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# UNDERSTAND THE BIG DEAL

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## HOW MARIJUANA HARMS YOUTH

University of Colorado at Denver Health Sciences Center and Denver Health & Hospital Authority  
Christian Thurstone, M.D.

Dr. Thurstone: "I'm interested in this subject because 95 percent of the teenagers treated for substance abuse and addiction in my adolescent substance-abuse treatment clinic at Denver Health are there because of their marijuana use, and because nationwide, 67 percent of teens are referred to substance treatment because of their marijuana use. Marijuana is the No. 1 reason why adolescents seek substance-abuse treatment in the United States.

"There are active compounds in cannabis that have some therapeutic use for adults, and either have been developed into medications that have received approval from the federal Food & Drug Administration or are currently being studied by the FDA. What we do know for sure is that smoking marijuana profoundly harms youth."

1.7 % of Americans over the age of 12 struggle with marijuana abuse or dependence.

(National Survey on Drug Use & Health, 2010)

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9% percent of people who try marijuana develop abuse and dependence; 17% if they try before the age of 18.

(Hall and Degenhardt, 2009)

These are some basic statistics about actual addiction to marijuana, not just use of the drug.

Each year, two-thirds of new marijuana users are under the age of 18. One in six of these adolescents will go on to develop marijuana use or dependence.

(Substance Abuse and Mental Health Services Administration, 2010;  
Hall and Degenhardt, 2009)

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Marijuana abuse accounts for 67% of adolescent substance-abuse admissions nationally. Marijuana abuse/dependence is also the No. 1 reason why youth in Colorado are admitted for substance-abuse treatment.

(NSDUH, 2010)

These are some basic statistics about actual addiction to marijuana, not just use of the drug.

# Marijuana is part of an alarming problem in Colorado schools

Academic Year	Expulsions for Drugs	Out-of-school Suspensions for Drugs
2009-10	749	4,125
2008-09	534	3,111
2007-08	567	3,138
2006-07	891	5,076
2005-06	899	5,214

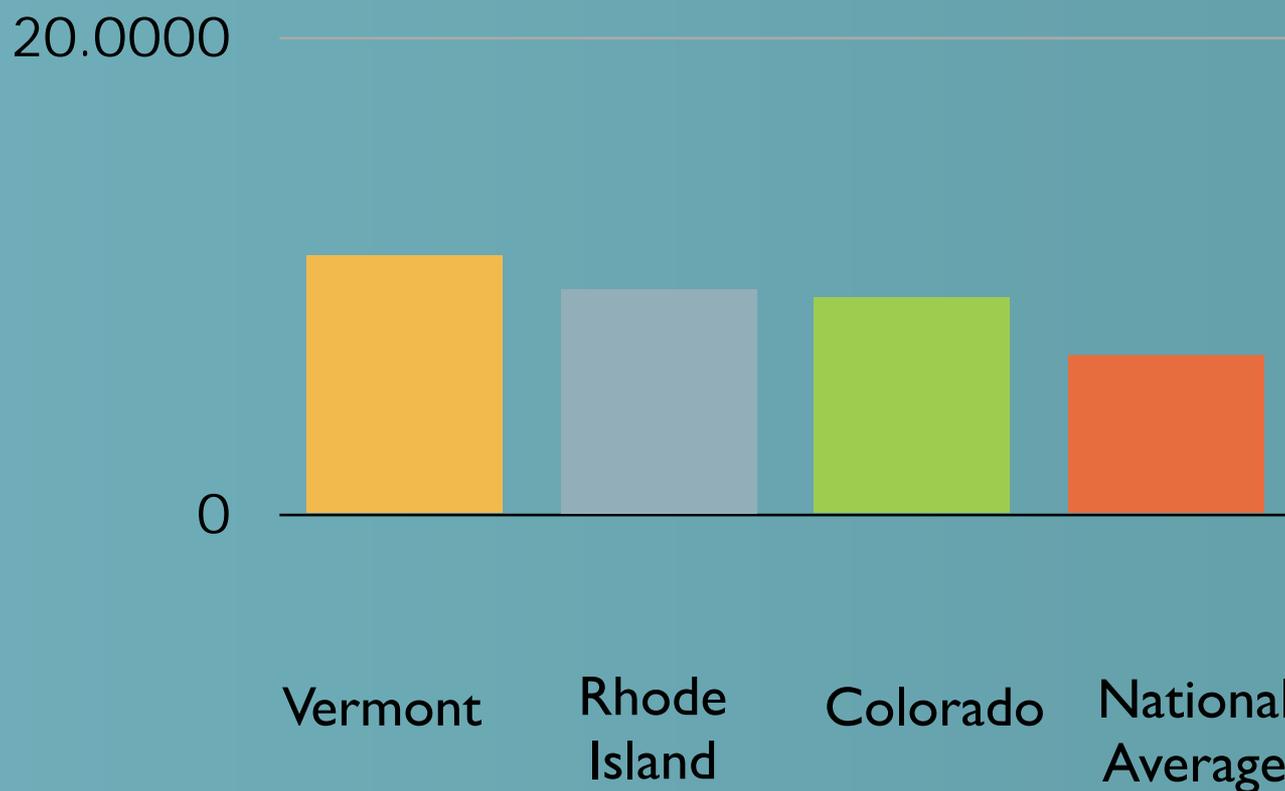
Colorado Department of Education

Colorado schools are reporting alarming growth in drug-related problems.

During the 2009-10 academic year, Colorado schools recorded 5,048 *total* disciplinary reports for drug offenses -- a concerning increase of 25.2 percent over the previous school year. In that same period, school *expulsions* for drug offenses shot up 24.6 percent, and *out-of-school suspensions* were up 29 percent. These upward trends in one year's time follow years of steady decline. The data include, but are not limited to, marijuana-related offenses. These troublesome increases happened in the same year that hundreds of marijuana dispensaries opened in Colorado, and federal "Safe and Drug-Free Schools and Communities" program funds made available to school districts for drug-prevention programs were eliminated.

# Marijuana use among Colorado teens ranks near the top in U.S.

Percent of youth ages 12-17 reporting past-month marijuana use

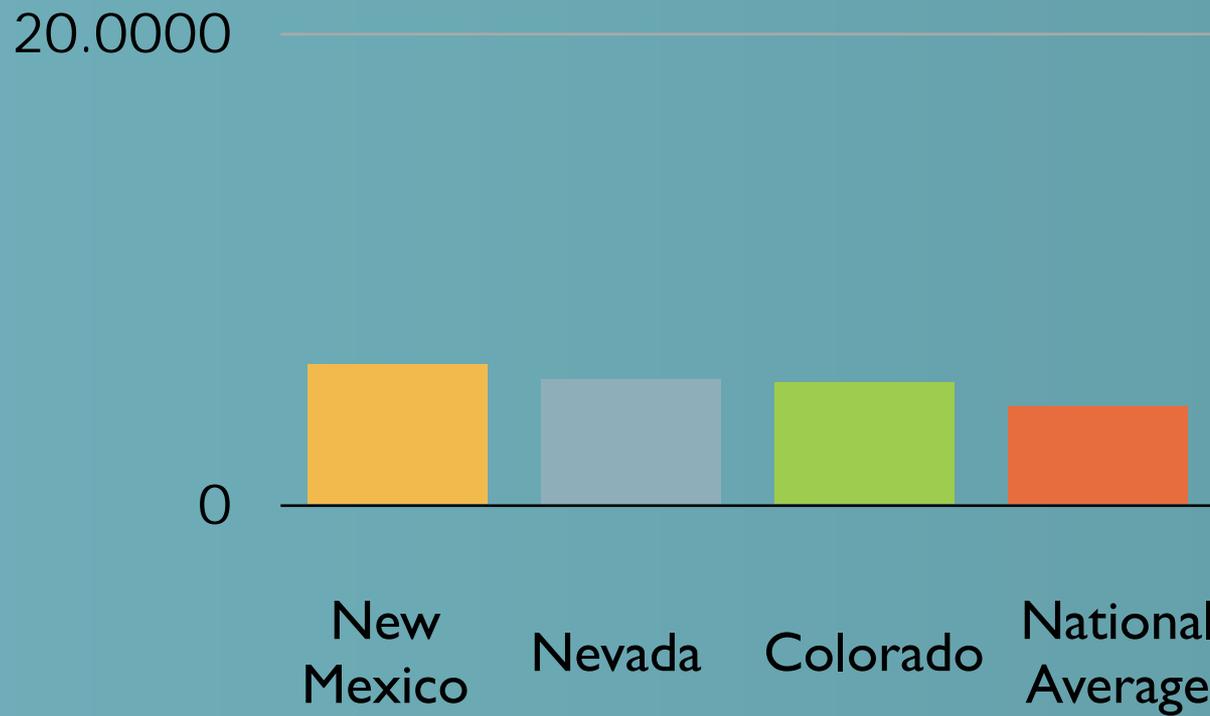


National Survey on Drug Use & Health, 2011

Marijuana use compared to other parts of the country.

# Colorado also has one of the highest gaps in treatment of youth with substance abuse problems

Percent of teen population with substance abuse disorder and did not receive treatment

