

Adolescent Development and Alcohol Use

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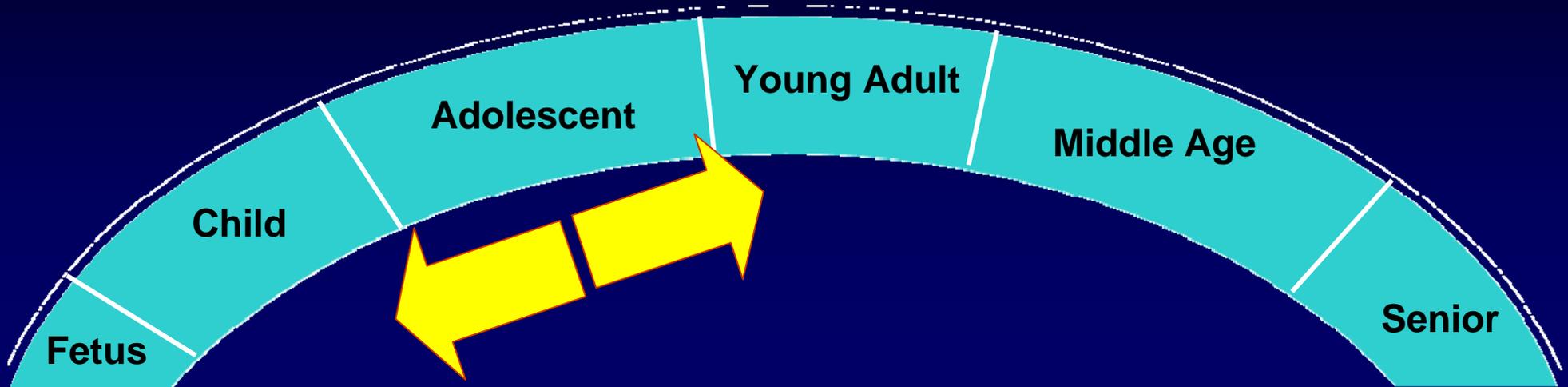
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**House Special Committee Meeting on Underage
Drinking**

September 23, 2008



Alcohol Across the Lifespan



Today's Talk: Underage Drinking

Will briefly describe salient features of underage drinking in America

Will show you how NIAAA's Underage Drinking Research Initiative is approaching the issue and outline the rationale for a developmental framework

Surgeon General's Call to Action to Prevent and Reduce Underage Drinking



NIAAA Underage Drinking Research Initiative

Developmental Framework

Age Group Articles

- under 10
- 10-15
- 16-20



Prevention

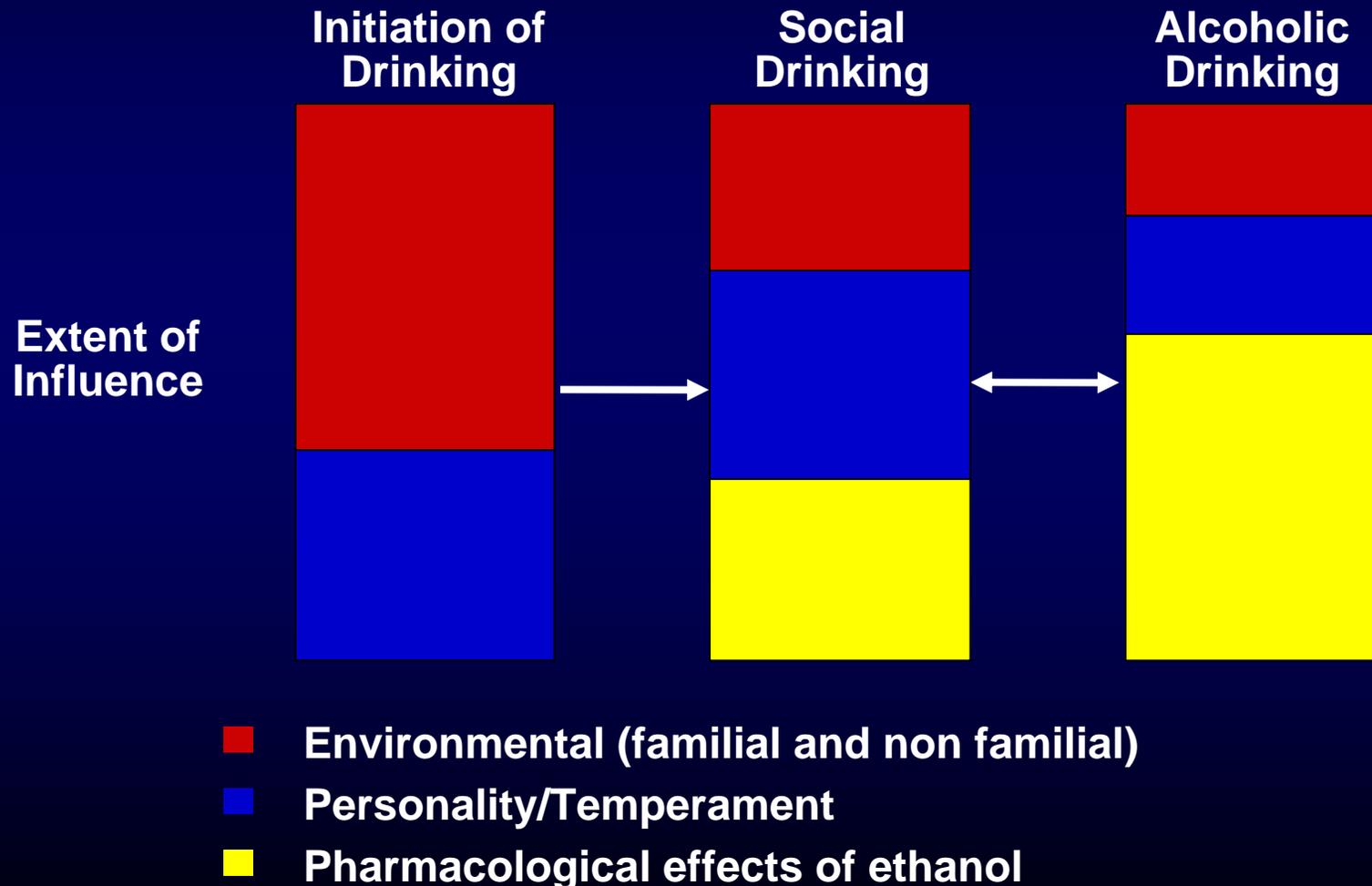
Treatment

http://pediatrics.aappublications.org/content/vol121/Supplement_4/index.shtml

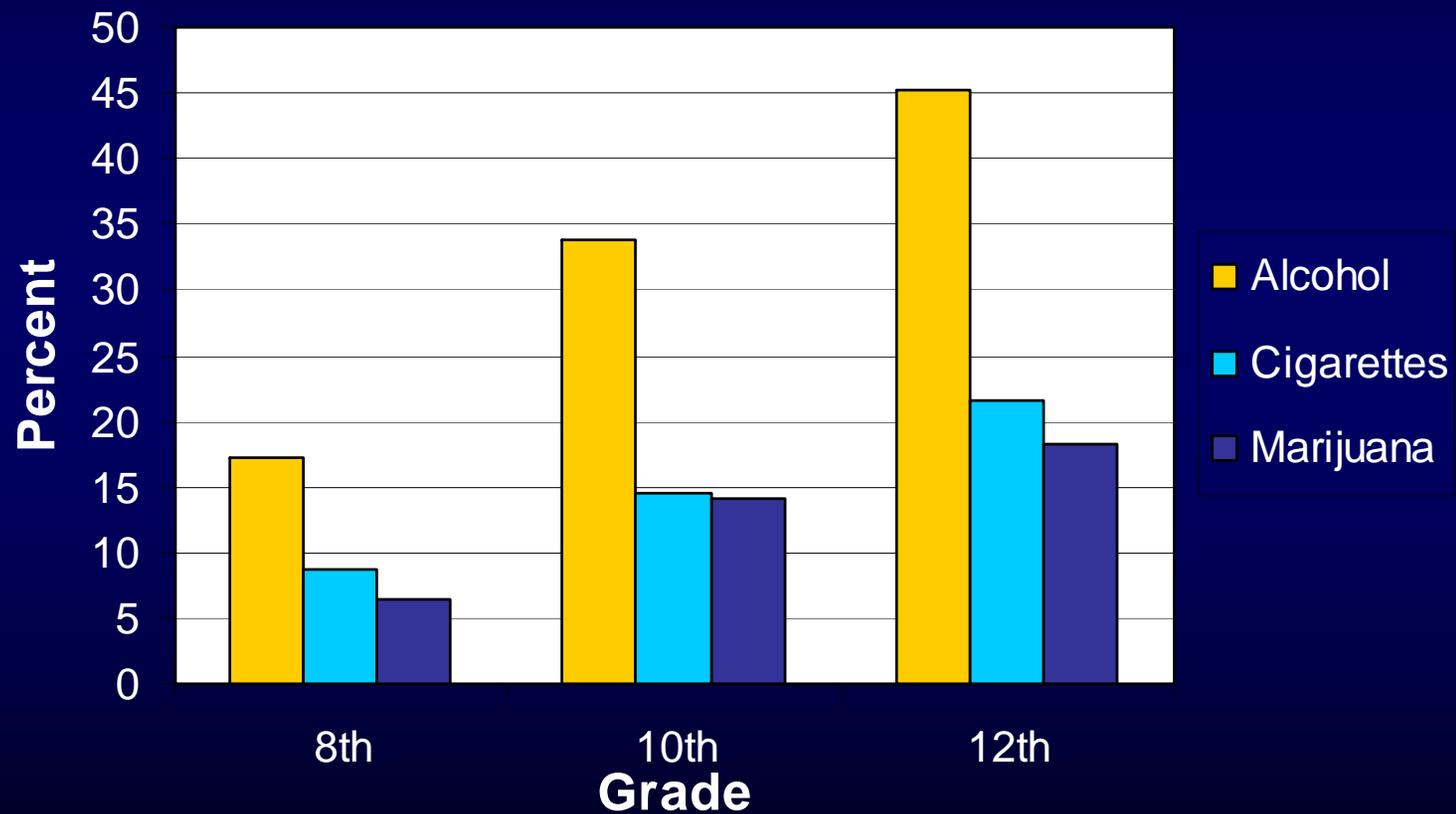
Underage Drinking: What's in the Mix?

