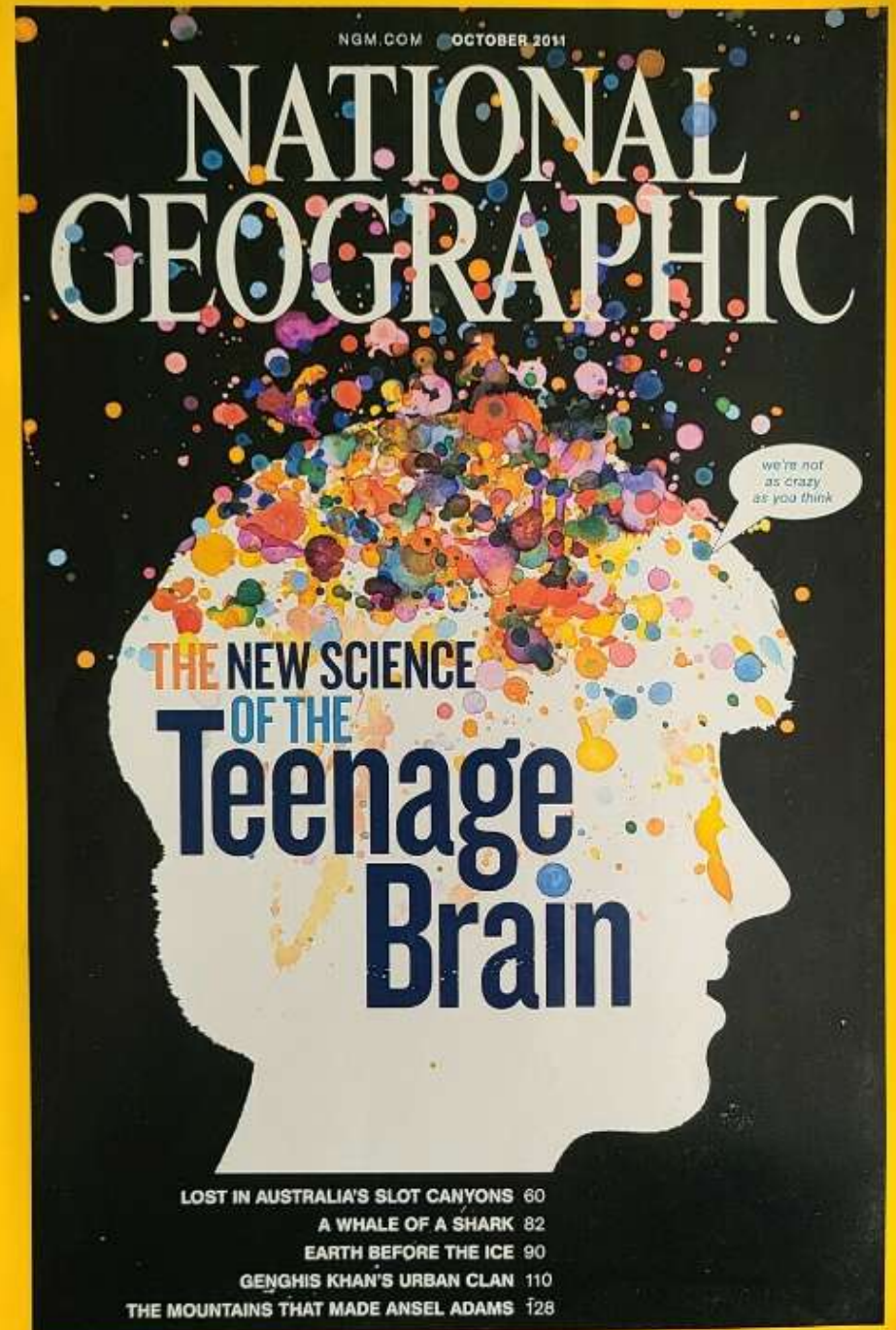


# The Adolescent Brain

Jesse Barondeau, MD FAAP

Adolescent Medicine Subspecialist





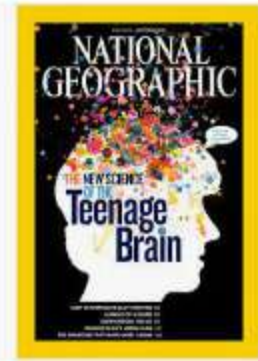
TIME Magazine Cover: ... content.time.com