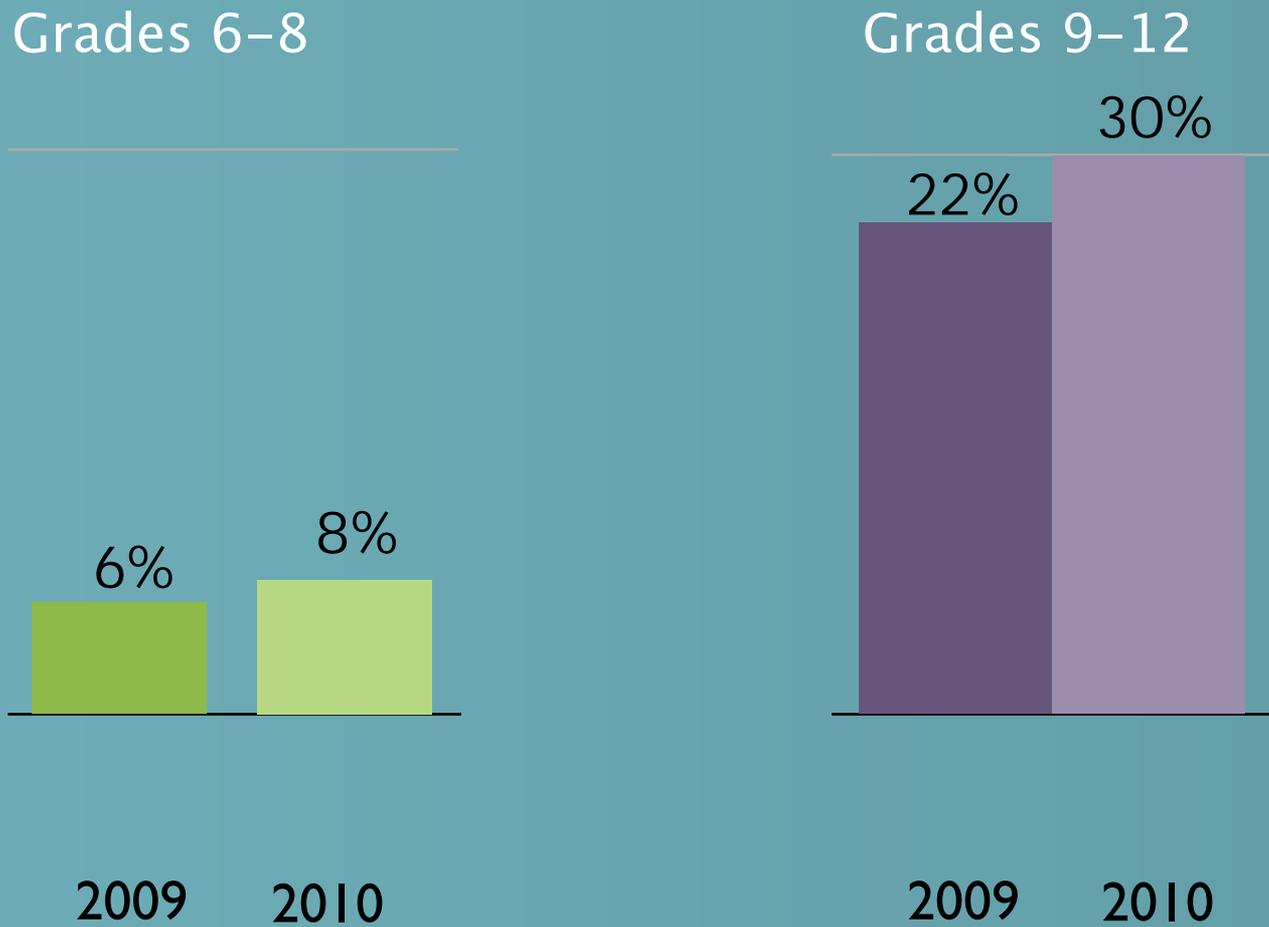


National Survey on Drug Use & Health, 2011

Colorado has one of the nation's highest gaps in treatment of youth with substance abuse problems. In 2010, Colorado had the third highest percentage of teens who needed substance treatment but did not receive it in the previous year. This graphic shows that 5.22% of all teens in Colorado had a substance use disorder and were not treated for it in the previous year.

# Adolescent marijuana use increases significantly in Adams County

Percent of Adams County Students reporting previous month marijuana use.



Adams County Youth Initiative, 2010

In the fall of 2010, 27,250 students completed the Adams County Student Survey in Adams County, Colorado. The percentages here reflect the number of students who answered that they had used marijuana at least one day in the previous month.

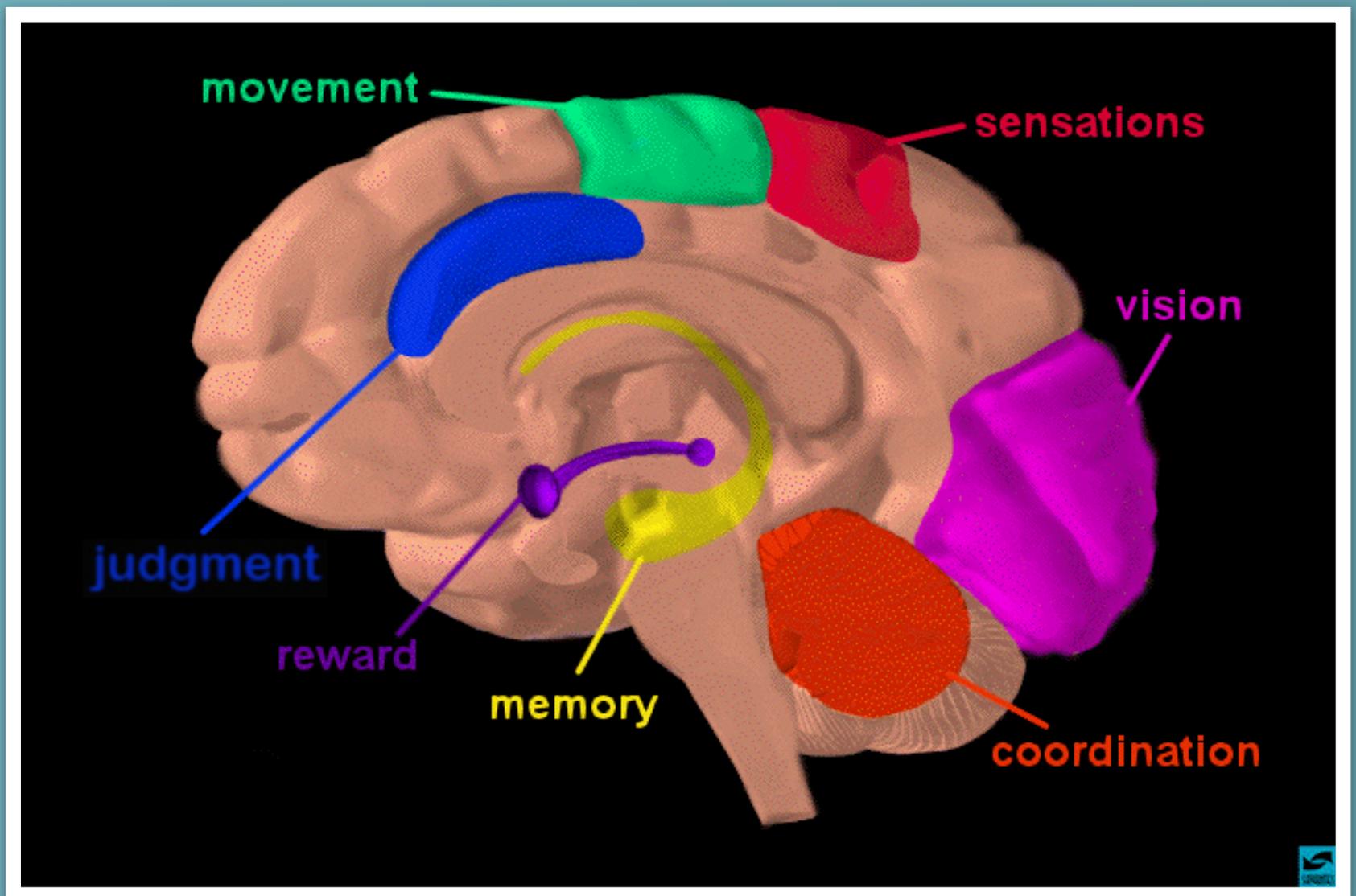
Past-month marijuana use among students in grades 6-8 jumped from 6 percent in 2009 to 8 percent in 2010. In 2008, 5 percent of students in grades 6-8 reported past-month marijuana use.

Past-month use among students in grades 9-12 increased from 22 percent in 2009 to 30 percent in 2010. In 2008, 19 percent of Adams County students in grades 9-12 reported past-month marijuana use.

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# Marijuana's Effects on the Adolescent Brain

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To understand marijuana's harmful effects on adolescents, it's important to be familiar with parts of the brain:

The prefrontal cortex controls judgment.

The cerebellum plays an important role in coordination.

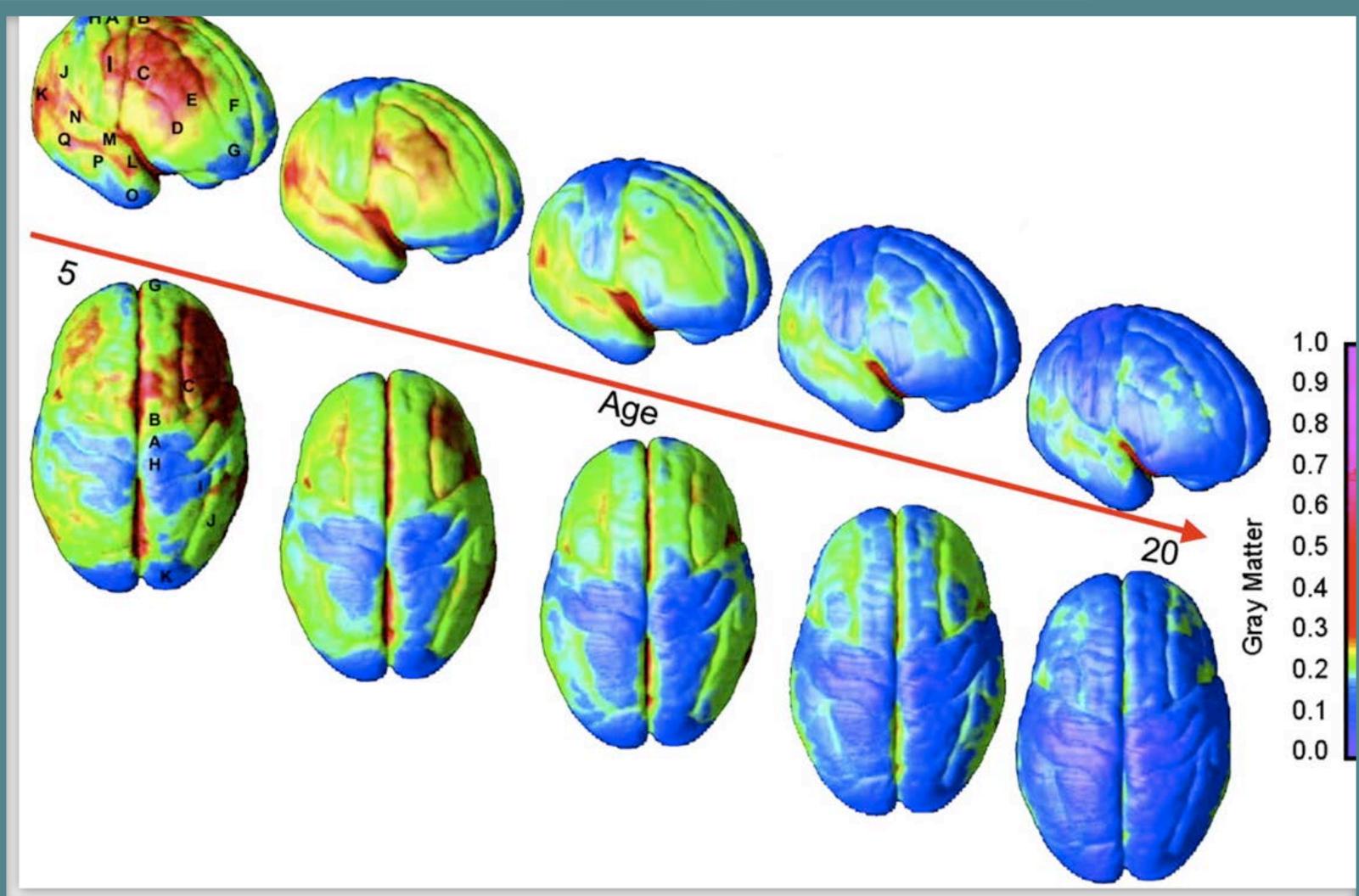
The hippocampus is important for learning and memory.

The brain's "reward circuit" consists of the nucleus accumbens and the ventral tegmental area. This reward circuit functions to promote pleasure -- such as the pleasure derived from eating and sex. However, in people with addiction, the brain reward circuit is taken over by substances, including marijuana.

All of these areas of the brain are relevant to the issue of marijuana use and the teen brain as we will find out later in this presentation.

