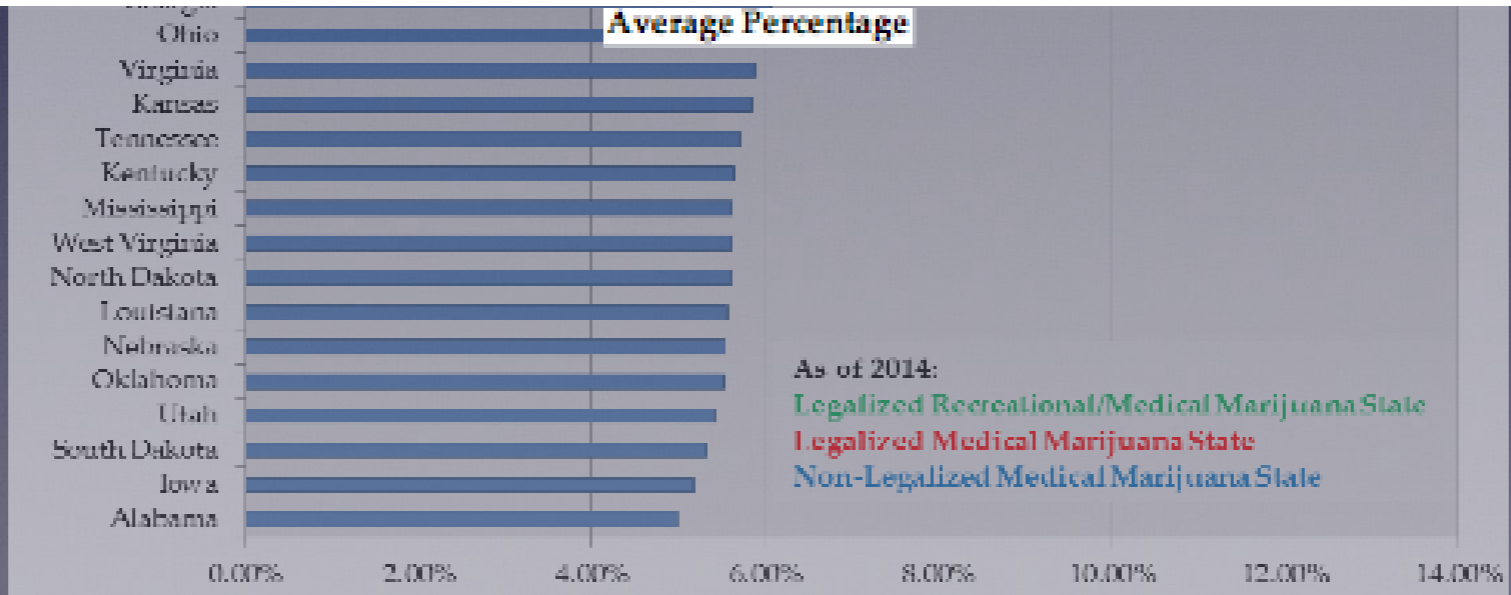
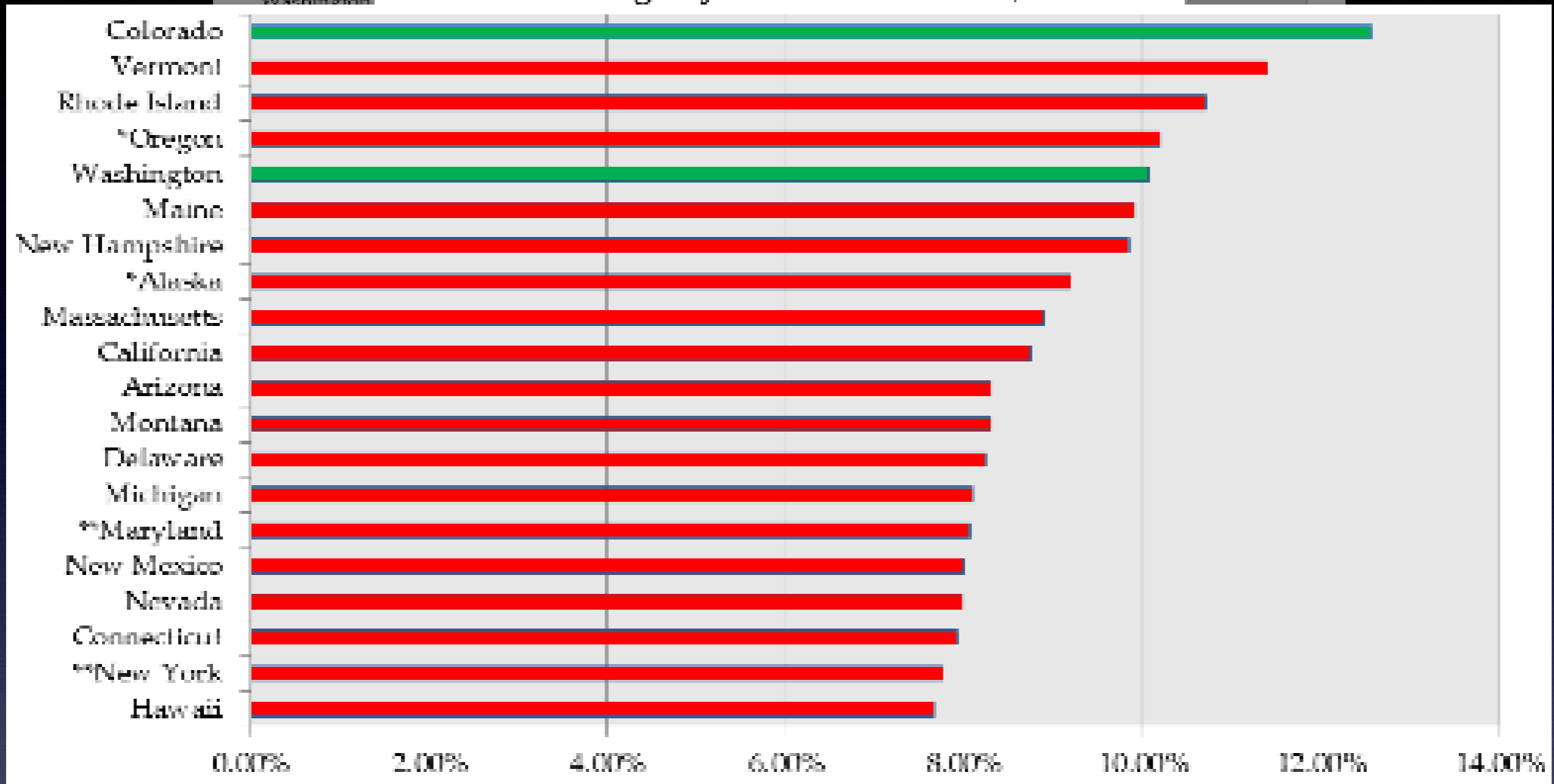
- If THC > 1ng/ml:
  - **2.5x** more likely to be involved in a car crash
  - **3.3x** more likely to be involved in a fatal car crash
- If THC  $\geq$  5ng/ml:
  - **4.7-6.6x** more likely of being involved in a fatal car crash