Secrets of the Teen Bra... content.time.com



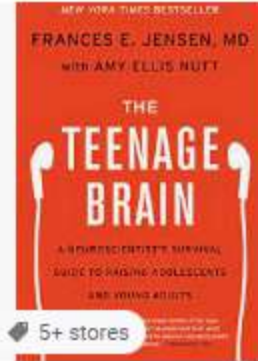
PDF) The Amazing Tee... researchgate.net



Teenage brain, Nationa... pinterest.com



THE TEENAGE BRAIN ... amazon.com - In stock



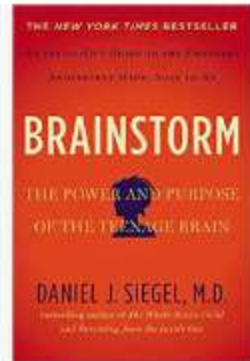
The Teenage Brain: A N... amazon.com - In stock



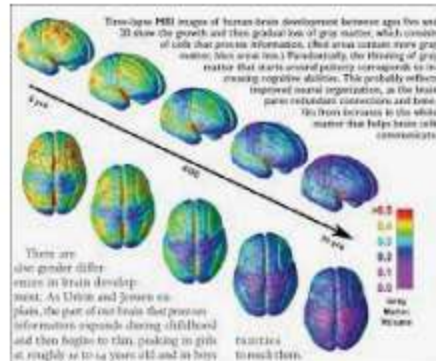
Time ebay.c



The Teen Brain



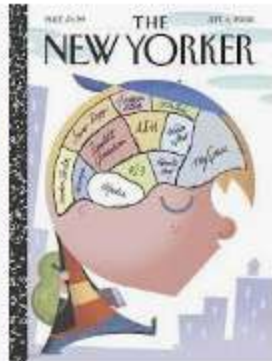
Teenage Brain: Siegel ...



Culture on the Teen Brain ...



The Teen Brain: Perils a...



September 4, 2006 - Bo...