This image, and others, can be found at: <http://www.drugabuse.gov/pubs/Teaching/default.html>

# How the Brain Matures



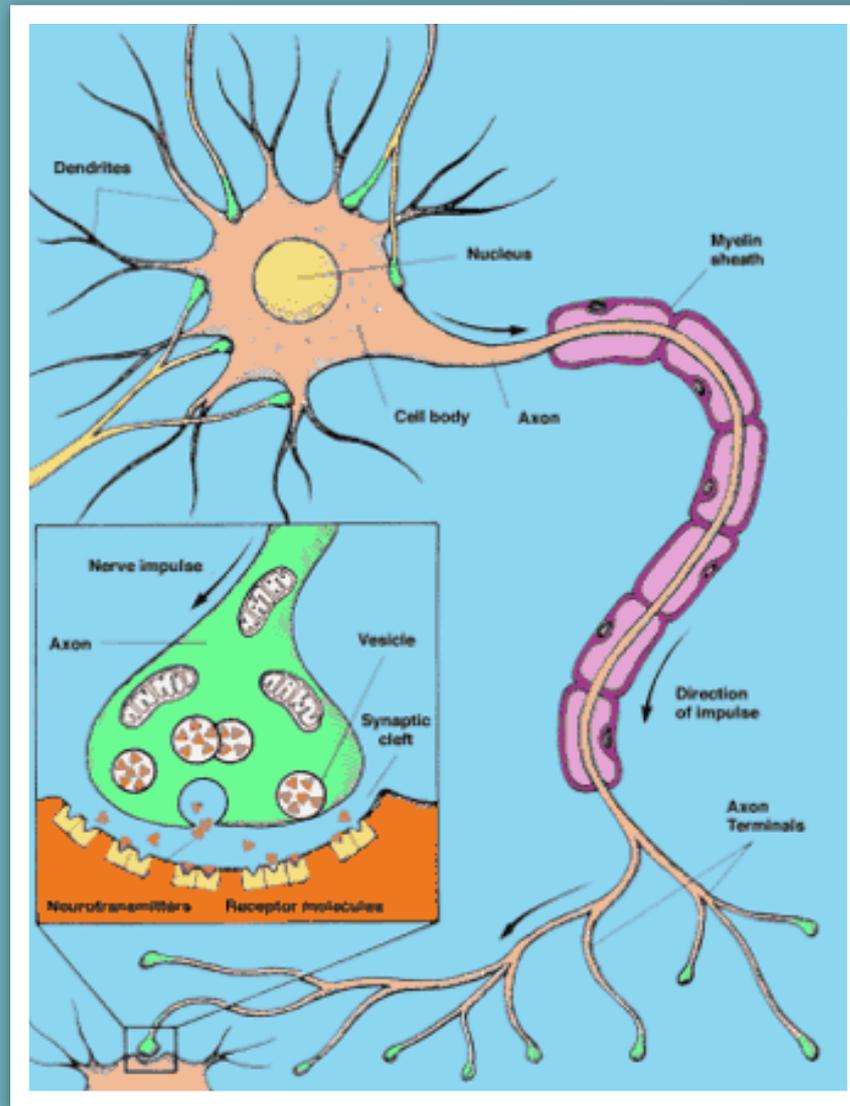
This is a picture of brain development from age 5 to the early 20s. The color blue represents myelination of the brain, or brain maturity. Myelination makes nerve impulses travel more efficiently. Note that the brain reward circuit (near the bottom of the brain) -- that part of the brain that drives our desire to seek pleasure, rewards, thrills and adventure -- matures in early adolescence. It's also important to note that the prefrontal cortex, which is in charge of judgment and impulse control, is the last area of the brain to mature. In other words, the adolescent brain craves pleasure, but it doesn't know how to weigh risks, determine and plan for consequences or how to say enough is enough.

Because of this gap in brain development, children and adolescents are especially vulnerable to addiction.

Gogtay et al. Proc Natl Acad Sci U S A. 2004 May 25;101(21):8174-9

The image can be found at: <http://www.loni.ucla.edu/~thompson/DEVEL/PR.html>

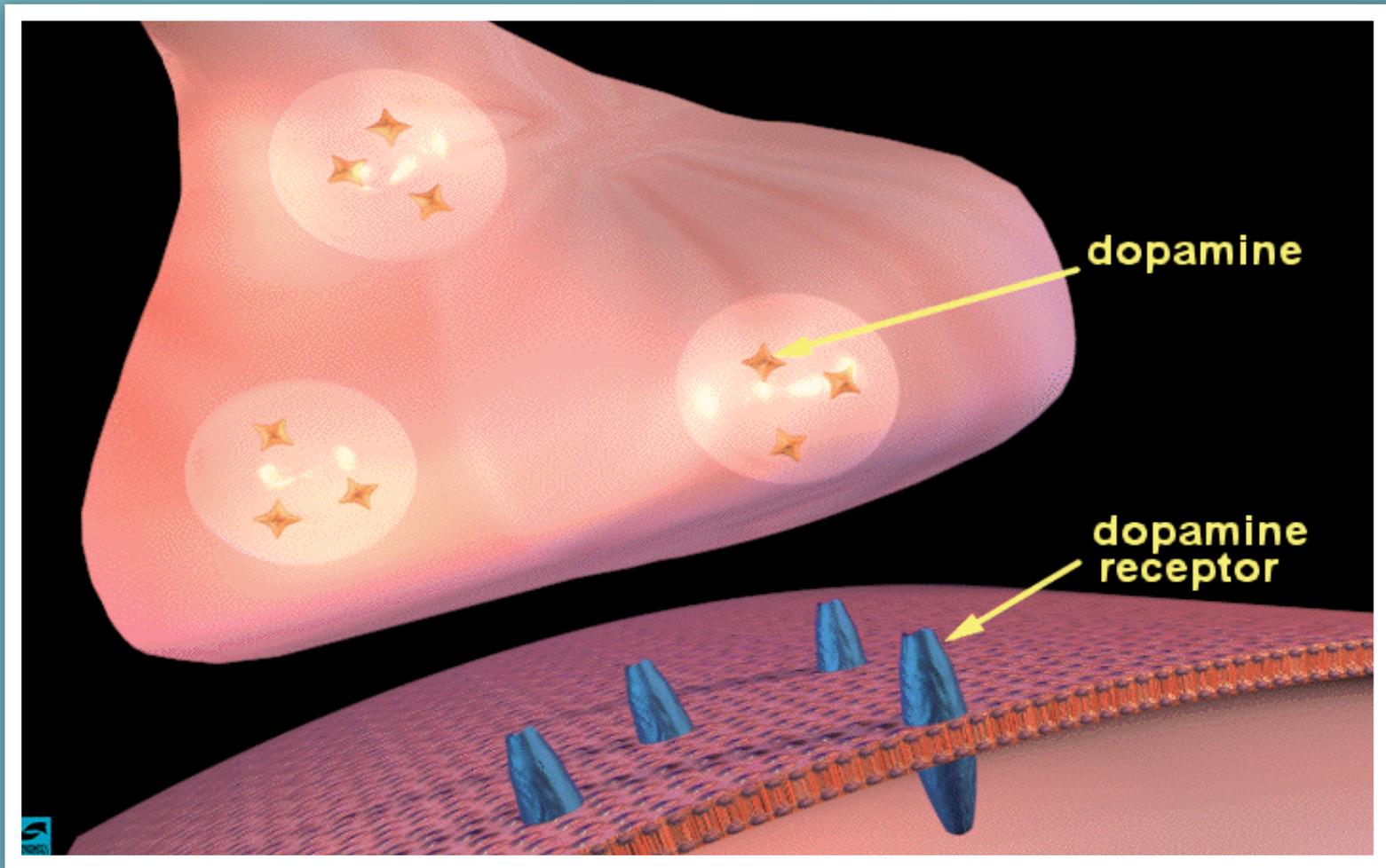
# A nerve cell up close



We've discussed myelination, but let's take a closer look at how it happens. This is a drawing of a neuron, or nerve cell. Electric impulses travel down the axon. The myelin sheath consists of fat cells that surround the axon and make electrical impulses travel faster and more efficiently. In adolescence, important structures in the brain become myelinated. To work more efficiently, the brain prunes axons and connections it doesn't need. This is an important part of brain development that can be negatively affected by drug use.

This image, and others, can be found at: <http://www.drugabuse.gov/pubs/Teaching/default.html>

# The Synapse: Where brain cells connect



This is a synapse, where two nerve cells come together to communicate. The neurotransmitters are stored in vesicles and released into the synaptic cleft. The neurotransmitter -- in this case, a chemical in the brain called dopamine -- binds to the post-synaptic receptor to transmit the electrical impulse.

Dopamine either increases or reduces the activity of nerve cells. It plays a very important role in the brain's functioning by regulating attention, cognition, hormonal processes, impulsivity, movement and pleasure. Attention-deficit/hyperactivity disorder, schizophrenia and Parkinson's Disease are attributed in part to dysfunction within the dopamine system.

All substances of abuse -- including marijuana -- increase the amount of dopamine released into the shell of the nucleus accumbens of the brain's reward circuit.

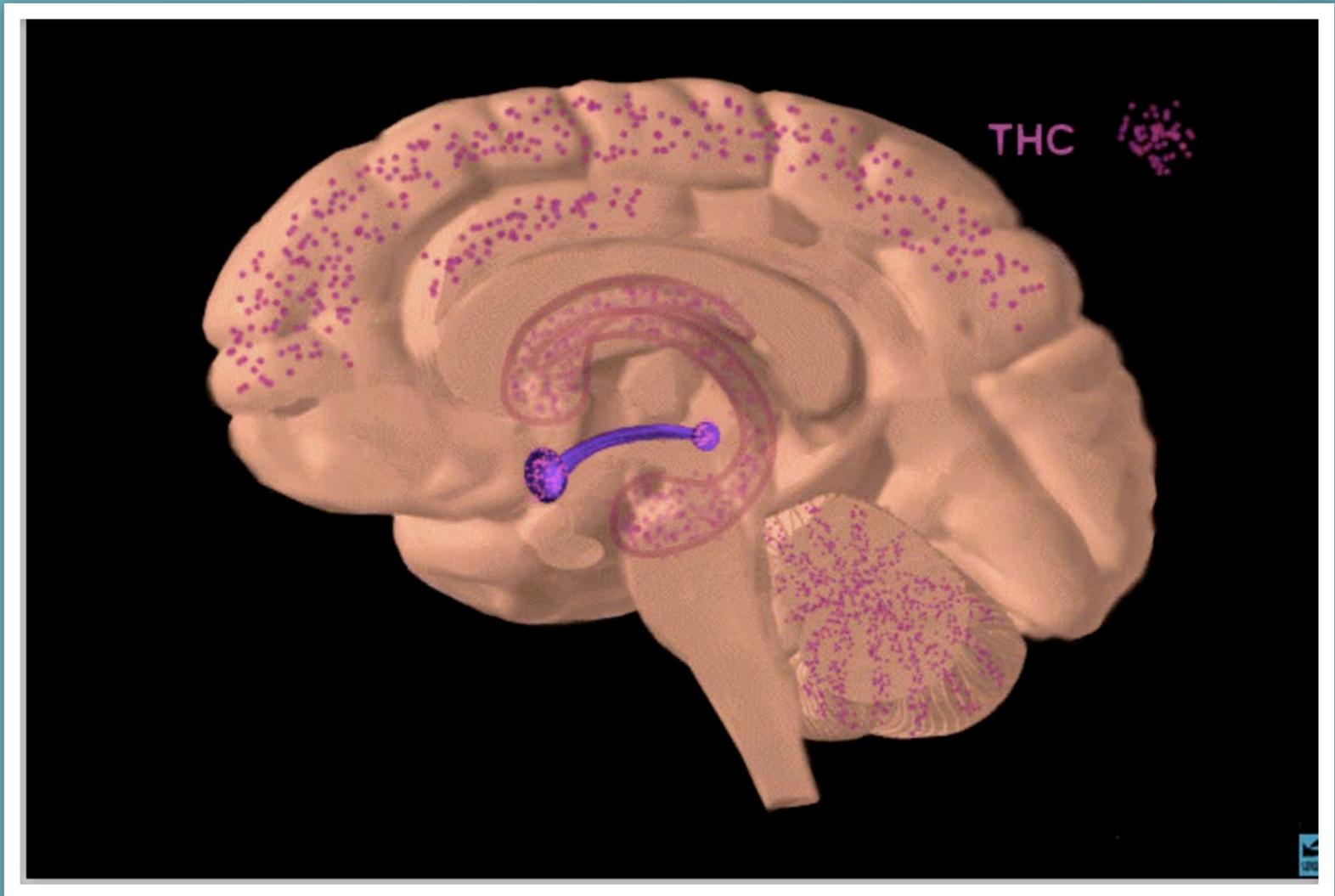
Endocannabinoids are also a neurotransmitter. They are the naturally occurring compounds in the brain that affect the brain in the same ways marijuana does. Endocannabinoids even bind to the same receptor as marijuana. This receptor is called Cannabinoid Receptor Type I, more commonly known as the CBI receptor.