- **Genetics**
 - Family history
 - Temperament / personality
- **Environment**
 - Family
 - Peers
 - School
 - Community
 - The larger world (internet, movies, etc.)
- **Alcohol**

Drinking Behavior and Alcohol Dependence are Complex Traits Influenced by Genes and Environment



Alcohol is the Drug of Choice Among Adolescents (Past Month Use)



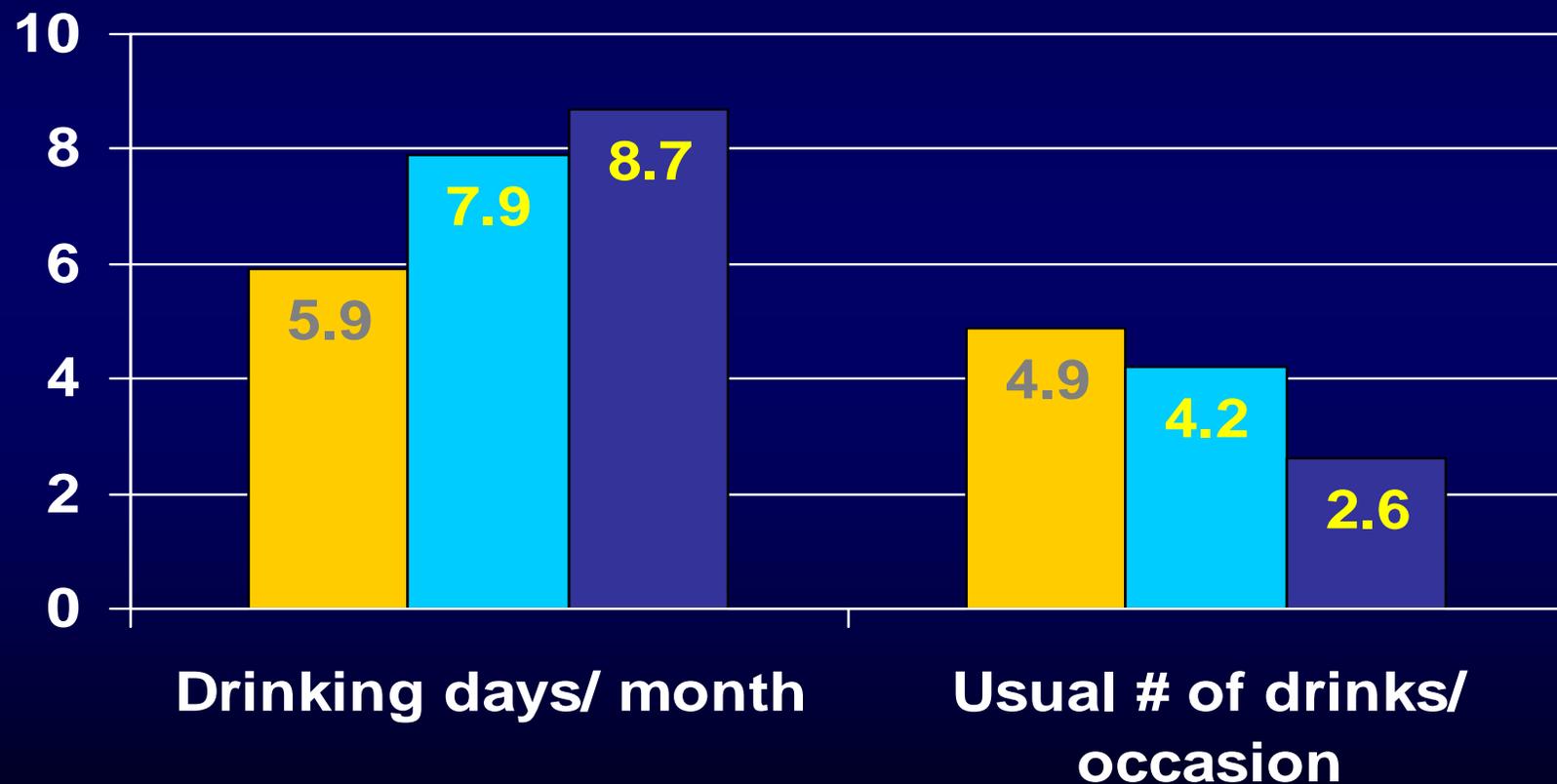
Source: Monitoring the Future, 2006

Experience with Alcohol Begins Early for Many

- **Kids form expectancies about alcohol early – some studies show as early as age 5 and certainly by age 9**
- **About half of kids start drinking (have had a full drink) by the 8th grade**
- **By the time they graduate from high school, the vast majority of young people (about 75%) have experience with alcohol**

Adolescents Drink Less Frequently than Adults But More Per Occasion

■ Underage 12-20 ■ Young Adult 21-25 ■ Adult 26 and older



Source: SAMHSA National Survey on Drug Use and Health 2006

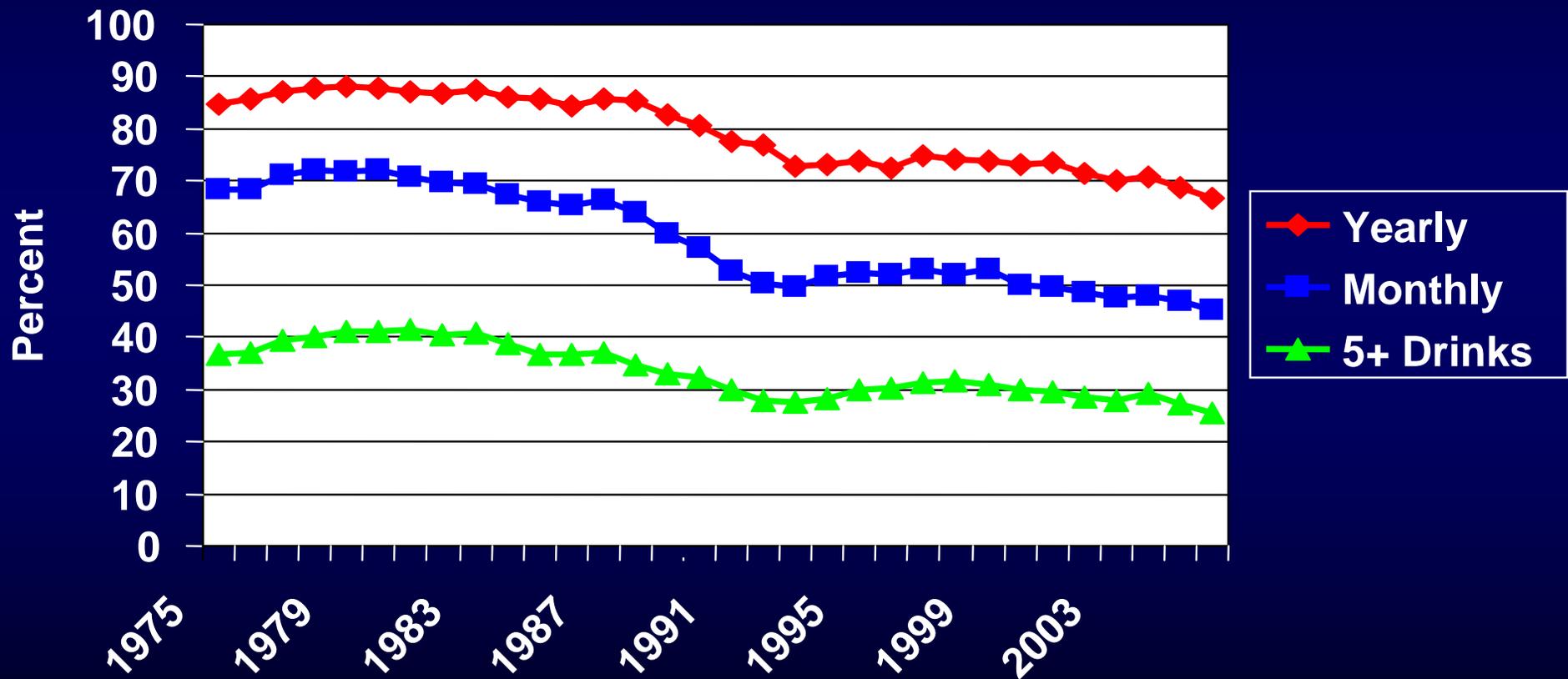
Direct Consequences of Underage Drinking