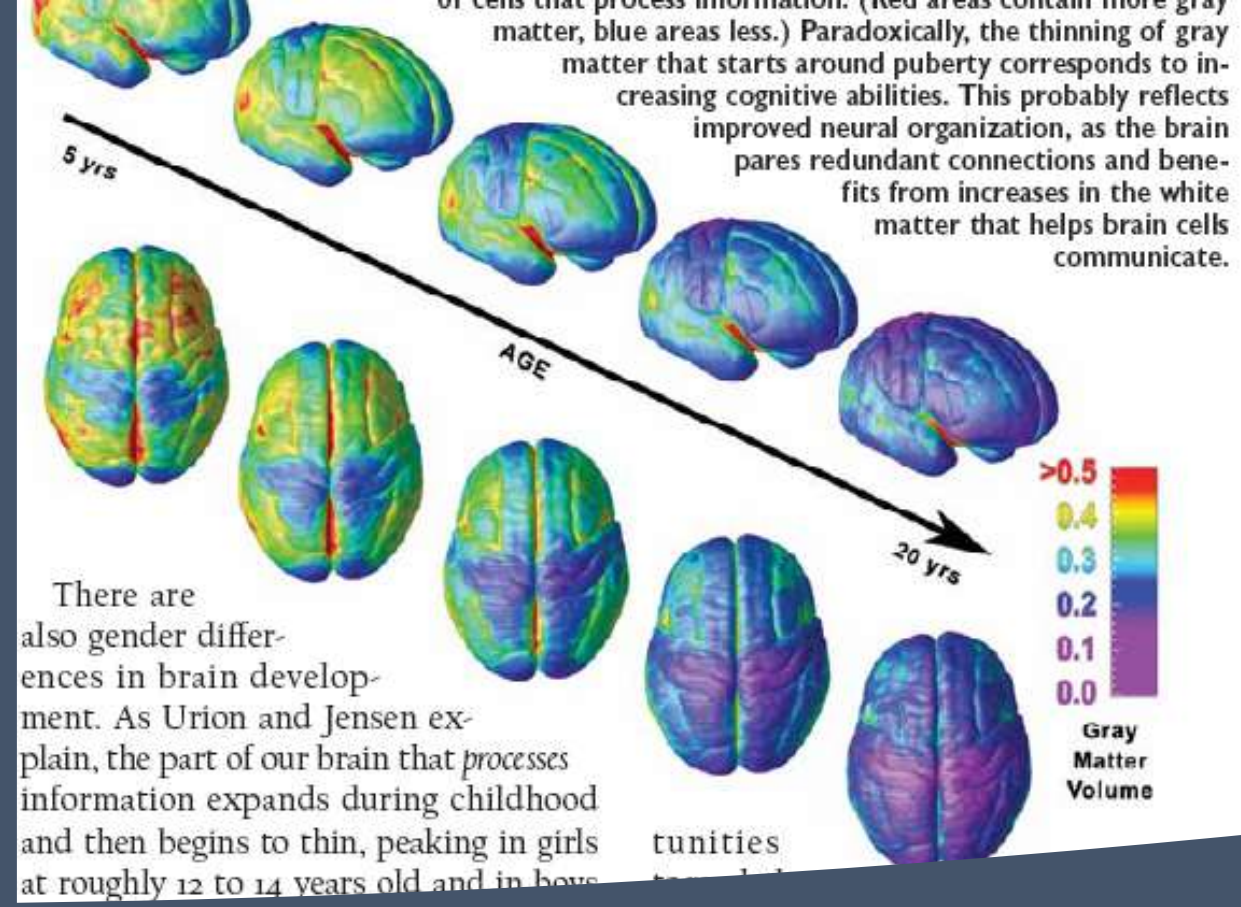
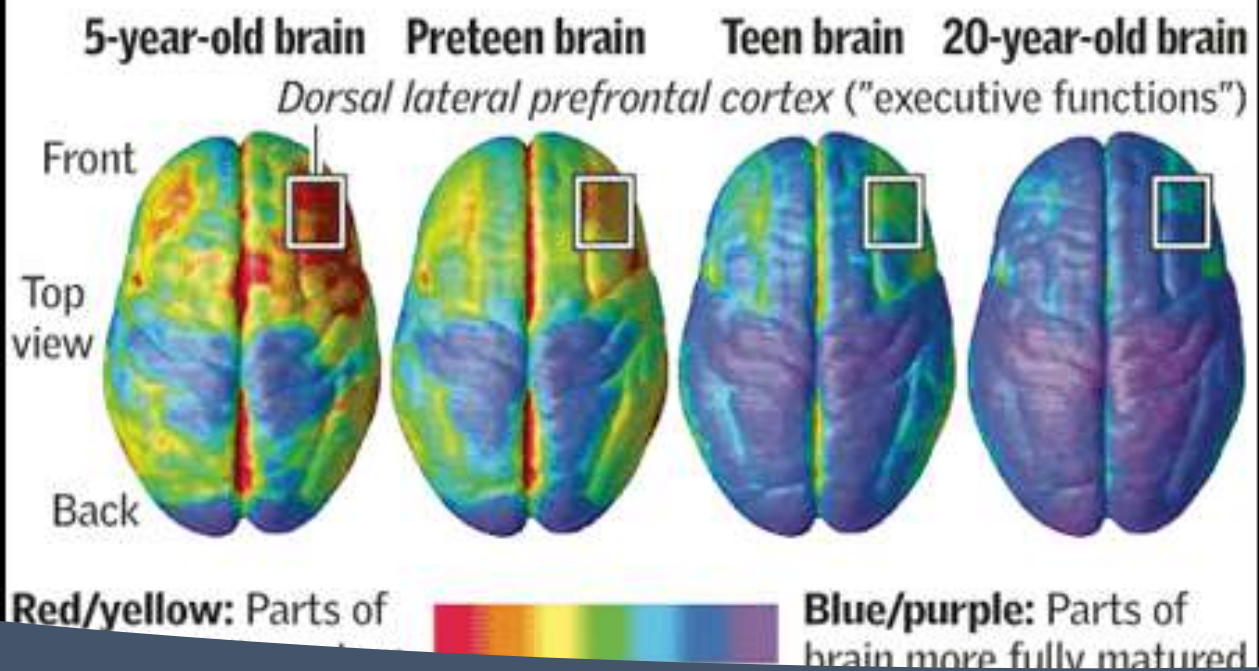
CASCW teen brain