After being stimulated, the CBI receptor decreases excitatory, or stimulated, impulses. Therefore, the CBI receptor, which is the most common G-protein receptor in the brain, acts as a type of circuit breaker or shut-off switch -- and likely plays an important role in brain development.

Marijuana use compromises the endocannabinoid system by overwhelming it. The brain's naturally functioning shut-off switches -- which help regulate brain development and function -- can't do their job.

This image, and others, can be found at: <http://www.drugabuse.gov/pubs/Teaching/default.html>

# Where marijuana binds throughout the brain

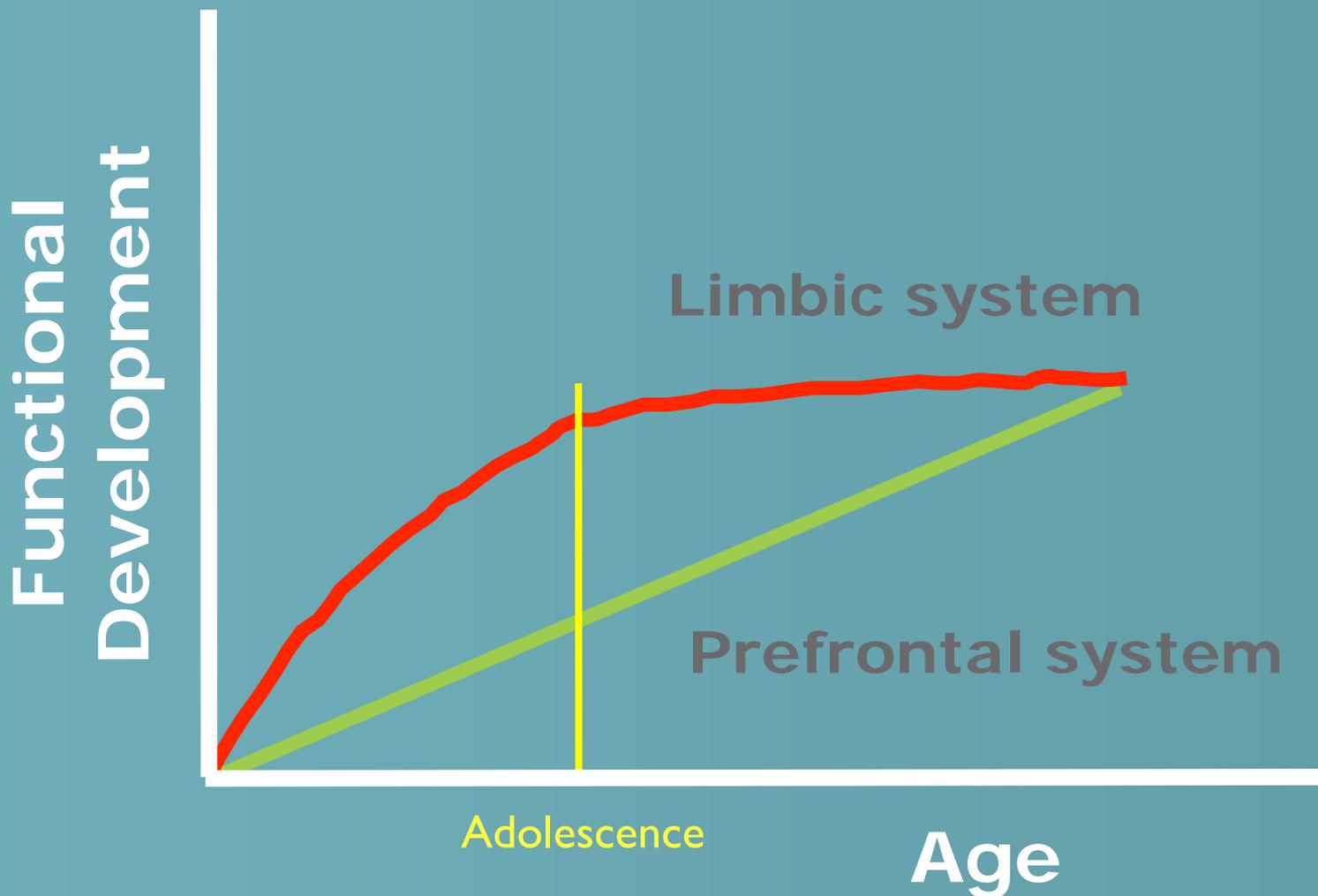


The dots correspond to places in the brain that are rich in CB1 receptors. You can see that the prefrontal cortex (which controls judgment), the brain reward circuit, the hippocampus (which affects memory and learning) and the cerebellum (which is charged with coordination) are rich in CB1 receptors.

This helps explain the effects of marijuana on the brain.

This image, and others, can be found at: <http://www.drugabuse.gov/pubs/Teaching/default.html>

# Why kids are more easily addicted than adults



Casey et al., 2008

As previously seen, the brain's reward circuitry develops early in adolescence, and the prefrontal system is slower to develop.

This graphical representation of a 2008 study shows that there is a period in adolescence when the brain's drive for pleasure and new experiences is strong, but its "brakes" are not mature.

This is why adolescents have more trouble than adults in controlling their impulses, and why adolescents may know what they should be doing but have trouble doing it. This graphic also explains why adolescents are more vulnerable to becoming addicted to substances. Adolescents who try marijuana are over nine times more likely to develop symptoms of cannabis dependence than adults who try marijuana (Chen et al., 2009)

Overall -- counting adults and adolescents -- 1 in 10 of people who try marijuana become addicted to it.

# Animal Studies: Effects of marijuana on adolescent rats

Domain	Outcome
Motivation	Decreased
Social interaction	Increased anxiety
Memory	Decreased short-term recognition
Attention	Impaired filtering of unnecessary stimuli
Learning	Mixed results

Jager and Ramsey, 2008, Rubino et al., 2009

Much of the research about the impact marijuana has on the adolescent brain comes from animal studies because it would be unethical to perform these studies in humans.

Rats go through adolescence at about the age of 20 days. In these studies, rats are exposed to marijuana (or similar drugs) and then tested as adults. These are relatively recent findings of the impact of adolescent exposure. As seen here, researchers found that the rats' experienced negative effects on their motivation, social interaction, memory and attention spans. Results were mixed on their learning.

These findings are consistent with the observations child mental health workers make about adolescent marijuana smokers.

# Marijuana intoxication in humans

## Brain Function

## Outcome

Impulsivity



Increased

Working memory



Decreased

Attention



Decreased in occasional users,  
normal in long-term users

Decision making



Slowed response time,  
decreased accuracy

Motivation



Decreased

Verbal fluency



Normal in regular users

Jager and Ramsey, 2008

Marijuana use has acute (meaning up to six hours), subacute (6 hours to 20 days) and long-term (more than 20 days) effects.

Here are some of the acute effects of marijuana on cognitive aspects important for learning.

# Adolescent marijuana use can affect people long after they've quit

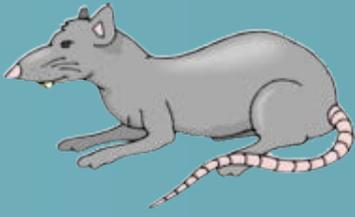
Domain	7hrs-20 days	>20 days
IQ	↓IQ	↓ Verbal Intelligence, not Performance Intelligence
Verbal memory	Decreased	Decreased
Visuospatial memory	Mixed	Mixed
Attention	↑ response time	No effects
Executive functions	No effects	No effect

Jager and Ramsey, 2008

Marijuana use has acute (meaning up to six hours), subacute (6 hours to 20 days) and long-term (more than 20 days) effects. So, even if a youth isn't actively using the drug, his or her abilities to learn and interact successfully at school could be compromised for extended periods of time.

Here are some of the acute effects of marijuana on cognitive aspects important for learning.

# Changes in brain structure with adolescent marijuana use



## In rats

- Decreased working spatial memory
- Decreased synaptic density in the hippocampus
- Decreased # of brain cells in the hippocampus
- More short, damaged connections
- More damaged cellular organelles

Rubino et al., 2009; Scallet, 1991

Adolescent  
Marijuana  
Use



## In humans

- Increased activation in the hippocampus, which controls memory and learning
- Increased activation of prefrontal cortex, which means the brain is having to work harder to complete tasks of spatial working memory.

Jacobsen et al., 2004; Padula et al., 2007; Schweinsburg et al., 2008; Schweinsburg et al., 2010;

This slide illustrates the impact of adolescent marijuana exposure on rats and humans. The findings in both were primarily in the hippocampus, which is important for learning and memory. They were observed in functional magnetic resonance imaging (fMRI) during spatial working memory tasks.