- **5,000 deaths among youth under 21 per year from alcohol related injuries including traffic crash fatalities (1,900), homicides (1,600) and suicides (300)**
- **Physical and sexual assaults; unwanted/unintended sexual activity**
- **Altered academic/vocational trajectories**
- **Possible adverse effects on developing brain**

Second-Hand Effects

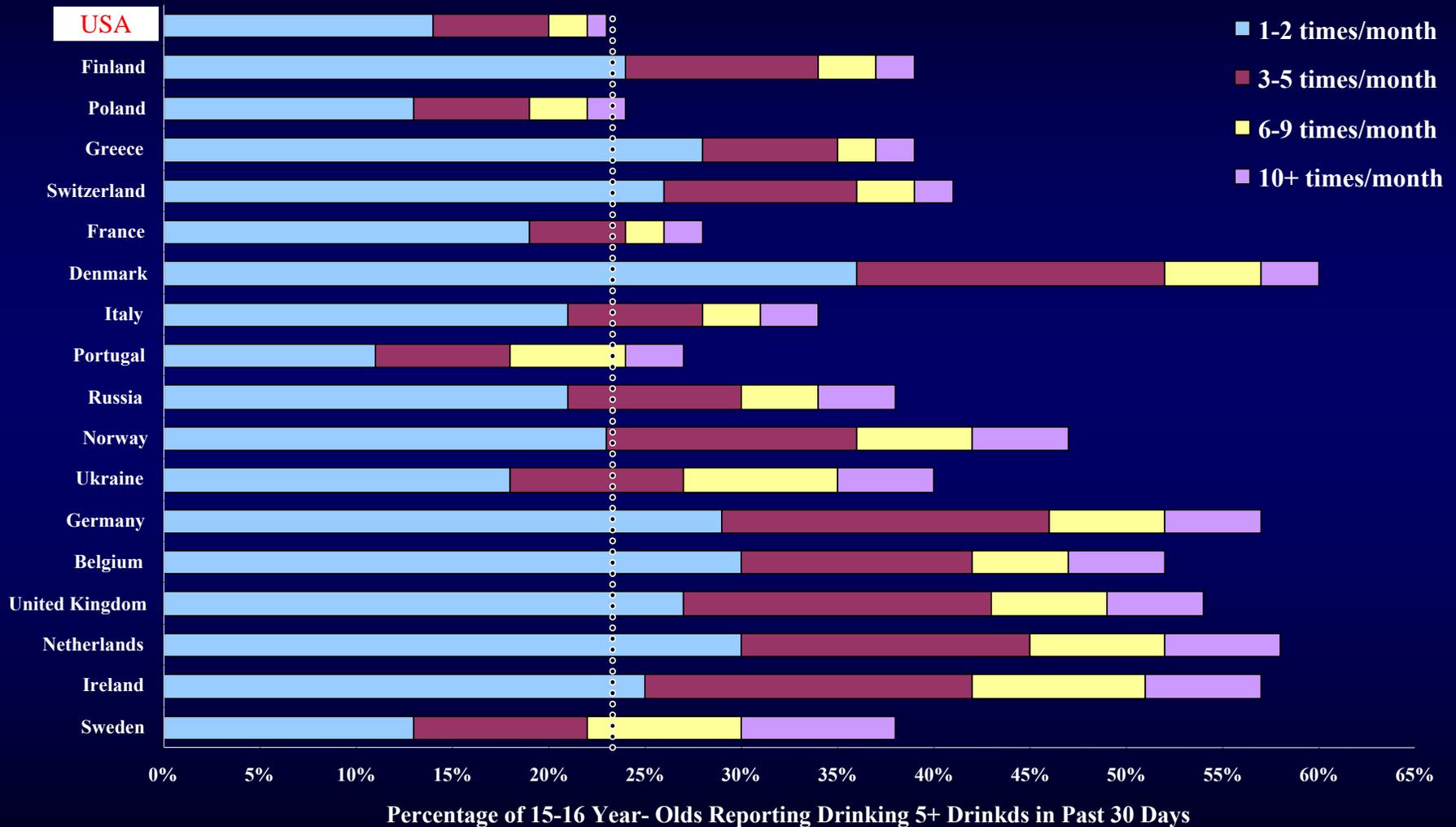
- **Half of all persons who die in traffic crashes involving drinking drivers under age 21 are persons other than the drinking driver**
- **Among college students under age 21 alone, 50,000 experience alcohol-related date rape, and 430,000 are injured by another student who has been drinking**

Drinking Trends Among High School Seniors, 1975-2006



Source: Monitoring the Future, 2007

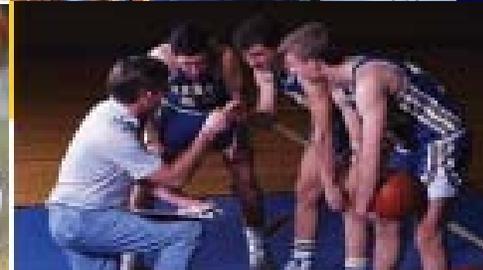
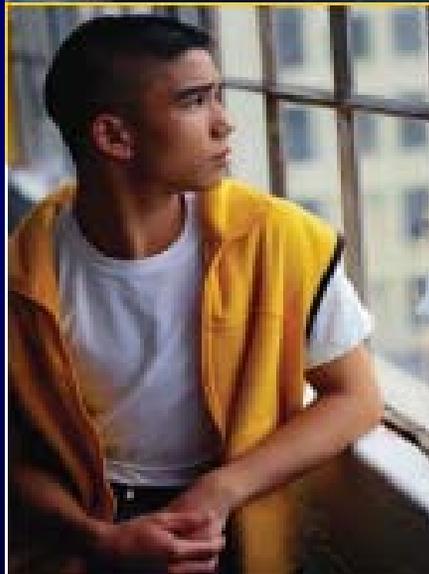
Binge Drinking (5+) Among European Students Ages 15-16



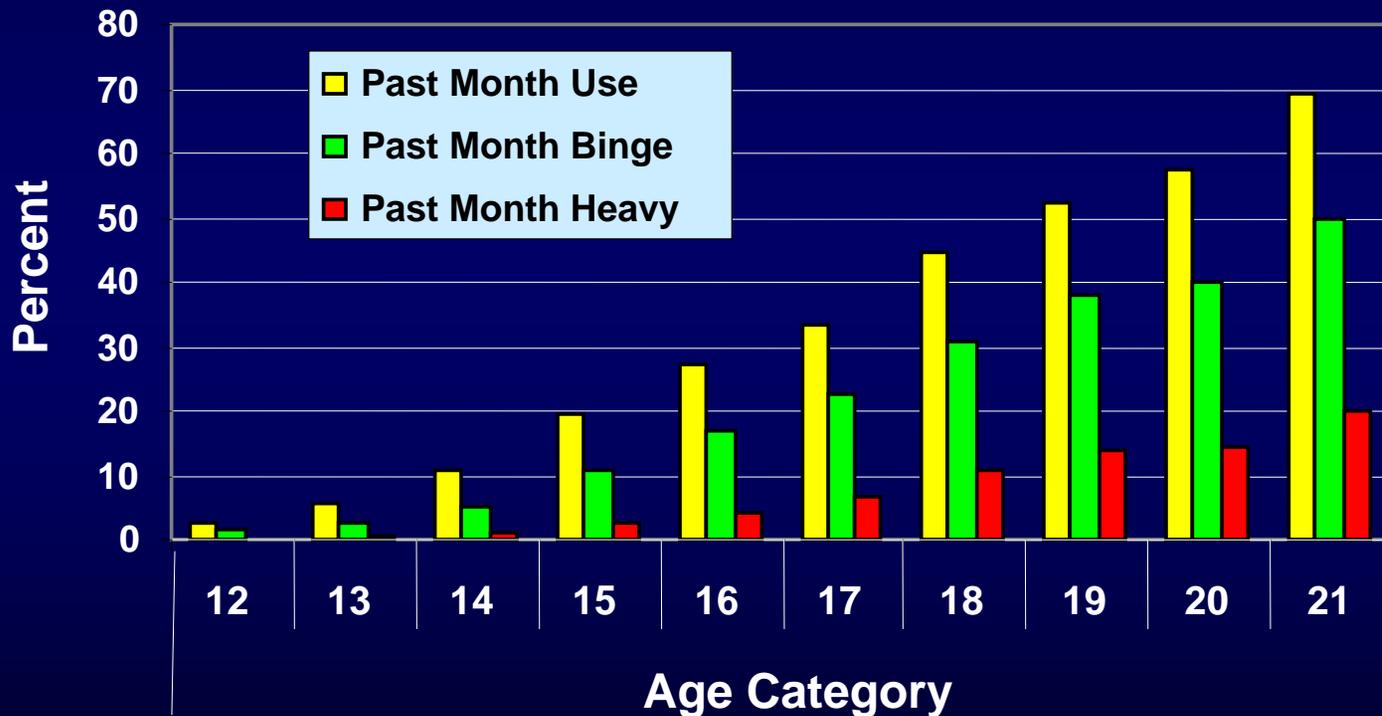
European School Survey Project on Alcohol and Drugs (ESPAD), 2003 (accessed 11/6/06 at http://www.sedqa.gov.mt/pdf/information/reports_intl_espada2003.pdf)