## Past Month Usage by 12 to 17 Years Old, 2013/2014



\* Legalized recreational cannabis in 11/2014

\*\* Legalized medical cannabis in 2014



\* Legalized recreational cannabis in 11/2014

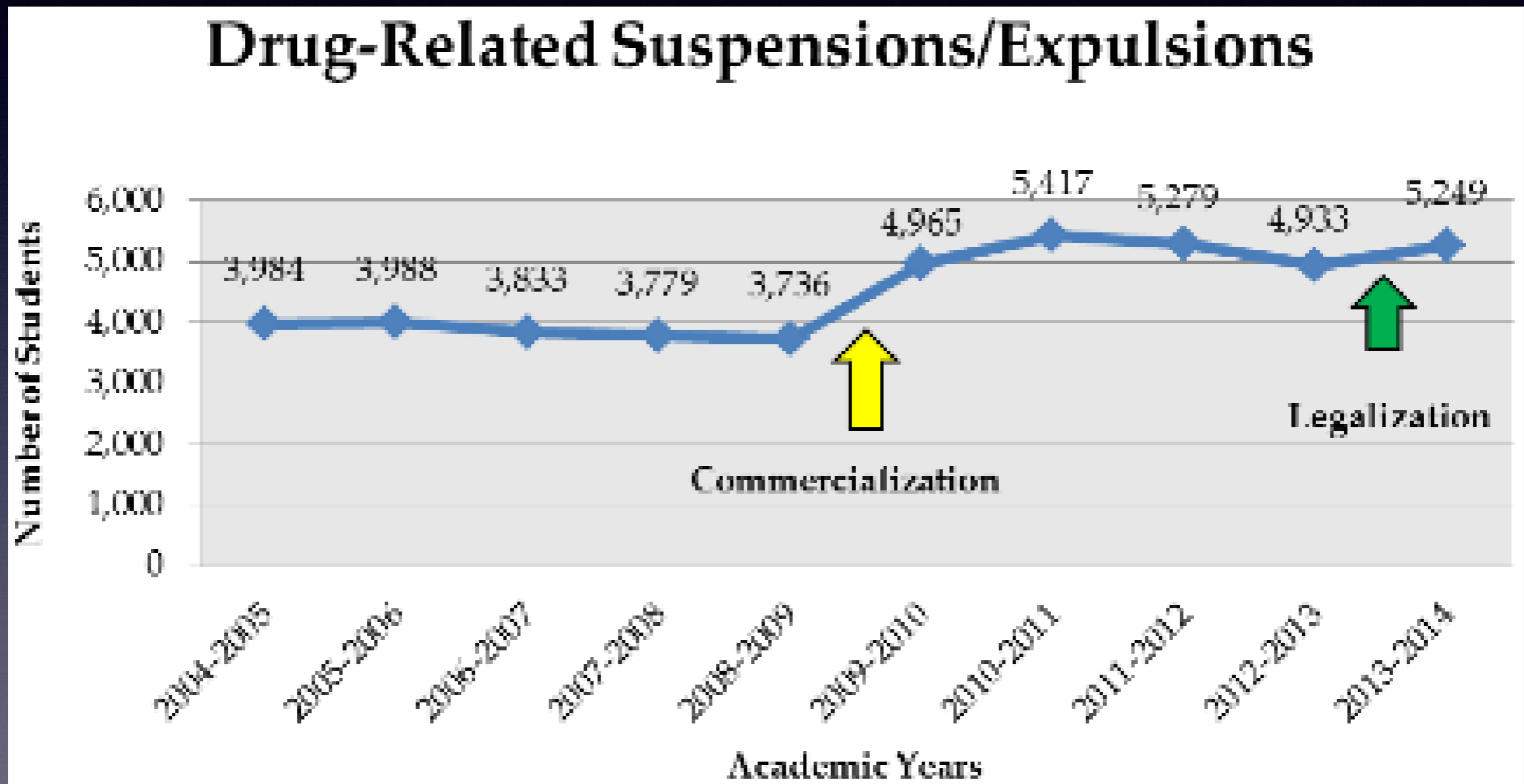
\*\* Legalized medical cannabis in 2014

# Youth Cannabis Use

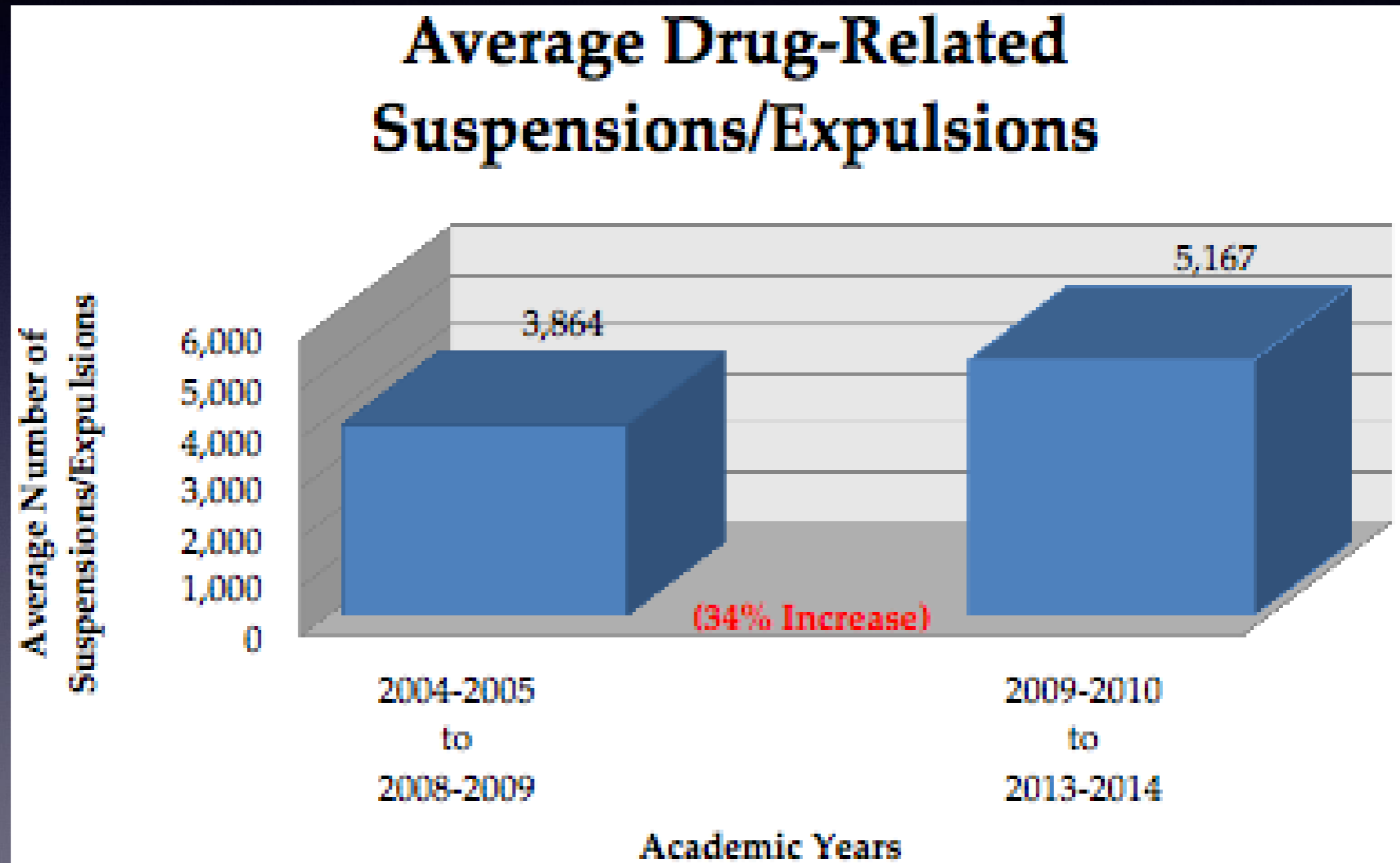
## States for Past Month Marijuana Use Youth Ages 12 to 17 Years Old, 2013/2014

<u>Top 10</u> (Medical/Recreational States)	<u>Bottom 10</u> (Non-Medical or Recreational States)
<b>National Rate = 7.22%</b>	
1. Colorado – 12.56%	41. Mississippi – 5.60%
2. Vermont – 11.40%	42. West Virginia – 5.60%
3. Rhode Island – 10.69%	43. North Dakota – 5.60%
4. Oregon – 10.19%	44. Louisiana – 5.55%
5. Washington – 10.06%	45. Nebraska – 5.54%
6. Maine – 9.90%	46. Oklahoma – 5.52%
7. New Hampshire – 9.83%	47. Utah – 5.42%
8. Alaska – 9.19%	48. South Dakota – 5.32%
9. Massachusetts – 8.88%	49. Iowa – 5.17%
10. California – 8.74%	50. Alabama – 4.98%