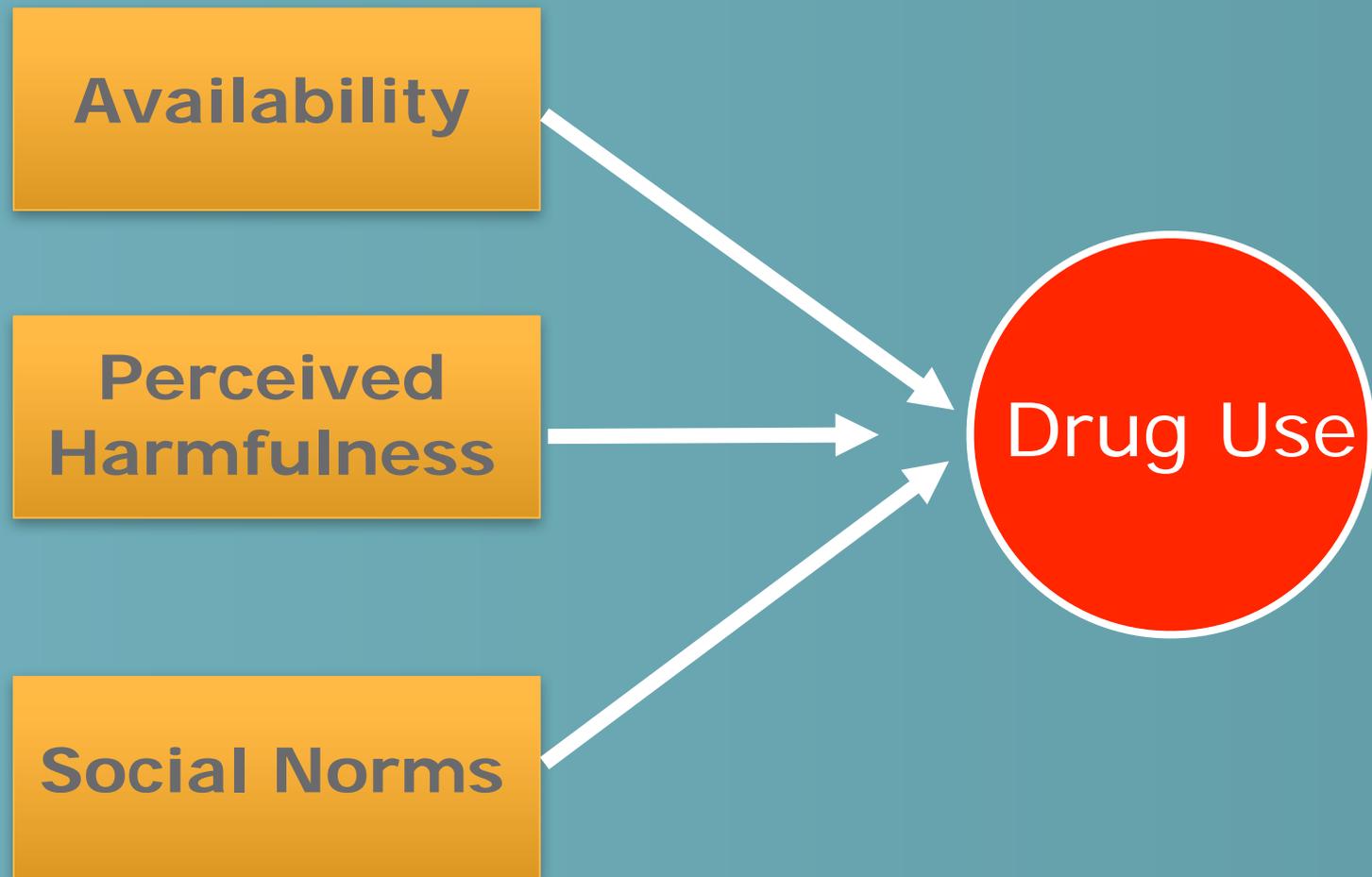
Long-term, regular users who started using marijuana before the age of 18 often cause changes in their brain's structure and functioning that result in permanent cognitive deficits. Essentially, they can create for themselves a level of "normal" performance that is lower functioning than the level of normal performance they may have achieved had they not used marijuana. Studies show that when marijuana users are intoxicated, their working memory is impaired, and they are more impulsive, less attentive, less motivated and slower to make decisions.

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What's contributing to  
rising marijuana use?

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# Three big contributors to drug use



Preventing Drug Use among Children and Adolescents, 2004

These are the three most important determinants of marijuana use among teens:

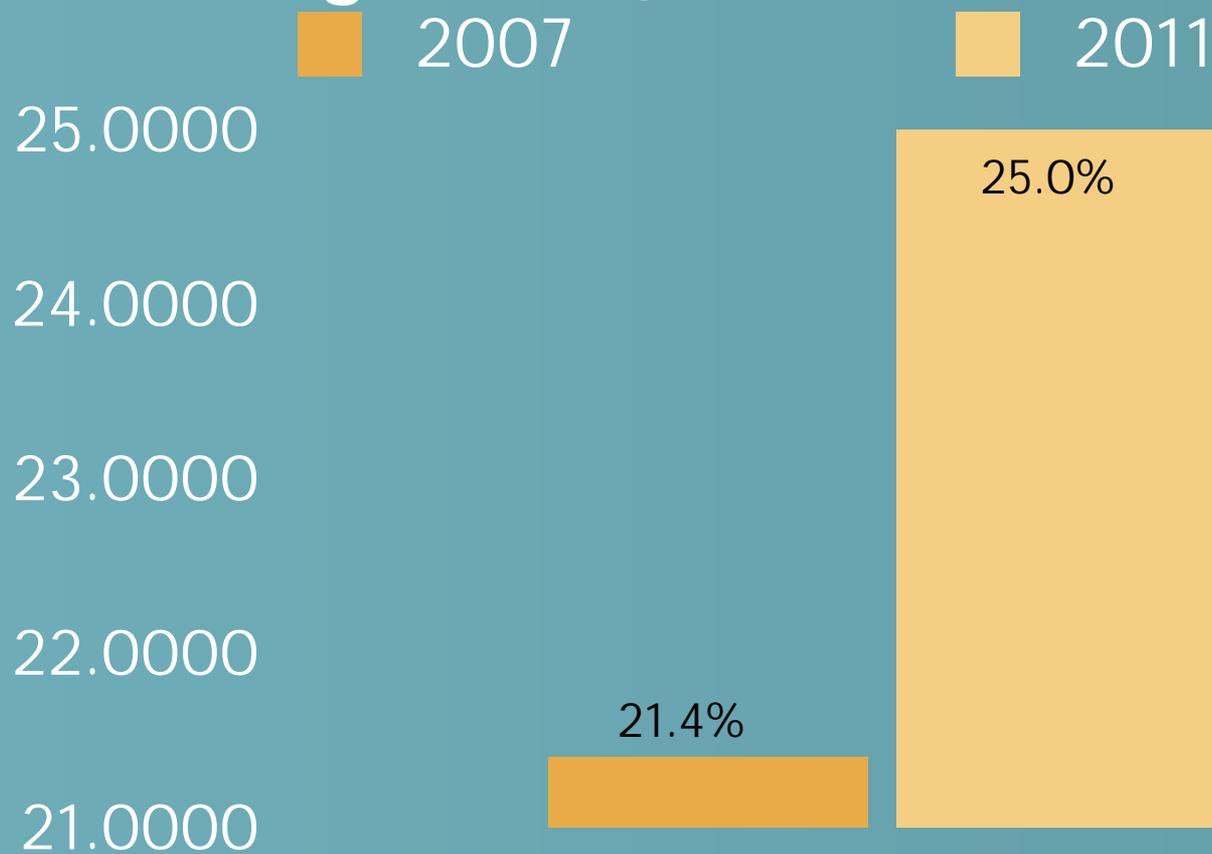
Availability of the drug

Normalization, or social acceptance, of the drug

Perceived harmfulness of the drug

The more accessible a drug is, the more socially acceptable it is to use it, and the less people understand about the drug's harmfulness, the more likely teens are to use it. Science has shown that to prevent drug use in adolescence, we must make substances less available, make them less socially acceptable and repeatedly remind young people that using drugs is unhealthy and unwise.

# Past-month marijuana use among students in grades 8, 10 and 12



Monitoring The Future, 2011

Now let's take a look at where our nation's kids stand on those three determinants of drug use.

The Monitoring the Future study and the National Survey on Drug Use and Health are two of our nation's most extensive and important studies on this issue. Both survey tens of thousands of youth. For example, 47,000 students in grades 8, 10 and 12 participated in the 2011 Monitoring the Future Survey.

Monitoring the Future reported that marijuana use among teens increased in 2011 for the fourth consecutive year -- a sharp contrast to the considerable decline that had occurred in the preceding decade. For the three grades combined, marijuana use rose from 24.5 percent in 2010 to 25 percent in 2011. That's not a significant one-year increase. However, the increase since 2007 -- from 21.4 percent to 25 percent in 2011 -- is highly statistically significant.

## Daily or near-daily use reported by U.S. teens in 2011

Defined as use on 20 or more occasions in the prior  
30 days:

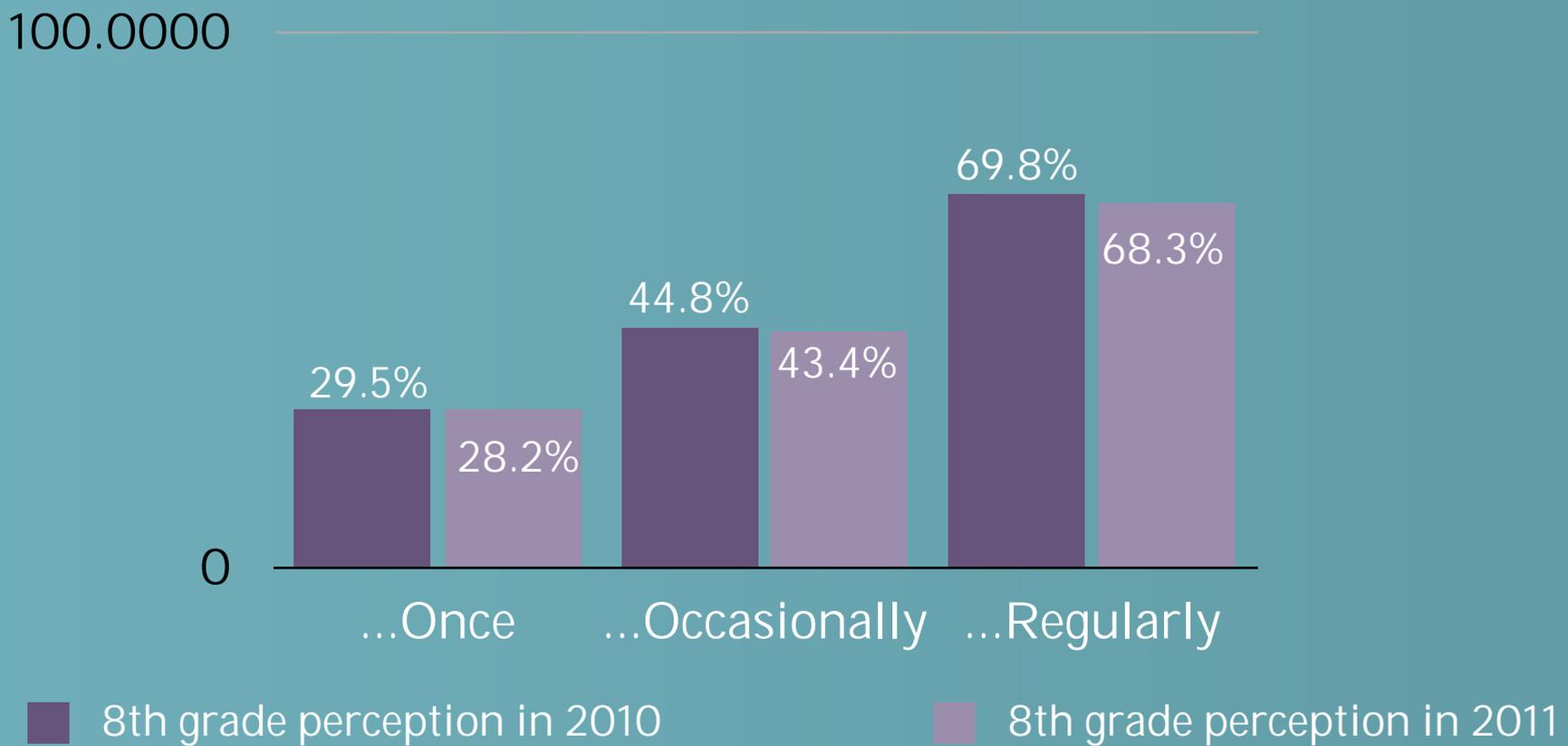
- 1.3 % of 8th graders
- 3.6 % of 10th graders
- 6.6 percent of 12th graders

Monitoring The Future, 2011

“Put another way, one in every 15 high school seniors today is smoking pot on a daily or near daily basis,” said Lloyd Johnston, the principal investigator of the Monitoring the Future study. “And that’s the highest rate that we have seen over the past 30 years—since 1981.”