Adolescent Alcohol Use

How and why does it happen ?

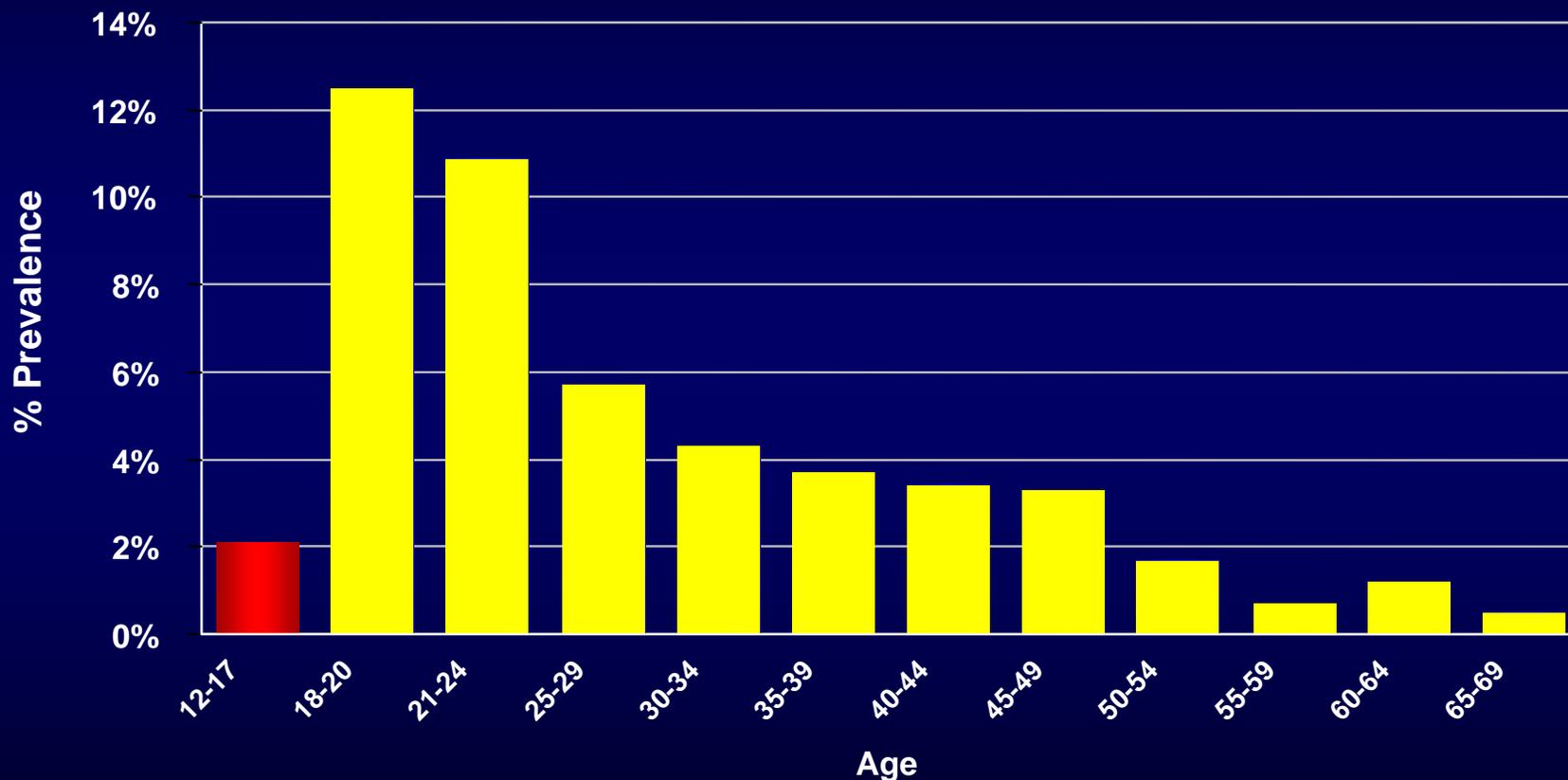


Alcohol Use and Binge Drinking Increase Dramatically During Adolescence



Source: SAMHSA National Survey on Drug Use and Health 2006

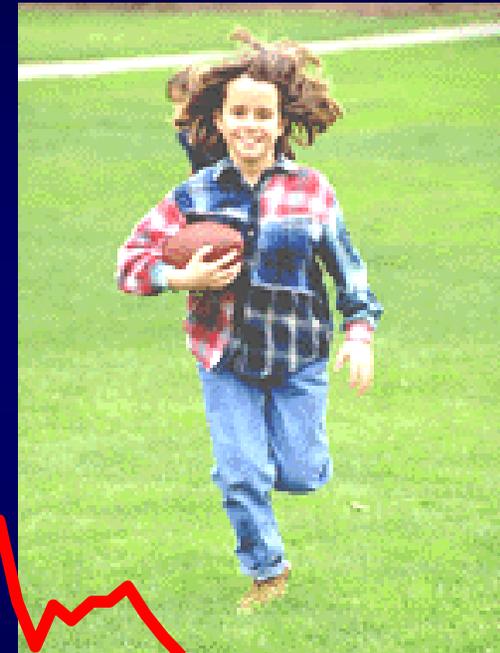
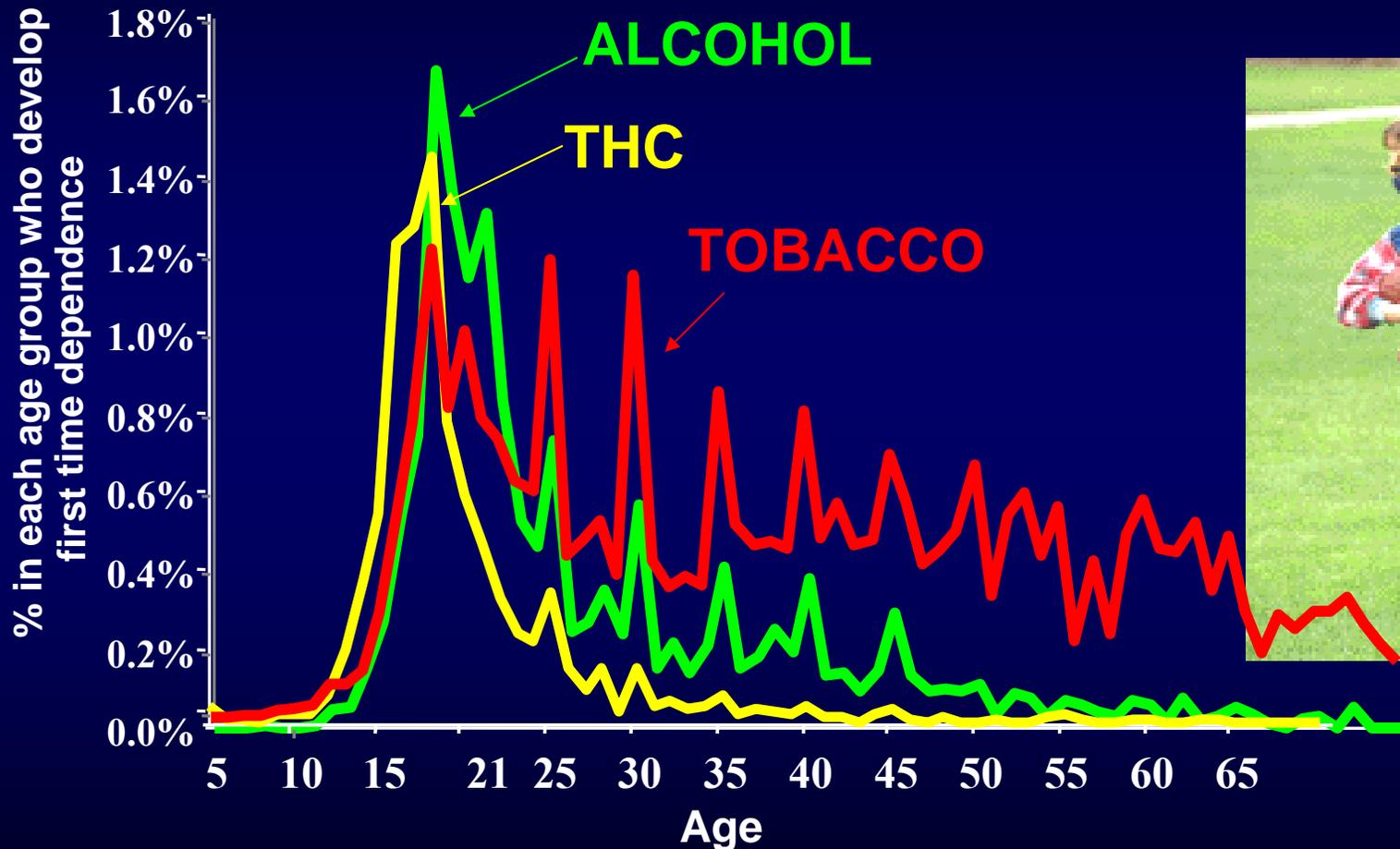
Prevalence of Past-year DSM-IV Alcohol Dependence by Age – United States