# Content

- Physiological brain development
- Physical development and body image
- Cognitive development
- Developing Autonomy
- Peers- social development
- Identity development



The area of the brain that controls "executive functions" — including weighing long-term consequences and controlling impulses — is among the last to fully mature. Brain development from childhood to adulthood:



Gray matter= Learning process & storing information

White matter= more efficient brain communication

# Pruning

Dynamic mapping of human cortical development



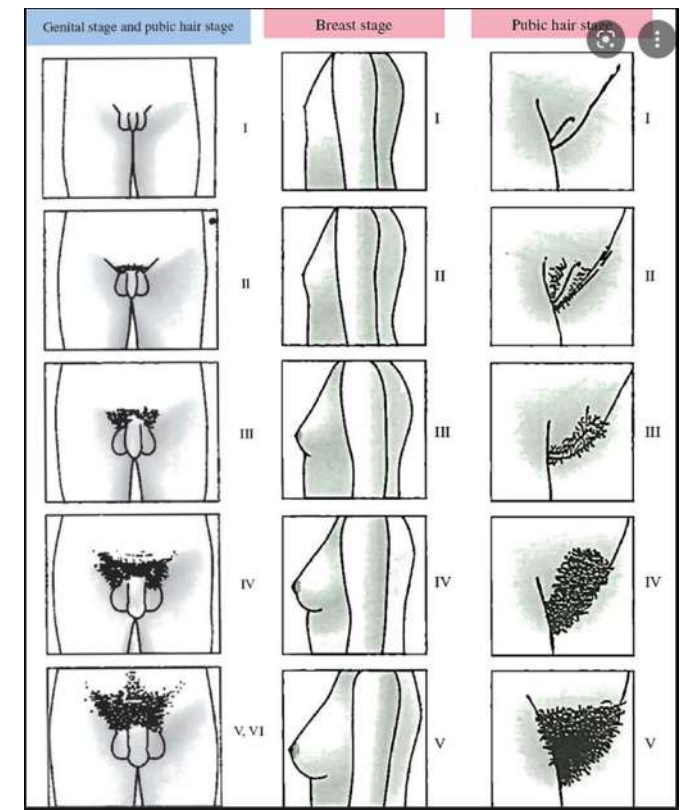
Source: "Dynamic mapping of human cortical development during childhood through early adulthood," Nitin Gogtay et al., Proceedings of the National Academy of Sciences, May 25, 2004; California Institute of Technology.

- White matter= more myelin around nerves- less learning and more efficient functioning
- Gray matter= more nerve bodies that can “learn more”
- Frontal cortex is LAST= The part where JUDGMENT exists
  
- Early and mid-teens are when it’s easiest to learn more information.
- The more that is used the more that stays.
  - “Use it or lose it”
- The more well rounded, the more *PRUNED WHITE MATTER* will remain

# Physical maturity

STAGES OF HEALTHY ADOLESCENT DEVELOPMENT			
Stage with Age Range (Approx)	Early Adolescence (ages 10-14 years)	Middle Adolescence (ages 15-17 years)	Late Adolescence (ages 18-21 years)
Characteristic Developmental Milestones and Tasks			
Physical Growth	* Puberty: Rapid growth period * Secondary sexual characteristics appear	* Secondary sexual characteristics advanced * 95% of adult height reached	* Physical maturity and reproductive growth leveling off and ending

- The cognitive/brain growth and maturity are happening at the same time as physical changes.
- Impacts a lot of social and peer group situations.
- *Especially athletics.*





# Body Image

## Early Adol (10-14)

- Preoccupation w physical changes
- Critical of appearance
- Anxieties about physical changes
- Peers used as standard for normal



## Middle Adol (15-17)

- Less concern about physical change
- Increased interest in personal attractiveness
- Excessive physical activity alternating with lethargy



## Late Adol (18-21)

- Usually become comfortable with body image



# Body Image

## Early Adol (10-14)

- Preoccupation w physical changes
- Critical of appearance
- Anxieties about physical changes
- Peers used as standard for normal