# Perception of marijuana's harmfulness is falling

Percent of 8th graders who said marijuana was harmless if used



Monitoring The Future, 2011

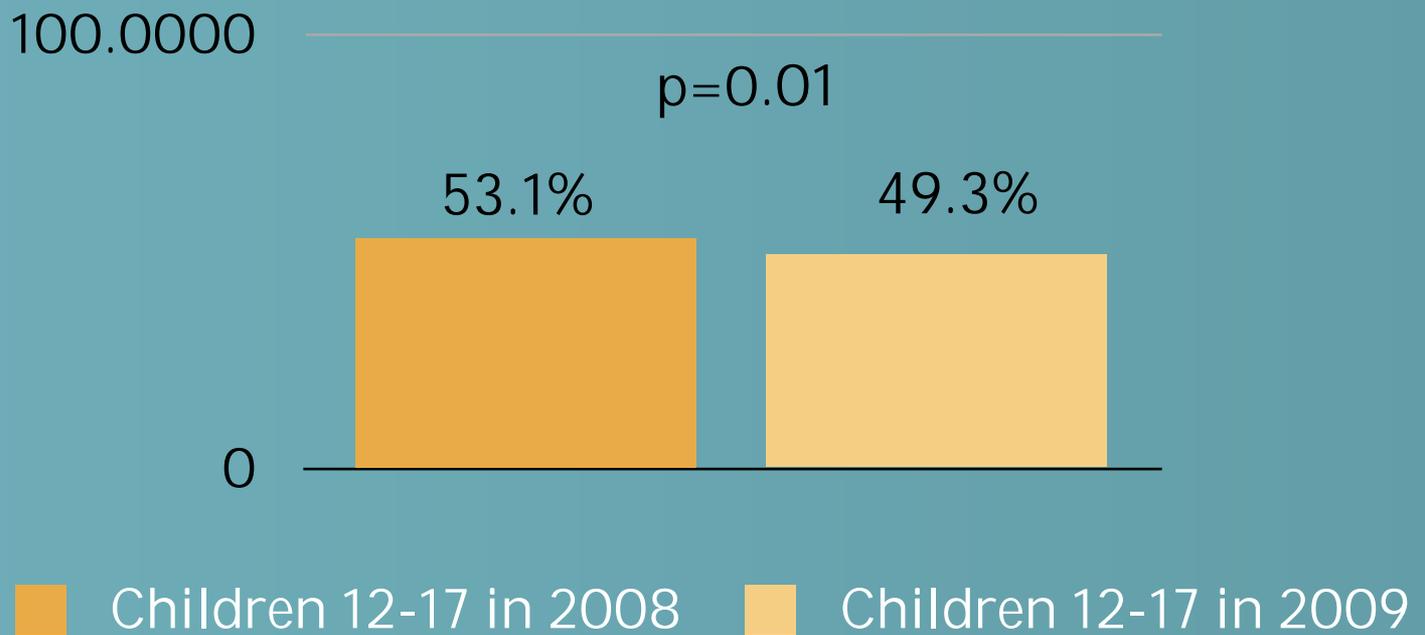
One possible explanation for the resurgence in marijuana use is that fewer teens perceive it to be harmful.

This graphic shows the change in perceived harmfulness of marijuana among 8th graders. This decrease in perceived harmfulness predicts an increase in marijuana use within two years.

We focus on 8th graders because they are in what is known as the concrete stage of moral development -- meaning they do things because they are either within or against the rules. Therefore, 8<sup>th</sup> graders might be most likely to be affected by changing laws regarding marijuana use. Many youth do not use marijuana simply because they know it is illegal.

# Perception of marijuana's harmfulness is decreasing

Percent of 12 - 17 year olds perceiving marijuana use as harmful

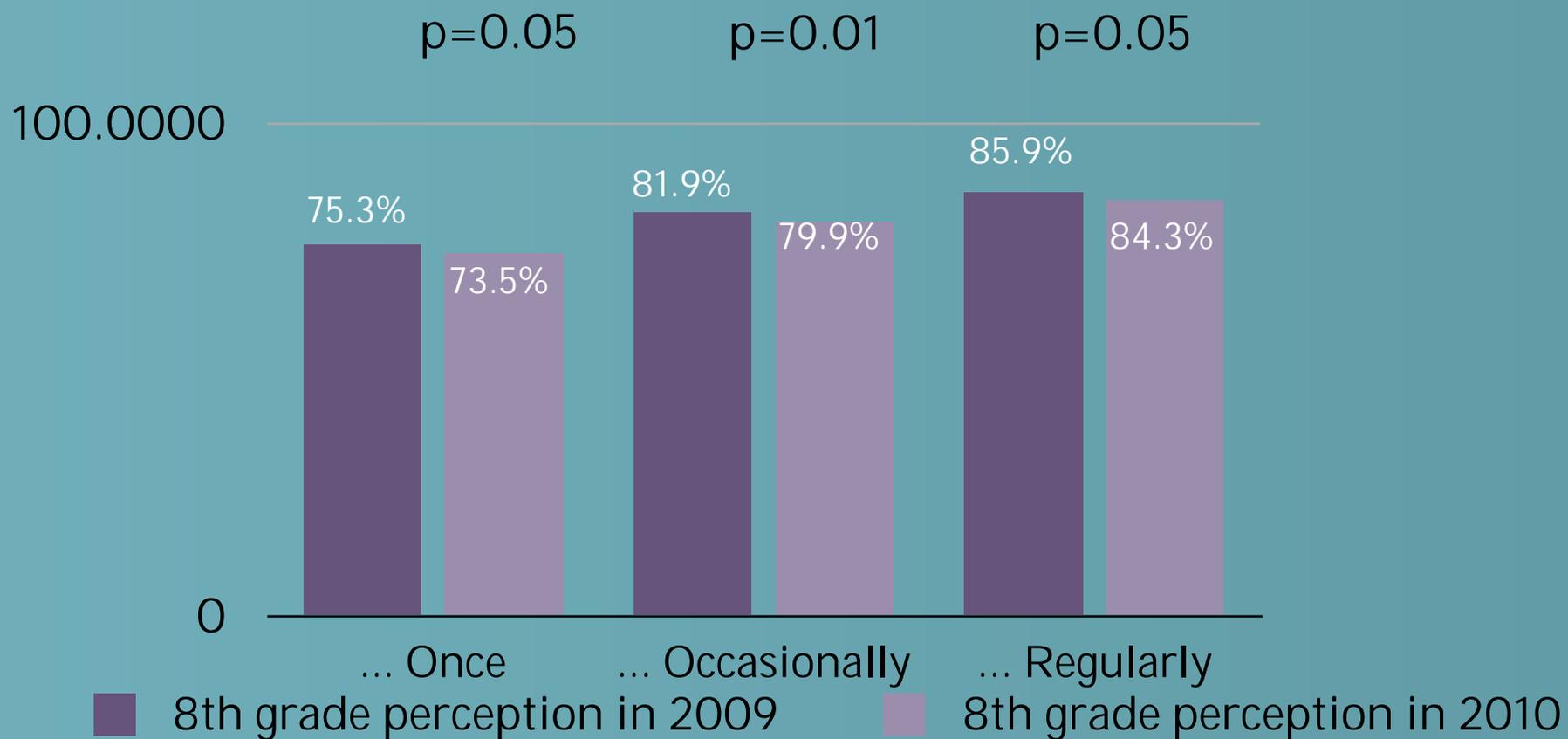


National Survey on Drug Use & Health, 2011

This graphic shows perceived harmfulness of marijuana use among 12-17 year-olds. There was a statistically significant decrease in perceived harmfulness from 2008 to 2009. See that  $p=0.01$ ? That means the probability of that these findings are a coincidence is only 1 percent. This graphic also predicts an increase in marijuana use within two years.

# Disapproval is decreasing

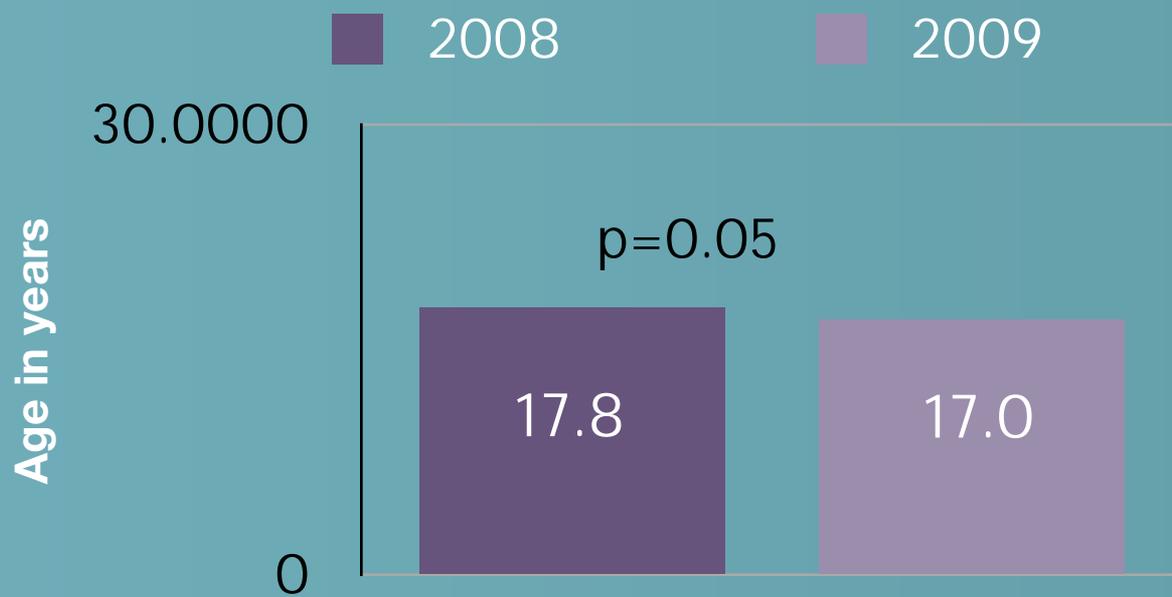
Percent of 8th graders who disapprove of marijuana use if the drug is used ...



Monitoring The Future, 2010

This graphic shows changing social norms about marijuana use. Eighth graders across the nation were asked whether they disapproved of one-time marijuana use, occasional marijuana use and regular marijuana use. As you can see, in only one year, there is a significant decrease in disapproval of marijuana use. For example, the  $p=0.05$  means that the chance that the one-year change is a coincidence is 5%. This graphic also predicts an increase in actual marijuana use because fewer students say they disapprove of the drug.