18 + yrs. - NIAAA NESARC (Grant, et al., (2004) Drug and Alcohol Dependence, 74:223-234)

12-17 yrs - U.S. Substance Abuse and Mental Health Services Administration 2003 National Survey on Drug Use and Health (NSDUH)

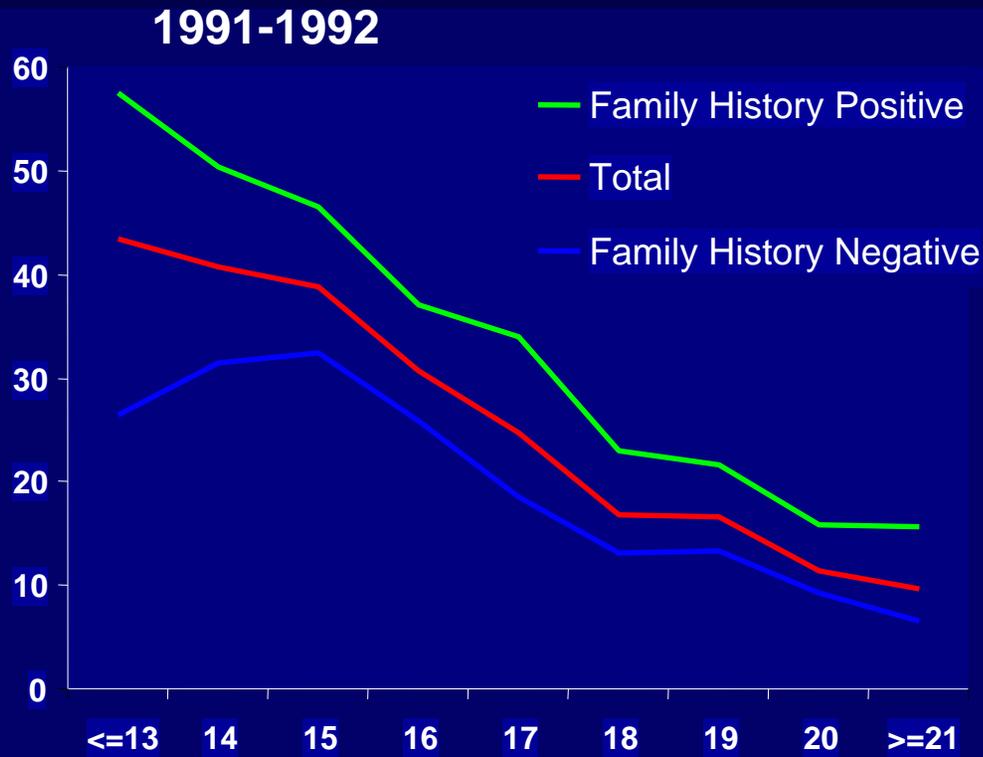
Addiction Is A Developmental Disease *often starts in childhood and adolescence*



Age at **alcohol**, at **tobacco**, and at **cannabis** dependence as per DSM IV

NIAAA National Epidemiologic Survey on Alcohol and Related Conditions, 2003.

Prevalence of Lifetime Alcohol Dependence by Age of First Alcohol Use



Age at First Alcohol Use

Source: Grant and Dawson. *J Subst Abuse*. 1998. 10(2):163-73.



Age at First Alcohol Use

Source: 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions

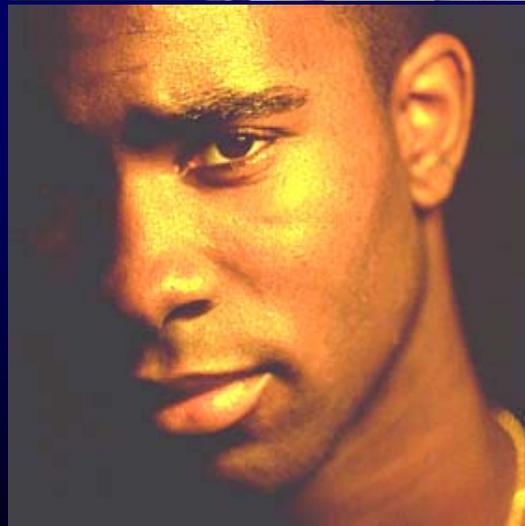
Developmentally Driven Questions

Why does alcohol have such a strong appeal to so many youth?

Are young people more vulnerable to alcohol's effects?

