THE ADOLESCENT BRAIN: FUTURE PLANNING AND DECISION MAKING

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What can we expect?

NEW RESEARCH ON THE ADOLESCENT BRAIN

* Discoveries from Neuroimaging
  * fMRI
  * Diffusion Spectrum Imaging
  * SQUID Magnetometry
  * MEG Magnetoencephalography

DEVELOPMENTAL CHANGES

* Chemical Trigger for Puberty
  * Kisspeptin
* Signal to Endocrine System
* Production of New Hormones
ADOLESCENT HORMONES

- Testosterone
  - Primary and Secondary Sex Characteristics

- Estrogen
  - Primary and Secondary Sex Characteristics

WHAT GOES ON IN THEIR MINDS

- Testosterone in Males
- Estrogen in Females
  - Influence size and activity levels of Amygdala
  - Emotional Intensity
    - 2 to 4 Times Intensity
    - More Frequent Change

BRAIN FACTS

- 200 Billion Cells
- Gray Matter/White Matter
  - Front to Back, Long Range Integration
EXECUTIVE FUNCTION

- Planning
- Sequencing of Activities
- Prioritizing long range goals
- Choices and Consequences

WHY IS THIS BRAIN AT RISK?

- Emotional Intensity
  - The Good or The Bad
  - Minute by Minute
  - Male/Female
  - Legitimate/Normal

WHY IS THIS BRAIN AT RISK?

- Emotional Intensity
  - Mirror, Mirror
- Male/Female Brain Differences
GIRLS VS BOYS

STRESS IN GIRLS vs. BOYS

When the girls thought about it and it was unacceptable and so, they’re less likely to say stress impacts their happiness a great deal.

Their appearance is a significant source of stress:
- 44% girls, 96% boys
- Feel bad when comparing themselves to others on social media
- New things generate fear on social media is a significant source of stress
- Say they feel pressure to be a certain way
- 59% girls, 79% boys

STRESS IN AMERICA-APA STUDY

- 13-23
  - Highest stress First time ever
    - 27% Extreme stress 8-10
    - 55% Moderate stress 5-7

STRESS IN AMERICA

- Emotional cost
- Negative emotions
  - Anxiety
  - Depression
  - Frustration
  - Anger

- Shift in age for suicidal behaviors
**WHY IS THIS BRAIN AT RISK? CONT.**

- Depression
- Serotonin Synthesis

**DEPRESSION AND SUICIDE**

- Aggressive Impulsive Reactors
  - Mostly Male
  - Negative Event, plus risk factors
  - Brief Period between decision and action

**STRESS RESPONSE**

- Release of chemicals, including:
  - Nor-epinephrine
  - Cortisol B
  - Adrenaline
  - Glucocorticoids
    - GATA2 Transcription Factor
    - Reduced connectivity
    - Hippocampus
    - Diminished volume
**PERCEPTIONS**

- **Spotlighting**
  - Everyone is watching
    - Who else can stand up?
  - Emotions intensify
    - Keep negatives short and sweet
  - Pre warning

**HOW CAN WE HELP?**

- **Access Skills for Stress Management**

**HOW CAN WE HELP?**

- **Emotional Competencies**
  - Self Awareness
  - Verbal Access
  - Emotional Regulation
  - Empathic Response
  - Passionate Interest
TEENS AND CONFLICT

- Migration and Activation
  - Cell Migration
    - L1
  - Benchmarks
    - "I Know!"
    - Open Conflict
  - Don't Take It Personally

WHY IS THIS BRAIN AT RISK?
CONT.

- Problem Solving
  - No Load

Social/Emotional Crisis

The Crisis Chemical THP

- Emotional Support Essential

AT-RISK

- Family environment
- Emotional disorder
- Mental health issue
- Learning disorder
- School failure
MOTIVATION FOR DRUG USE

- Seek drugs for:
  - Create positive effect in brain chemistry
    - Dopamine release in reward sites
  - Suppress negative emotions
  - Activation in specific sites

ADOLESCENT BRAIN FACTORS, CONT.

- Duke University study
  - Low negatives
  - High positives

- At-Risk population

- Genetics
  - High sensitivity
  - One-third to one-half as likely
  - 10% - 20% of population CYP2E1 enzyme

ALCOHOL: NEW PRODUCTS

- Alcohol treats
- Pocket Shots
ALCOHOL: NEW PRODUCTS, CONT.

- Whipped Cream
- Jell-O Shots
- Palcohol

Malt Beverages
- Malt brewed beer
- Sugars
- Flavors
- 20 – 24 ounces
- 7 – 13% alcohol

ALCOHOL: IMPACT ON ADOLESCENT BRAIN, CONT.

- NMDA pathways
- 48 hours – calcium overrun
- Cell death
- One year of binge drinking
  - 10% loss of PFC volume
  - Logic, reason, executive function
ALCOHOL: IMPACT ON ADOLESCENT BRAIN, CONT.

- One year of binge drinking
  - 10% loss of hippocampus volume
  - Memory
  - Motivation
  - Social behaviors
    - Learn how to study
    - Appropriate social interaction
  - Ask for help

IMPULSE CONTROL

- PRDM2
  - Down regulated
  - Disrupts impulse control

ECM - extracellular matrix
PNN - perineuronal nets

NEW FORMATS
NEW PRODUCTS

- Butane Hash Oil
- Amber, Shatter, Ear Wax

MARIJUANA RISKS

- Non-responsive
  - High dose – no divided attention
  - Operation of any moving vehicle
  - 2x more likely to have accident
  - Not attentive to environmental risks

- Cognitive impact
  - Measurable impact on memory and learning
  - IQ drop in early age onset
  - Potential paranoia and/or psychotic in vulnerable individuals

HOW CAN WE HELP?

- Evaluation
- Early Intervention
BRAIN FACTS

- Risk Taking
  - New Sites of Activity
  - Influence of Peers
  - Male/Female
- Emotional Reward

BRAIN FACTS

- Influence of Peers
- Be All That You Can Be

CULTURAL AND ENVIRONMENTAL INFLUENCES

- Role Models
- TV
- Social Media
RISK TAKING

- Kylie Jenner Challenge

RISK TAKING

HEALTHY OPTIONS

- Evaluate Risk Spectrum
- Introduce Activities
- Role Model
- Create Opportunities
FUTURE LIFE DOMAINS

- Education
- Career
- Family

ACADEMIC SUCCESS

- Praise and Encouragement
- Positive Reinforcement
  - Perseverance
  - Effort
  - Strategies
  - Learn from failure

WHAT YOU CAN DO

- Provide Multiple Experiences
- No Fear of Failure
- The Flexible Future
### THE ROLE OF ADULTS

- Beliefs and Expectations
- Encouraging Autonomy

### SOCIAL CAPITAL

- Micro-Systems
  - Adult
  - Peer

### GETTING READY FOR ADULTHOOD

- Positive Talk for Post High School Education
  - Not focused on degree
  - Variety of “College Experiences”
  - Value of Lifelong Learning
TALK THE TALK

- Eye contact - keep it brief
- Side by side
- Metaphors help
- First person stories

WHY IS THIS BRAIN AT RISK? CONT.

- A Work in Progress
  - Stages of Adolescent Development
- Emerging Adult Brain
  - The Long and Winding Road

COMPONENTS OF TRUST

1. Reliability
2. Predictability
3. Faith
WRAP UP

- Validate Emotions
- Social Bonding
- Risk-Taking Opportunities
- Crisis Support
- Early Intervention

Anatomy of a Teenager's Brain