- Enter puberty between 9-16.
  - Hard time for athletics in “late bloomers”
  - Hard time for “early bloomers” ...
  - Cliques
  - Peak time for eating disorders
  - *Acne*
- Reassurance that everyone goes through this and feels self-conscious at times

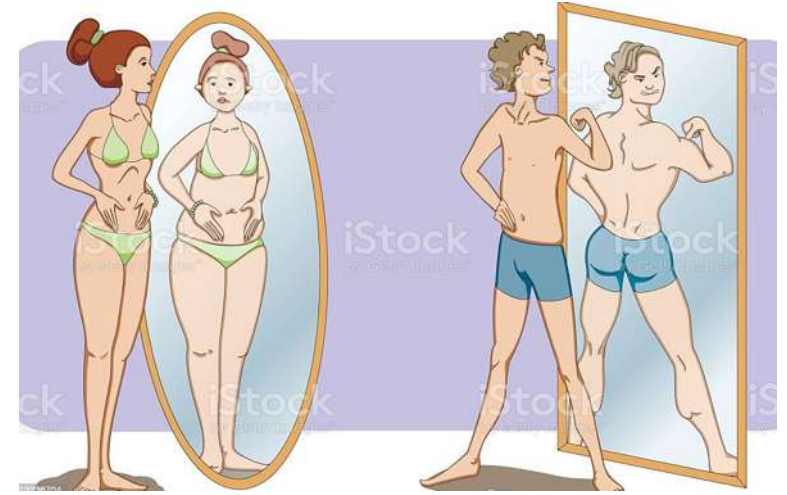


# Body Image

- Body changes nearing end; know your new shape and look
- Explore identity more—dress, hair, makeup, jewelry
- Punk, prep, goth, jock
  - *Choose battles*
  - *Trying to find themselves*
  - *Transition between 'know it all' to insecurity and doubt*

## Middle Adol (15-17)

- Less concern about physical change
- Increased interest in personal attractiveness
- Excessive physical activity alternating with lethargy



- Lots of energy mixed with needing lots of rest

# Body Image

- Generally, fully matured and through pubertal changes.
- Another peak for eating disorders
- Anorexia and obesity

## Late Adol (18-21)

- Usually become comfortable with body image

# Intellectual/Cognition- Process, not an event

## Early Adol (10-14)

- Concrete thought dominates
  - HERE & NOW
- Cause-effect poorly understood
- Stronger “self” than “social awareness”

## Middle Adol (15-17)

- Growth in abstract thought
  - Revert to concrete under stress
- Cause-effect relationships better understood
- Very self-absorbed
  - *Main character of movie*

## Late Adol (18-21)

- Abstract thought established
- Future oriented
  - Understand, plan, and pursue long range goals
- Philosophical and idealistic



# Intellectual/Cognition- Process, not an event

## Early Adol (10-14)

- Concrete thought dominates
  - HERE & NOW
- Cause-effect poorly understood
- Stronger “self” than “social awareness”

- Develop own style as they imagine they can make own decisions
  - *May separate from childhood/parent interests*
- Focus on personal decisions and begin to understand adult authority is NOT absolute: **Oppositional defiant disorder**
- Question parent/teacher authority & rules of society. Why are rules made?
- Start of abstract thought
- Supportive adults are a big buffer for emotional issues experienced during this time.
- *“To Kill A Mockingbird”- Does anyone actually kill a mockingbird? Is the book about hunting birds?* 😞

# Intellectual/Cognition- Process, not an event

## Middle Adol (15-17)

- Growth in abstract thought
  - Revert to concrete under stress
- Cause-effect relationships better understood
- Very self-absorbed
  - *Main character of their own movie*

- Question authority more extensively
- Can better link current behavior to future consequence
- Begin to imagine their own identity & role in the world
- Have a need to make own plans
- Can increasingly consider complexity
- Begin to see higher ethical and moral standards because of their questioning rules.