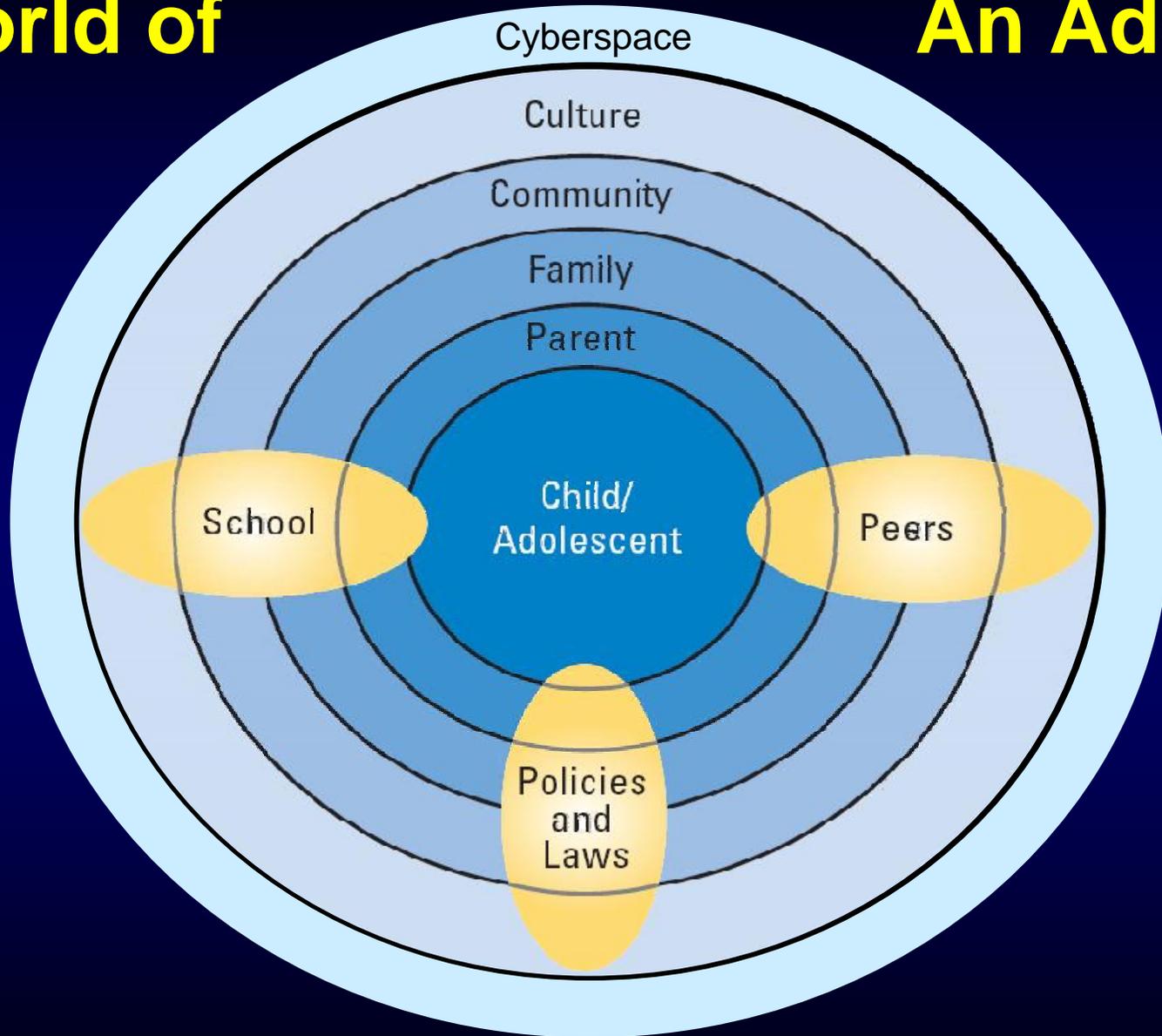
The Complex Dynamics of Adolescence

- Brain maturation
- Development of self-regulation
- Endocrine changes
- Sexuality/romantic interests
- Shift in reward sensitivity
- Increased risk taking, sensation seeking, impulsivity
- Environmental changes – e.g., school transitions, increased social interactions, importance of peer affiliations, driving
- The balance of self to other monitoring shifts



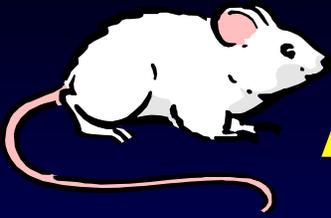
The World of

An Adolescent



Development influences alcohol use

- **Developmental processes (biological and psychosocial) affect choices youth make about alcohol**
 - Risk taking that is characteristic of adolescence
 - Strong desire to be accepted by peers
- **Differential sensitivity to alcohol's effects seen in animals may also play a role in the way human adolescents drink**



Alcohol use affects development

- **Evidence from animal studies and a few human studies with heavy drinking youth show that alcohol use can affect brain structure and functioning**
- **Alcohol use can negatively impact psycho-social development**
- **Vulnerability to alcohol's effects including dependence may be different for adolescents than for adults**

Structural and Functional Changes in the Brain

Plasticity, i.e. the ability to change in response to the environment creates a period of great learning potential

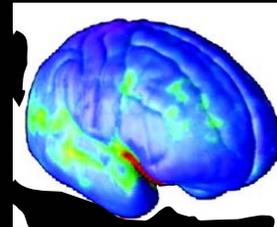
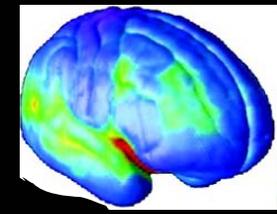
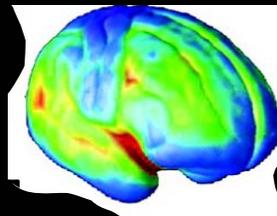
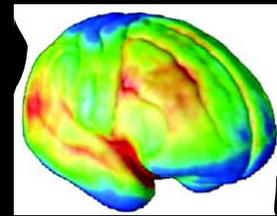
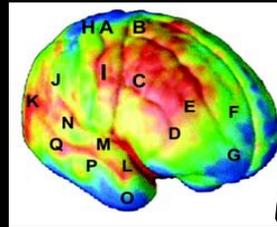
- **Overproduction in number of synapses, seen as an increase in the brain's gray matter
(till about age 11 in girls, 12 in boys)**

Structural and Functional Changes in the Brain

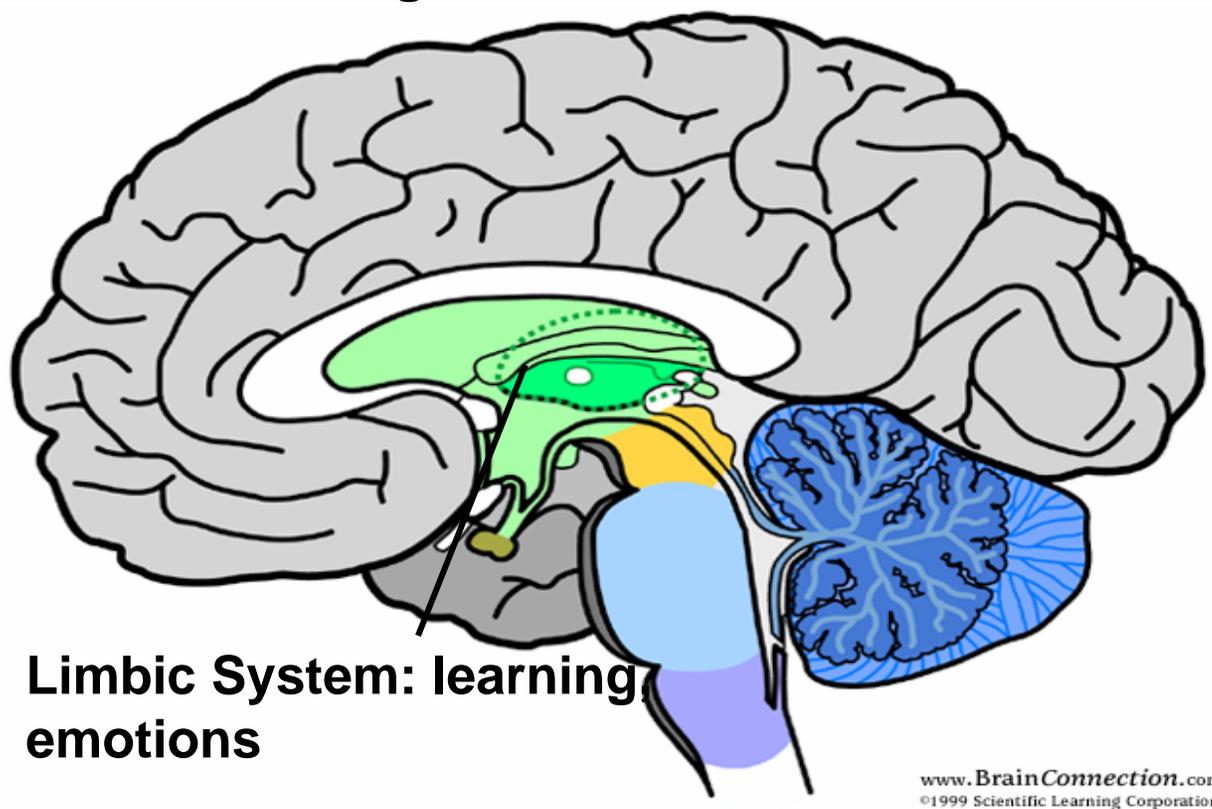
Increased Efficiency

- **Decrease in gray matter - dendritic pruning/ competitive elimination of synapses**
- **Increase in white matter - increased myelination**