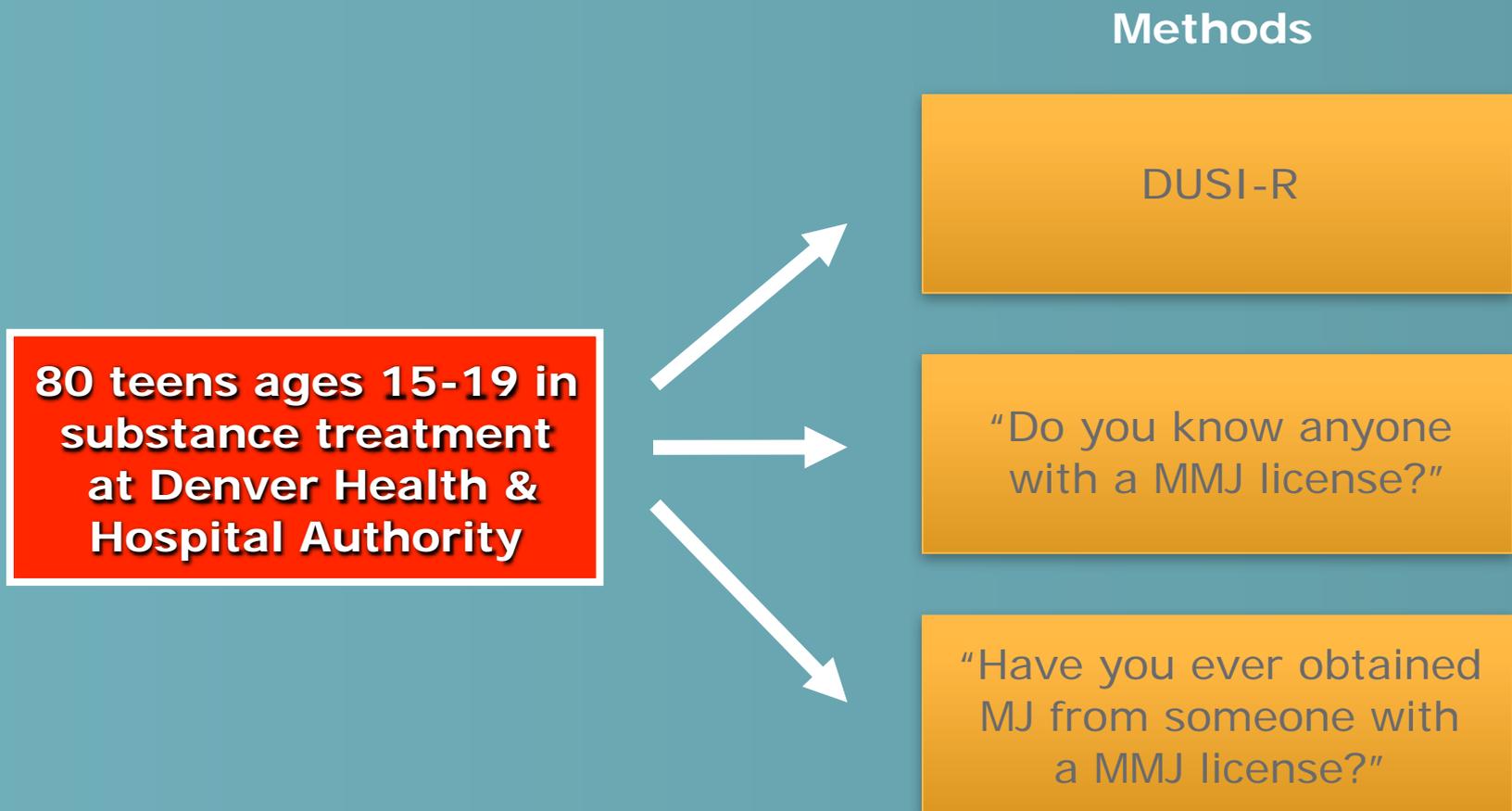
# The age at first-time use is falling



National Survey on Drug Use & Health, 2011

The 2011 National Survey on Drug Use and Health found in only one year a significant decrease in the mean age of first marijuana use. It is important to remember that the younger people are when they try marijuana, the worse their prognosis is. Younger teens are more likely to become addicted to the drug and to have a more difficult time stopping its use. Their brains also get more exposure to the toxic effects of marijuana (we will discuss this more later in the presentation), and they have more time to suffer the social consequences of their marijuana use, such as school problems.

# Diversion of medical marijuana among Colorado teens with substance problems



How has an increase in adults' access to medical marijuana in Colorado affected adolescents' access to marijuana?

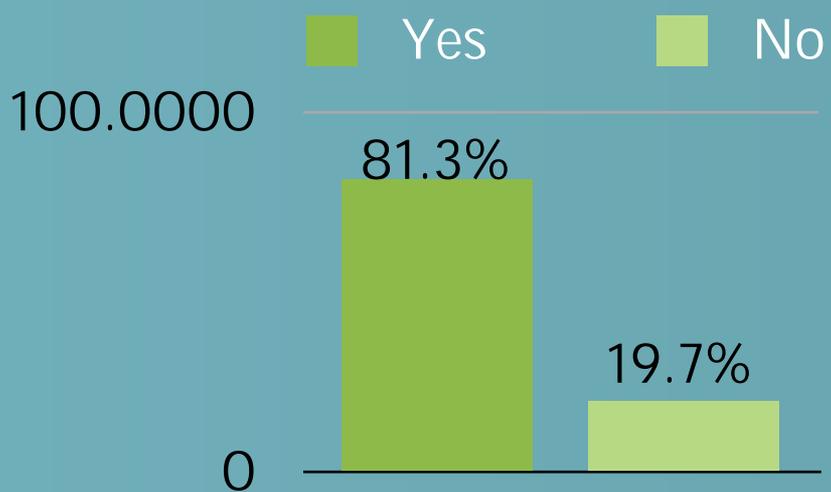
This slide explains the result of one study conducted by Dr. Christian Thurstone, a child, adolescent and addiction psychiatrist who serves as medical director of the Substance Abuse Treatment, Education and Prevention program (STEP) at Denver Health. Dr. Thurstone's research team surveyed 80 teenagers ages 15 to 19.

Research participants were evaluated using the Drug Use Screening Inventory, or DUSI-R, which measures the severity of problems in 10 areas: substance abuse, psychiatric disorder, behavior problems, school adjustment, health status, work adjustment, peer relations, social competency, family adjustment and leisure and recreation.

Participants also were asked two questions: "Do you know anyone with a medical marijuana license?" and "Have you ever obtained marijuana from someone with a medical marijuana license?"

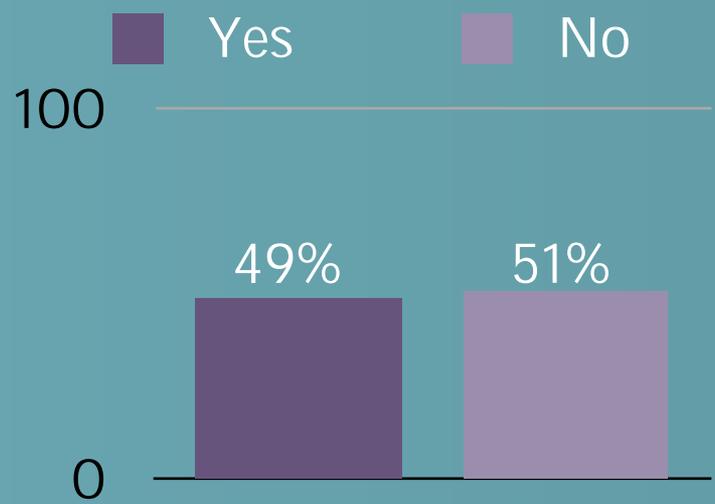
# Medical marijuana (MMJ) diverted to Colorado teens with substance problems

“Do you know anyone with a MMJ license?”



N = 65/80    N = 15/80

“Have you ever obtained MJ from someone with a MMJ license?”



N = 38/80    N = 42/80

This slide shows more than 80 percent of those surveyed reported that they know someone with a medical marijuana license. The slide also shows that medical marijuana is often diverted to adolescents: 49 percent of the youth participating in this study reported that they had obtained marijuana from a license holder.

It is important to link this data to the three conditions that lead to drug use: accessibility, social acceptance and perception of the drug's harmfulness.

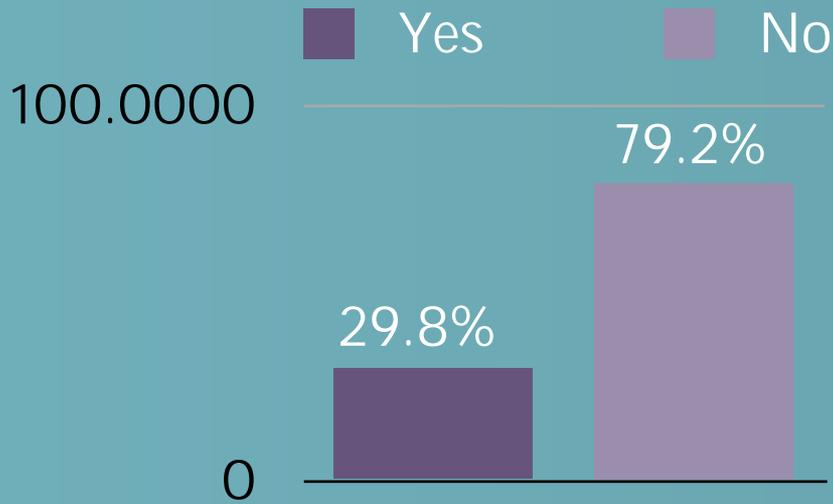
# Diversion of medical marijuana to Colorado teens with substance problems

Variable	Ever obtaining N=39	Never obtaining N=41	P-value
Very easy marijuana access	33 (84.6%)	18 (43.9%)	0.0002
Friends don't disapprove of regular marijuana use	31 (79.5%)	23 (56.1%)	0.026
More than 20 times/month of marijuana	31 (83.8%) N=37	23 (56.1%)	0.008
DUSI-R - Substance	46.5 (24.3) N=37	30.8 (25.3) (N=40)	0.021
DUSI-R-Overall	46.3 (16.3) (N=36)	37.6 (15.7) (N=40)	0.007

This slide shows that research participants who obtained marijuana from someone with a medical marijuana license were significantly more likely to report easy access to marijuana and less peer disapproval of marijuana use. These adolescents also used marijuana more frequently and had more substance-related and general problems on the DUSI-R. In this graphic, nearly 85 percent of youth who had obtained marijuana from a license holder reported "very easy" access to the drug, compared to almost 44 percent of youth who had never obtained marijuana from a license holder. The graphic also shows that nearly 84 percent of youth who had obtained marijuana from a license holder reported using marijuana more than 20 times a month, compared to 56 percent of youth who had never obtained marijuana from a license holder.

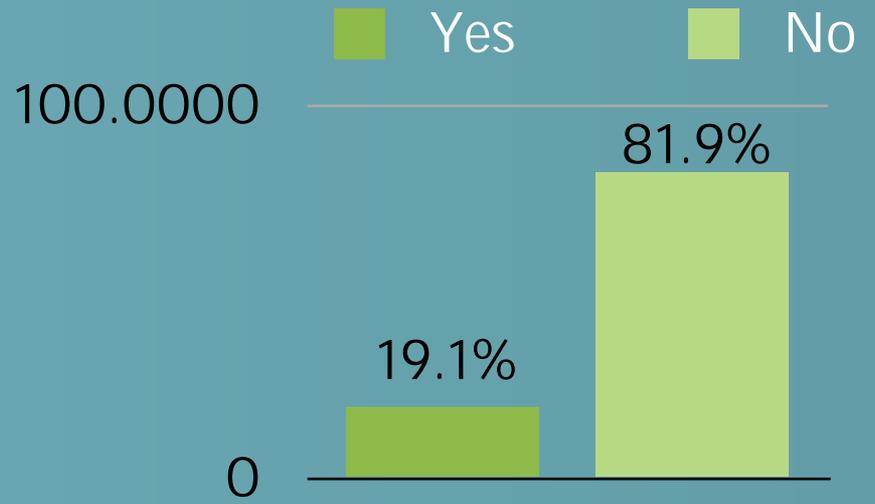
# Medical marijuana (MMJ) diverted to Colorado teens with no reported substance problems

“Do you know anyone with a MMJ license?”