- *“To Kill a Mockingbird”- There are things in the book that I don’t like. The bad guys and good guys aren’t traditional. Is that title a metaphor?*



# Intellectual/Cognition- Process, not an event

- Begin to make career decisions & plan for their role in the adult world
- Can apply views to global concepts such as justice and equity, and their views may grow increasingly idealistic.
- Become more comfortable debating their own ideas and opposing authority.
- Begin to balance their idealism with reality-based constraints
- *“To Kill a Mockingbird”- It’s about killing innocence for no good reason, or bad reasons. Many fictional to real world concepts to digest.*



## Late Adol (18-21)

- Abstract thought established
- Future oriented
  - Understand, plan, and pursue long range goals
- Philosophical and idealistic

*10-15% of adults never obtain full abstract thought!!!*



# Autonomy

## Early Adol (10-14)

- Challenge authority, family
- Loneliness
- Wide mood swings
- Things of childhood rejected
- Argumentative and disobedient

## Middle Adol (15-17)

- Conflict with family predominates
- Ambivalence about emerging independence

## Late Adol (18-21)

- Emancipation
  - College
  - Technical school
  - Work
- Adult lifestyle

# Autonomy

## Early Adol (10-14)

- Challenge authority, family
- Loneliness
- Wide mood swings
- Things of childhood rejected
- Argumentative and disobedient

- Beginning the process that will end as adulthood
- “No!”- 2yo’s...and early teens!
  - Challenging authority and understanding “WHY this rule!” is a healthy part of development
- Testing limits=disobedience
  - Testing limits help to understand why limits. Successful people imagine possibilities & challenge limits
  - Zero tolerance policies???
- *Pathology: Separation anxiety, school phobia, ODD.*

# Autonomy

- Adult shape and size
- Cognition is more abstract and in many ways ready for independence
- Peer groups very important
- But still strong reliance on family
- *Gender or sexual preference*

## Middle Adol (15-17)

- Conflict with family predominates
- Ambivalence about emerging independence

- *Pathology: Premature autonomy, foster system autonomy, juvenile justice, ODD, Conduct disorder, anxiety/depression,*



# Autonomy

- Ready to move on
  - Parenting:
    - Authoritarian- “helicopter”
    - Authoritative
    - Permissive
    - Uninvolved
  - *Pathology: cognitive delays, substance abuse issues, Anx/depression*
    - *Some aren't ready, if not allowed to go through other processes.*

## Late Adol (18-21)

- Emancipation
  - College
  - Technical school
  - Work
- Adult lifestyle

# Peer Group

## Early Adol (10-14)

- Serves a developmental purpose
- Intense friendship with same sex
- Contact with opposite sex IN GROUPS

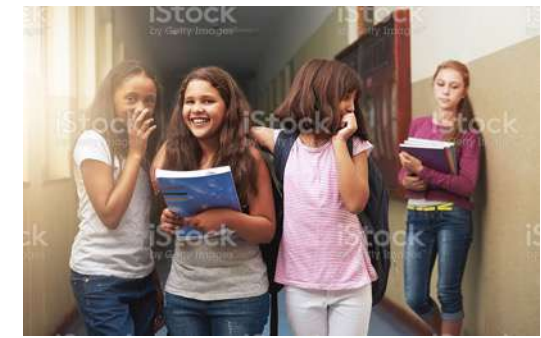
## Middle Adol (15-17)

- Strong peer allegiances
  - FAD BEHAVIOR
- Sexual drives emerge & explore ability to date and attract A PARTNER  
(Less group)

## Late Adol (18-21)

- Decisions/values less influenced by peers
- Relates to individuals more than to peer group
- Selection of partner based on individual preference

# Peer Group



## Early Adol (10-14)

- Serves a developmental purpose
  - Intense friendship with same sex
  - Contact with opposite sex IN GROUPS
- This is when peers become more important than family in regards to acceptance or belonging.
  - Trying to identify where they fit. What clique?
  - Cliques often exclude
    - Some cliques DON'T exclude- vaping, gang, etc
  - Start to explore sexual/relationship world.
  - Scary but important part of development.
  - *Pathology: social phobia/anxiety/depression, bullying, reproductive health*
    - *Higher rates in LGBTQ as this awareness develops*



# Peer Group



- Risk taking at peak!
- Scary but also normal, and *healthy*
- Learn a lot of lessons & lots of effect on the frontal cortex
- Invincibility

## Middle Adol (15-17)

- Strong peer allegiances
  - FAD BEHAVIOR
- Sexual drives emerge & explore ability to date and attract A PARTNER (Less group)
- Impressing peers/partners is a major driver in decision

- Pathology:
  - Reproductive health
  - Anx/dep/mood disorders
  - Oppositional/conduct disorder
  - Substance
  - Violence related
- Lack of peer group can cause delays.