Maturation Is Not Uniform Across the Developing Brain



Frontal Cortex:
decision-making, self-control

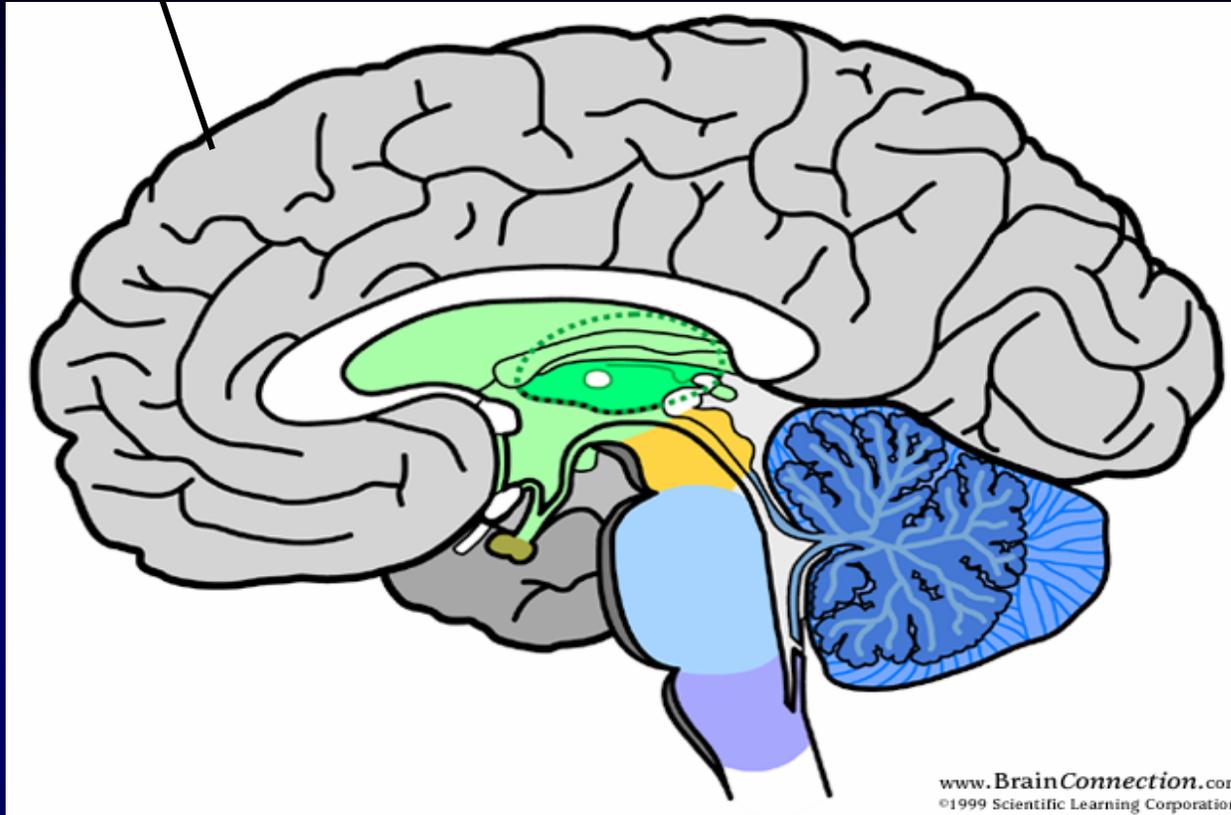


Limbic System: learning
emotions

The Limbic System Develops Early in Adolescence

The limbic system governing emotions matures relatively early in adolescence and its development may be triggered by pubertal hormones. It may also be responsible for the shift in reward sensitivity that drives adolescents to seek higher levels of novelty and stimulation than they did as children.

Frontal Cortex: decision-making, self-control



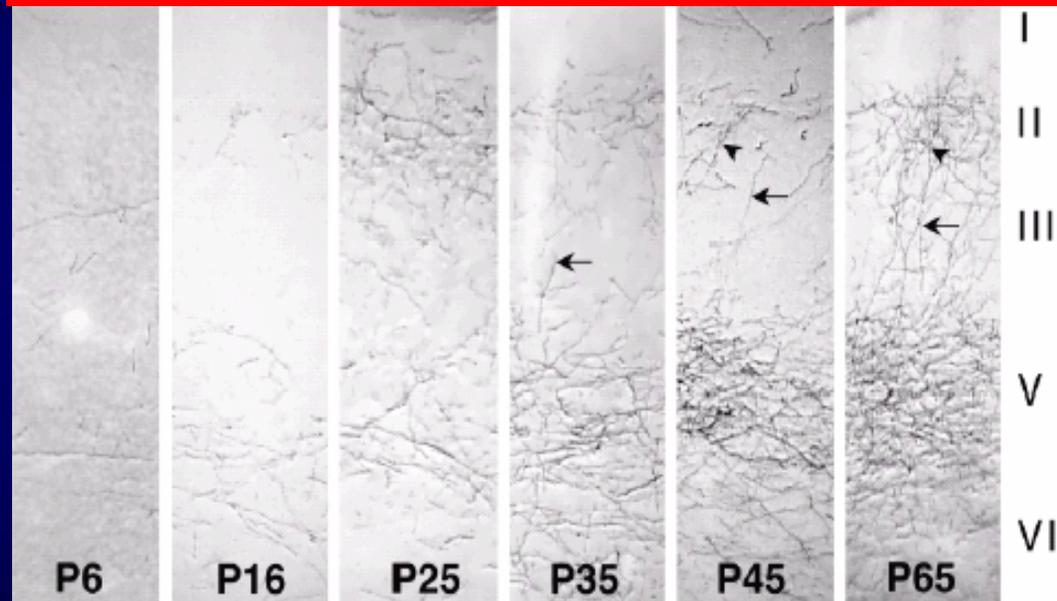
Maturation of the Prefrontal Cortex Continues Into the 20's

Maturation of the prefrontal cortex is more gradual and is linked to age and experience. This region is responsible for integrating input from the senses, memories, values, and aspirations to help us control impulses and make decisions.

Reviewed in Steinberg, Lawrence (2004) Ann. N.Y. Acad. Sci. 1021: 77-85.

The Adolescent Brain Is Still Undergoing Development

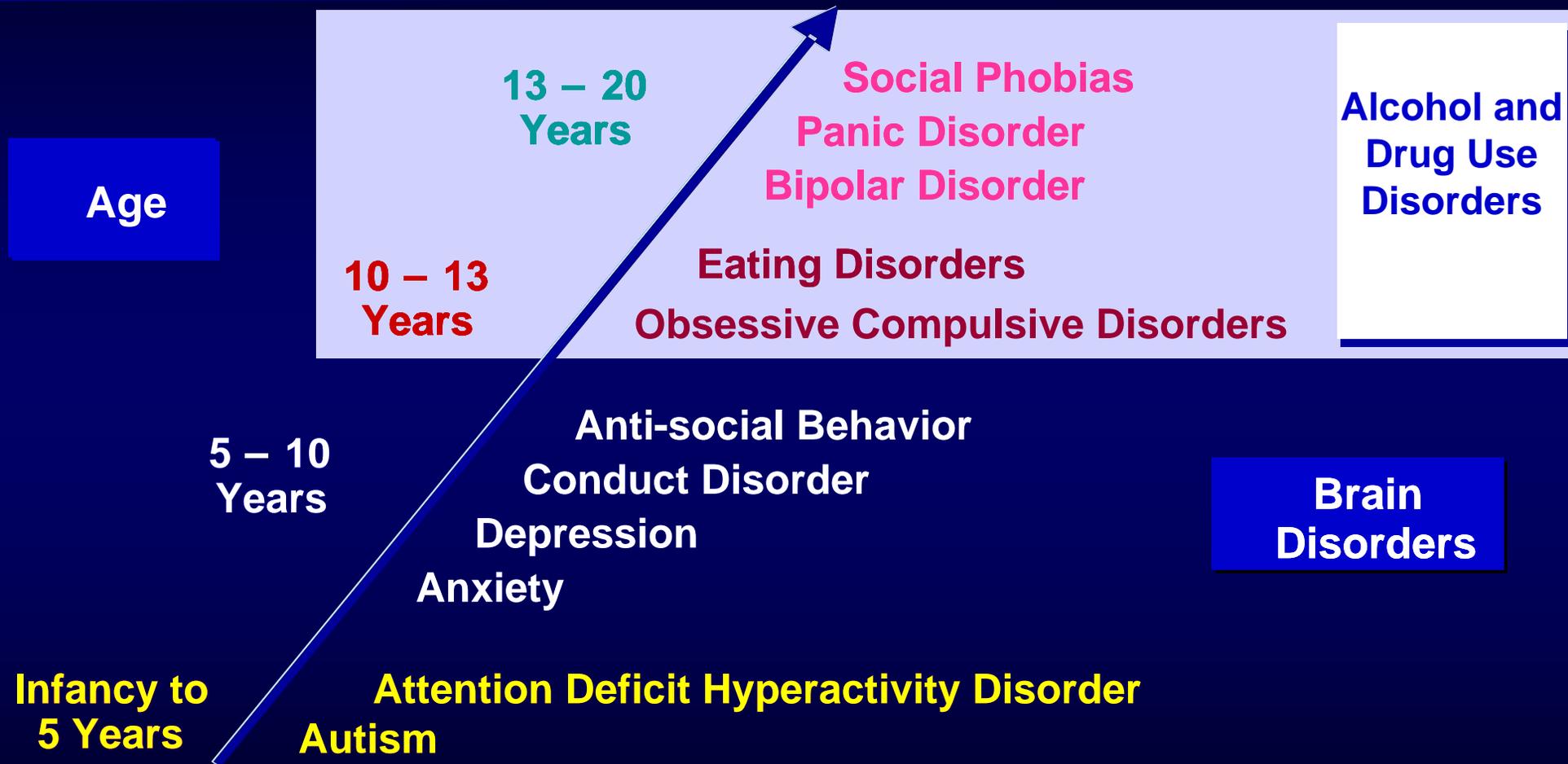
The brain is not fully interconnected until early adulthood



Amygdalo-cortical Sprouting
Continues Into Early Adulthood

Source: *Cunningham, M et al., J Comp Neurol*
453, pp 116-130, 2002.