# Youth Cannabis Use in Colorado

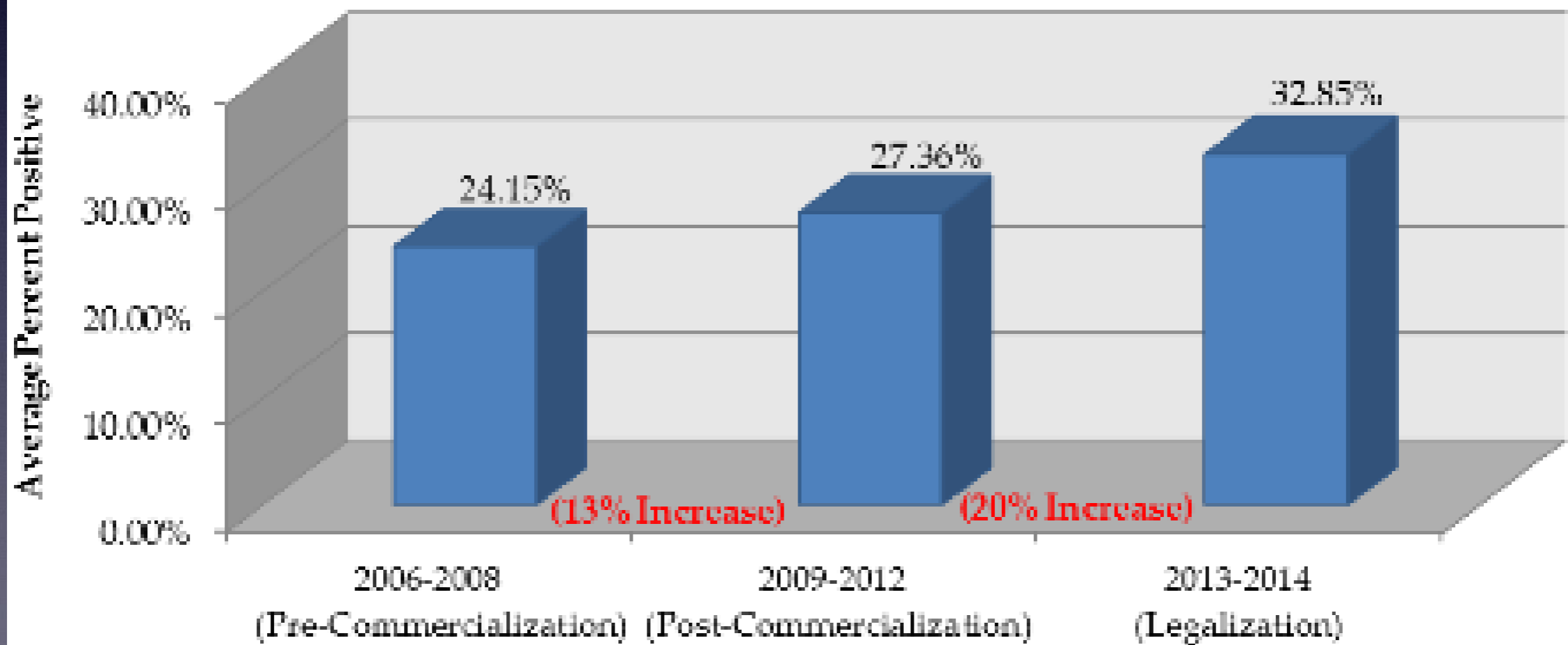


# Youth Cannabis Use in Colorado



# Youth Cannabis Use

## State of Colorado Probation Average Percent Positive THC Urinalyses Ages 12 to 17 Years



# Young Adult Cannabis Use

## States for Past Month Marijuana Use College Age Adults 18 to 25 Years Old, 2013/2014

<u>Top 10</u> (Medical/Recreational States)	<u>Bottom 10</u> (Non-Medical or Recreational States)
National Rate = 19.32%	
1. Colorado – 31.24%	41. Oklahoma – 15.76%
2. Vermont – 30.60%	42. Kansas – 15.11%
3. New Hampshire – 30.09%	43. Texas – 15.06%
4. Rhode Island – 28.90%	44. Alabama – 15.04%
5. Massachusetts – 28.74%	45. Tennessee – 14.72%
6. Maine – 28.38%	46. Idaho – 14.28%
7. Oregon – 24.85%	47. North Dakota – 14.05%
8. Washington – 24.47%	48. Iowa – 14.01%
9. Maryland – 23.42%	49. South Dakota – 13.02%
10. Michigan – 23.17%	50. Utah – 11.55%