# Peer Group

- Adjusts back more to individual rather than peers.
- Separate further from family
  - But likely more appreciative or understanding of family influence
  - Even if disagrees with family or bad experience with family

## Late Adol (18-21)

- Decisions/values less influenced by peers
- Relates to individuals more than to peer group
- Selection of partner based on individual preference

# Identity development- Putting it together

## Early Adol (10-14)

- Am I normal?
- Daydreaming
- Vocational goals change
- Develop own value system
- Emerging sexual feelings
- Imaginary audience
- Privacy
- Magnify own problems
  - “No one understands”

## Middle Adol (15-17)

- Experimentation at peak
  - Sex
  - Drugs
  - Friends
  - Jobs
  - Risk-taking behavior
- Impressing peers/partners is a major driver in decision



## Late Adol (18-21)

- Pursue realistic vocational goal
- Relate to family as adult
- Realization of own limitations (& mortality)
- Establish sexual identity
- Ethical and moral values
- Capable of intimate relationships

# Identity development- Putting it together

## Early Adol (10-14)

- Am I normal?
  - Daydreaming
  - Vocational goals change
  - Develop own value system
  - Emerging sexual feelings
  - Imaginary audience
  - Privacy
  - Magnify own problems
    - “No one understands”
- Reassurance about self-consciousness. Everyone goes through this.
  - Listen & understand the fit into their peer group.
  - Acknowledge needing more personal time & with peers.
  - Model healthy communication & with mutual respect.
    - Discovering the leaders, bullies, and left out.
    - Not involved in some activity or club in or outside of school always concerns me.
  - Supportive adults are a big buffer for emotional issues experienced during this time.
    - *Sometimes this may be a teacher or school administrator more than a parent*

# Identity development- Putting it together

- Maintain open communication and be aware of teen's friends and what they are doing.
- Peak for risk taking behaviors & peer pressure.
- A close relationship with adult=less likely to engage in high risk-taking. Set safe boundaries.
- Try not to lecture, allow teens time to process and come up with own solution.

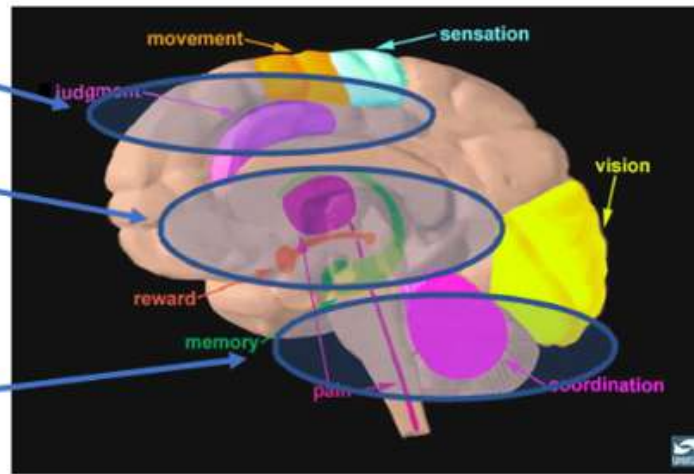
## Middle Adol (15-17)

- Experimentation at peak
  - Sex
  - Drugs
  - Friends
  - Jobs
  - Risk-taking behavior
- Impressing peers/partners is a major driver in decision