Age of Onset of Psychiatric Disorders



Developed from *Time Magazine*, January 20, 2003, p.82, 82

Adolescent Brain Development, Decision-Making, and Risk

- **Immaturity of cognitive processing may lead to risky decisions.**
- **Risk-taking may facilitate adolescent transitions.**
- **The presence of peers influences decision-making.**
- **Strong emotions may override rational decision-making.**

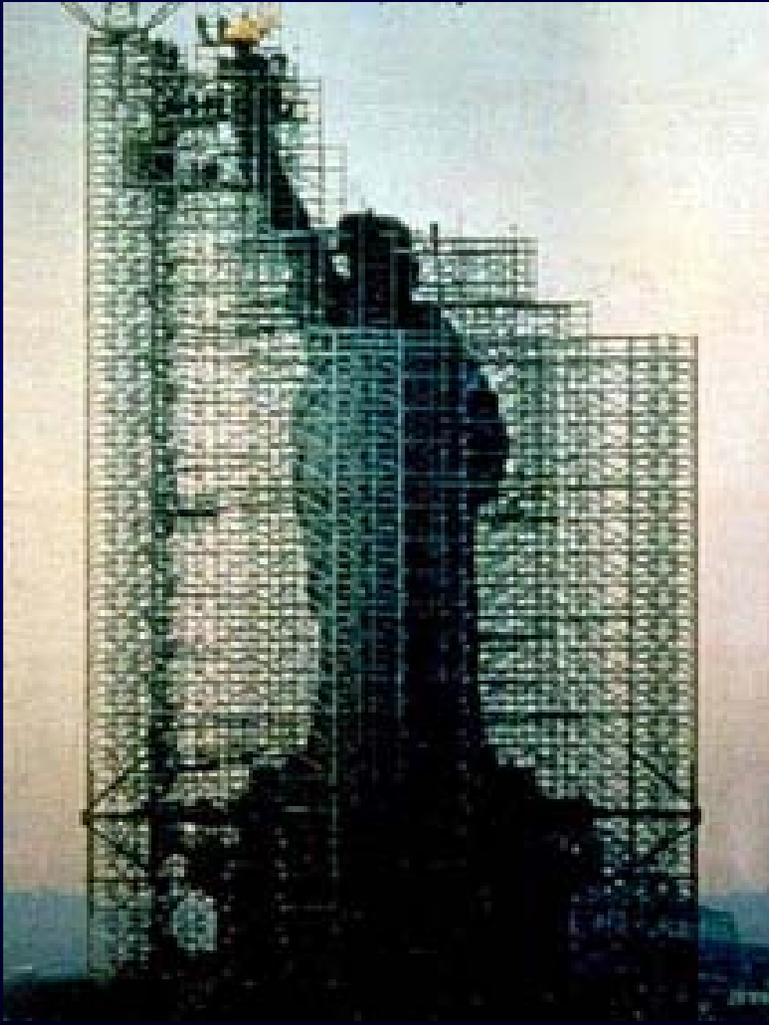
Reviewed in: Dahl, RE (2004) Ann. N.Y. Acad. Sci. 1021: 1-22

Intervening Is Challenging, Because...

- **adolescence is complicated**
- **one size does not fit all**
- **multiple systems are involved in complex behaviors**
- **what resonates with children and adolescents changes frequently and differs for different individuals**
- **we want enduring effects**

Integrated Efforts are Needed to Prevent Alcohol Use and Problems

Scaffolding For Healthy Adolescent Development



- **Presence of a Caring Adult**
- **Positive Peer Groups**
- **Parental Monitoring and Open Lines of Communication**
- **School Connectedness**
- **Alternative Activities**

Underage Drinking Laws

- Are a form of scaffolding
- Vary from state to state
- **It's important to know your State's laws.** This information is available from the NIAAA Alcohol Policy Information System at <http://www.alcoholpolicy.niaaa.nih.gov/stateprofiles//index.asp>

Federal Law

- The **Federal Uniform Drinking Age Act**, signed into law in 1984, provides for withholding 10% of Federal highway funds from States that do not prohibit the purchase or public possession of any alcoholic beverage by a person who is less than 21 years of age.
- This Act effectively raised the national minimum legal drinking age to 21, as **all States ultimately complied**.
- **While it is illegal to sell alcohol to persons under 21 in all States, State laws vary widely with respect to specifics** about possession and conditions under which consumption might be permissible (e.g. with parents).

Variations in State Law

- In all 50 states and the District of Columbia there are laws making it is illegal:

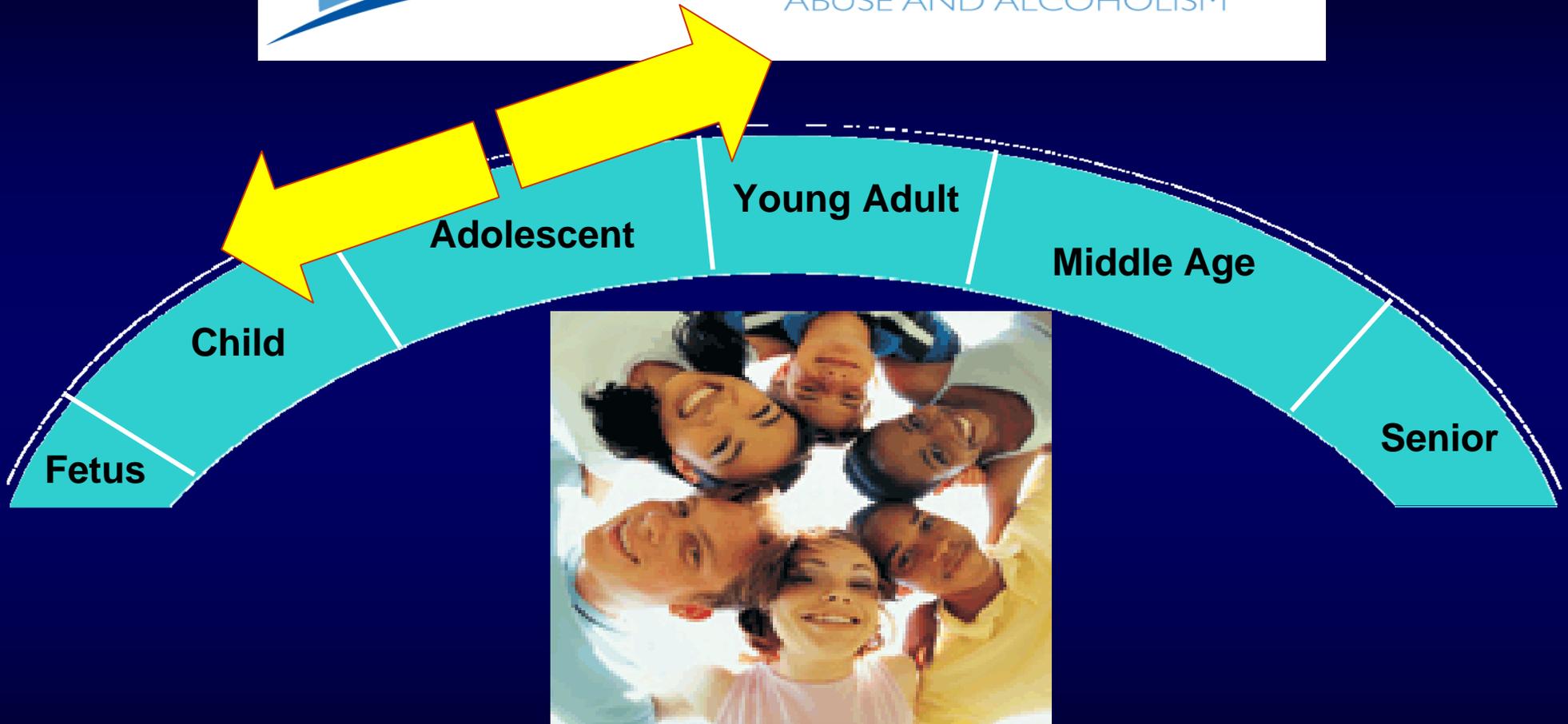
- For a person under 21 to **possess** alcohol.
- To **furnish** alcohol to a person under 21.
- To use a false ID to **obtain** alcohol.
- For a person under age 21 to **drive** with a BAC ≥ 0.02 g/dl.

- But, it's more complicated than you think because depending on the state it **can** be legal:

- for persons under 21 to **possess** alcohol with parental/guardian consent and/or presence (24 States) – **Yes in Maryland**
- for a parent or guardian to **furnish** alcohol to a person under 21 (31 states) – **Yes in Maryland**
- In fact, only 31 States and DC **explicitly** prohibit **consumption** of alcohol by a person under age 21 – **Maryland is not one of them**

Take Home Messages from NIAAA's Underage Drinking Research Initiative

- We need to rethink underage drinking and change the culture around it.**
- We need to take the alcohol out of adolescence.**
- We have to stop thinking of underage drinking as a rite of passage.**
- We have to start understanding and addressing it and adolescent AUDs in the context of overall development.**



www.niaaa.nih.gov/AboutNIAAA/NIAAASponsoredPrograms/underage.htm

Thank You