N = 14/47 N = 33/47

“Have you ever obtained MJ from someone with a MMJ license?”



N = 9/47 N = 38/47

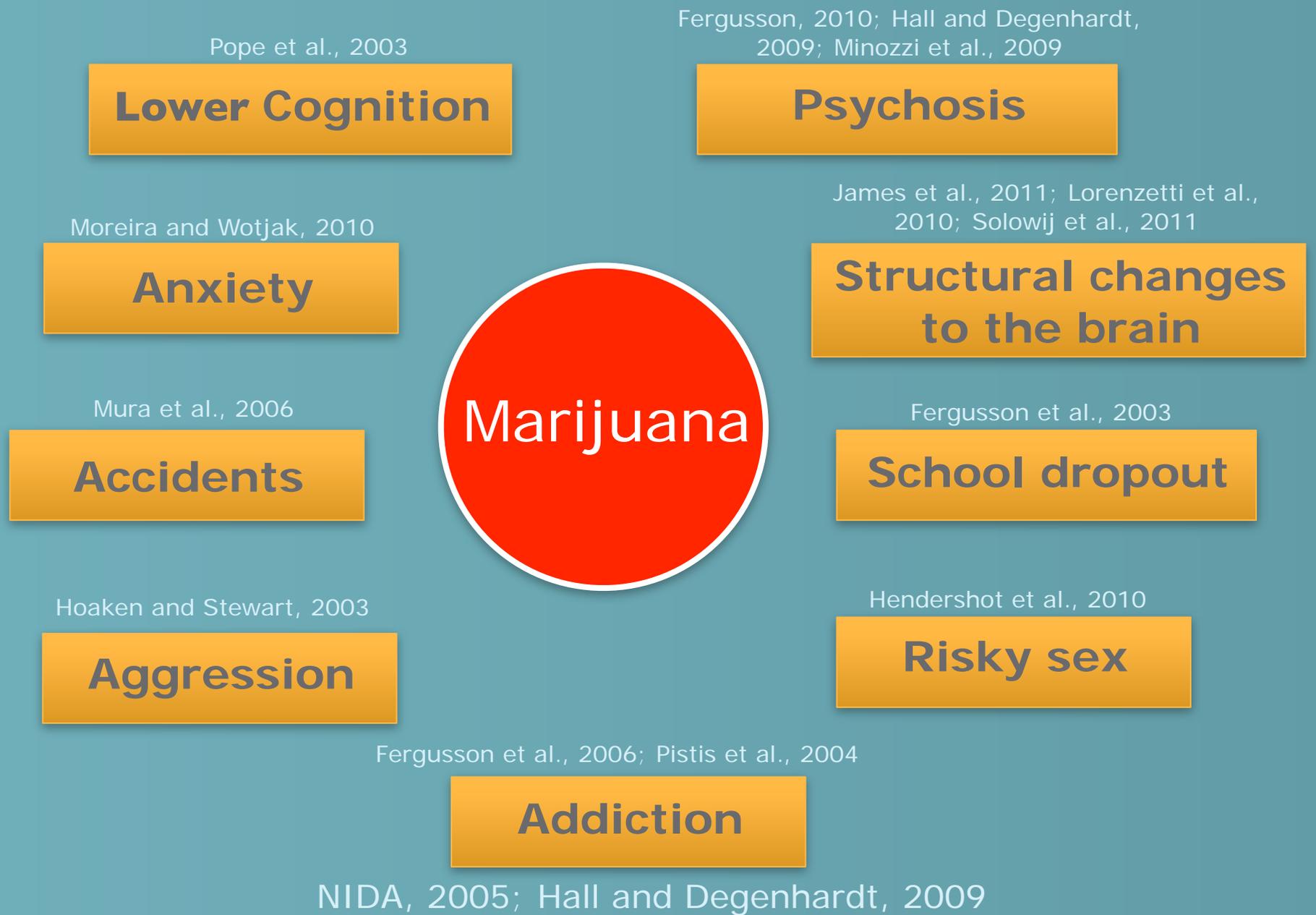
In a separate study, Dr. Thurstone’s team similarly surveyed 47 adolescents ages 15-19 who sought treatment from a primary care clinic in Denver. These youth were not in treatment for substance-related problems. As seen in this slide, nearly 30 percent of research participants reported knowing someone with a medical marijuana license, and more than 19 percent reported obtaining marijuana from a license holder.

# Diversion of medical marijuana to Colorado teens

Variable	Know someone N=14	Do not know someone N=33	P-value
Great risk with regular use	3 (21.4%)	15 (45.5%)	0.104
Very easy marijuana availability	8 (57.1%)	11 (33.3%)	0.128
Friends don't disapprove of regular marijuana use	7 (50.0%)	9 (27.3%)	0.182
No marijuana use	3 (21.4%)	19 (57.6%)	0.023
DUSI-R - Substance	20.5 (26.9)	13.6 (18.5)	0.31
DUSI-R-Overall	36.2 (16.6)	25.0 (14.6)	0.03

Researchers compared data collected from adolescents in Colorado who reported knowing a medical marijuana license holder with data collected from adolescents who reported not knowing a license holder. Researchers found that the adolescents who know someone with a medical marijuana license were significantly more likely to report marijuana use and general problems on the DUSI-R. They also reported easier availability of the substance, less friend disapproval of the substance's use, less risk in using the substance and more substance-specific problems on the DUSI-R.

# The risks of adolescent marijuana use



This slide summarizes problems related to adolescent marijuana use.

- 1) **Psychosis:** Adolescents who use marijuana before the age of 18 are 2-4 times more likely to develop symptoms of psychosis in early adulthood than those who do not. This finding has been replicated at least eight times and persists after controlling for many possible confounding variables, such as family history, other substance use and socioeconomic status. These studies have involved thousands and thousands of people over generations and in several populations and countries.  
**Structural changes to the brain:** Animal studies and fMRI studies show changes in brain structure (especially the hippocampus) in people exposed to marijuana during adolescence.  
**School dropout:** Marijuana use in adolescence predicts less school achievement.  
**Risky sex:** Marijuana use predicts risky sexual behaviors, such as not using a condom.  
**Addiction:** There is no longer scientific debate that marijuana is both psychologically and physically addictive.  
**Aggression:** Marijuana withdrawal frequently includes restlessness, nervousness, agitation and insomnia. These, in turn, can lead to aggression.  
**Accidents** are the leading cause of death for adolescents, and marijuana use predicts an increased risk of accidents. One study in France found that of drivers younger than 30 who were killed in a traffic accident, 30 percent were acutely intoxicated by marijuana at the time of their deaths.  
**Cognition:** Marijuana has acute, sub-acute and long-term effects on cognition -- as we will discuss.

# Adolescent marijuana use and HIV risk in Colorado

Variable	Substance treatment (N=402)	Community (N=220)
Mean age (years, SD)	15.7 (1.2)	15.9 (1.6)
% (n) with cannabis abuse/dependence	87.3% (351)	15.0 (33)
Onset age sex (years, SD)	13.1 (1.6)	14.6 (1.6)
Lifetime # sex partners (SD)	6.2 (5.5)	1.2 (2.9)
% (n) using protection sometimes/never	54.8% (218)	9.7 (21)
% (n) with injection drug use at 8-yr follow-up	20.0 (56)	0

Thurstone et al., 2011

This slide demonstrates that adolescents who smoke marijuana often have risky sex that exposes them to sexually transmitted diseases and HIV infection.

In 2011, Dr. Thurstone published the findings of a survey comparing data collected in Colorado from 402 adolescents in substance abuse treatment and from 220 adolescents from the larger community who were not in treatment for substance-related problems.

Among his team's findings:

Adolescent marijuana users were more likely to have sex at an earlier age.

Adolescent marijuana users had more sexual partners than their non-using peers, and they were far less likely to use protection when having sex.

When asked eight years after providing their initial information, adolescent marijuana users were far more likely to have engaged in injection drug use and the earlier teens started using marijuana, the more likely they were to develop injection drug use.

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# How Marijuana Use Undermines Education

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# Adolescent marijuana use and education

6,316  
children



Followed to  
age 21-25

<b>Academic Achievement</b>	<b>Marijuana use during ages 15-17</b>	<b>No use before age 18</b>
<b>High School degree</b>	1.9 times more likely to get degree than teen who uses before age 15	3.6 times more likely to get degree
<b>College enrollment</b>	1.5 times more likely to enroll than teen who uses before age 15	2.3 times more likely to enroll
<b>College degree</b>	1.9 times more likely to get degree than teen who uses before age 15	3.7 times more likely to get degree

Fergusson et al., 2010

This slide explains the findings of a study of more than 6,300 children in New Zealand who were followed from birth or preschool to early adulthood.

It's important to note that associations -- such as marijuana use and early school dropout -- do not prove causality. However, those who did not use marijuana before the age of 18 were nearly four times more likely to obtain degrees from high school and college than those who started using marijuana before the age of 15.

These findings underscore the importance of discouraging and deterring marijuana use among adolescents.

# Summary

- Adolescent addiction to marijuana is prevalent.
- Adolescent marijuana use is increasing.
- Adolescent marijuana use leads to multiple problems and poor outcomes.
- Adolescent exposure to marijuana can cause permanent cognitive deficits and changes in brain structure and functioning.

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# How You Can Intervene

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# Help kids avoid problems with marijuana

<b>Elementary school</b>	<ul style="list-style-type: none"><li>↑ self-control</li><li>↑ emotional awareness</li><li>↑ communication</li><li>↑ social problem-solving</li><li>↑ academic support - especially reading</li></ul>
<b>Middle and high school</b>	<ul style="list-style-type: none"><li>↑ study habits</li><li>↑ communication</li><li>↑ peer relationships</li><li>↑ self-efficacy/assertiveness</li><li>↑ drug resistance</li><li>↑ anti-drug attitudes</li><li>↑ anti-drug commitments</li><li>↓ misperception that all students use</li><li>↓ drug availability</li></ul>

National Institute of Drug Abuse, 1997

We have reviewed a lot of the bad news, so let's focus now on what we as individuals and communities can do to prevent adolescents from being harmed by marijuana use.

For starters, know that it's never too early to start having age-appropriate conversations with kids about drugs. Also know that assisting youth with academic and social success is paramount to protecting them from drug use and many other problems.

**Elementary students:** Help them understand self-control and how to deal positively with their emotions. Help them understand how to solve social problems effectively. Provide academic support -- especially with reading.

**Middle school and high school students:** Keep the lines of communication open, and periodically explain that drug use is unhealthy and unwise -- and that it isn't allowed. Help children build self-esteem and self-confidence through good study habits and academic performance and through healthy, pro-social activities. Encourage them to build healthy, positive friendships, and remind them that not all kids try drugs.



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# Credits



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