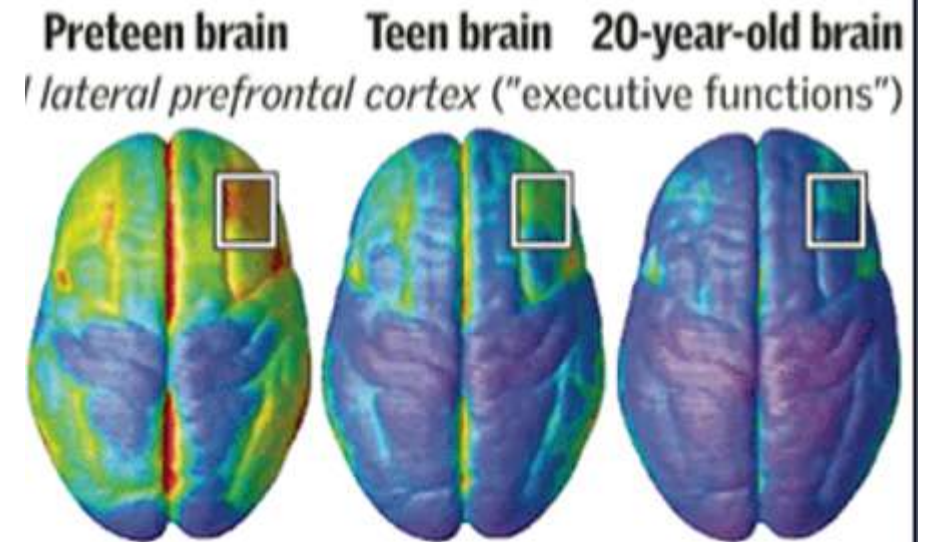


# Regarding substance abuse and teens

- **Cortex Area**
  - Prefrontal Cortex
- **Limbic Area**
  - Emotion
    - Amygdala (fear, anger)
    - Hippocampus (new memories)
    - Hypothalamus (hormones)
- **Brain Stem**
  - Keeps us alive



Content Source: Walsh, 2013  
Image Source: NIDA, [www.drugabuse.gov](http://www.drugabuse.gov)



- Substances activate the natural dopamine reward system
- Stimulates memories of pleasure- PRUNE to SUBSTANCE ABUSE
- Improve anxiety or depression (temporarily)
- Less gray matter in early teens using substances

# Identity development- Putting it together

- 17-21: Encourage reflective thinking and wise decision-making.
- Encourage to learn from their mistakes.
- Adults guide best when calm and create space to think things through.
- Will make mistakes; wide range of emotions.

## Late Adol (18-21)

- Pursue realistic vocational goal
- Relate to family as adult
- Realization of own limitations (& mortality)
- Establish sexual identity
- Ethical and moral values
- Capable of intimate relationships

# Identity development- Putting it together

## Early Adol (10-14)

- Am I normal?
- Daydreaming
- Vocational goals change
- Develop own value system
- Emerging sexual feelings
- Imaginary audience
- Privacy
- Magnify own
  - "No one

## Middle Adol (15-17)

- Experimentation at peak
  - Sex
  - Drugs
  - Friends
  - Jobs
  - Risk-taking behavior
- Impressing peers/partners is a major driver in decision

## Late Adol (18-21)

- Pursue realistic vocational goal
- Relate to family as adult
- Realization of own limitations (& mortality)
- Establish sexual

**Consider Juvenile justice situations**

and moral

of intimate  
ships

# Celebrating development

- Why? But why?
  - “NO!” can be annoying as in 2 yr olds, but also healthy.
  - “Why” is good to explore abstract ideas and understand “Why” rather than robotically accept
- Testing limits
  - Healthy to “think outside the box” or “imagine possibilities”
  - Need to help learn and understand “limits of safety” & “why”
- A shiny new toy
  - Thinking abstractly or about topics without a “final answer” is an exciting new thing to discover in yourself
    - Even if the answer is known; it’s good to allow the exploration of the topic
- Turning off the lecture
  - Some facts must be lectured. But ideal to allow adolescents chances to solve and think through own problems or topics- history, current events, literature or science

# Big picture: The brain is still changing

Channel “The Catcher in the Rye”

**Not started by adolescents!**

- WW2
- Holocaust
- Slavery
- Civil War



**Didn't happen without adolescents**

- French Revolution
- American civil rights movement



***Adolescents can be molded and taught to help one way or another***





# Reference



## Reaching Teens: Strength-Based, Trauma-Sensitive, Resilience-Building Communication Strategies Rooted in Positive Youth Development, 2nd Edition

Editor: Kenneth R. Ginsburg, MD, MS Ed, FAAP, FSAHM; Associate editor: Zachary Brett Ramirez McClain, MD

FORMAT:

Paperback/Video

### Description

Proud recipient of Digital Health Awards, Spring 2021.