


Center for School, Health and Education


Public Health Capacity Building Assistance for SBHC Leaders  
A CDC Funded Learning Series

Module #3 – Health and Education: Two Sides of the Same Coin



## The Adolescent Brain: Normal Development and the Impact of Chronic Stress

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### GUIDING QUESTIONS

- What structural and functional changes are typical in adolescent brain development?
- How does chronic stress and adversity impact typical brain development?
- What are some implications for public health and school-based health centers?




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## ADVANCES IN BRAIN SCIENCE

### Old Thinking

- Early childhood experiences have little impact on later development
- Brain development is linear: the brains capacity to learn grows steadily from infancy to adulthood
- The genes you are born with determine how your brain develops

A  
toddlers brain is less active than the brain of a college student

- Brain growth and development

### New Thinking

- Early experiences have an impact on the structures of the brain & later adult capacities
- Brain development is non-linear: there are optimum times for acquiring various skills
- Brain development is dependent on the interplay between your genes and your experiences
- By age three, brains are twice as active as those of an adult.
- The brain grows until mid 20s and can continue to develop until death



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## PHYSICAL DEVELOPMENT

Between early and middle adolescence significant changes in physical functioning are evident:

- Growth spurt
- Increase/redistribution body fat, muscle tissue
- Circulatory, respiratory – strength, endurance
- Secondary sex characteristics, reproductive organs
- Hormonal and endocrine systems



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Disjunction between *physical growth* and developing *brain, cognitions, affect, and behavior*



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## BASED ON THEIR BRAIN DEVELOPMENT, ADOLESCENTS ARE

### more likely to:

- act on impulse
- misread or misinterpret social cues and emotions
- get involved in fights
- get into accidents of all kinds
- engage in dangerous or risky behavior

### less likely to:

- think before they act
- pause to consider the potential consequences of their actions
- modify their dangerous or inappropriate behaviors

AACAP, FACTS FOR FAMILIES, No. 95, December 2011




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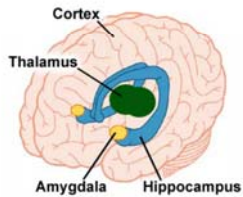
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## AMYGDALA & HIPPOCAMPUS

### This part of the brain matures early



The **amygdala** processes stress and other emotions, and is responsible for reactions like fear and aggressive behavior.

The **hippocampus** is involved in short and long-term memory




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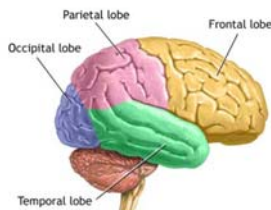
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## FRONTAL LOBE (Prefrontal Cortex)

### This part of the brain is delayed in maturation



Frontal lobe is the center of judgment, **self-control**, emotional regulation, **rational thought**, goal setting, long-term **planning**, understanding consequences, and morality




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## DRIVEN BY EMOTION RATHER THAN RATIONALITY

By design, adolescents are not good at risk assessment, take more risks, and seek more novelty



*“the frontal cortex’s efficiency is diluted... the limbic system is fully online and hormones are careening all over the place”*

Quote from Robert Sapolsky, <http://nautil.us/issue/15/turbulence/dude-where-s-my-frontal-cortex>



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## COLD VS HOT COGNITIONS



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## RISKY DECISION-MAKING



*“Nature made the brains of adolescents excitable. Their brain chemistry is tuned to be responsive to everything in the environment. That’s what makes them susceptible to thrill-seeking.”*

Quote from Frances Jensen, MD (March 2010), *The Teen Brain: It’s Just Not Grown Up Yet*. Accessed at <http://www.npr.org/templates/story/story.php?storyId=124119468>



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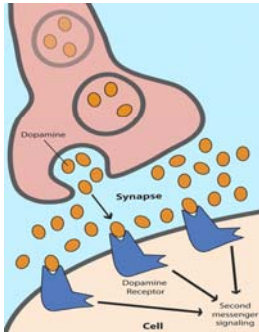
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## CHEMICALS IN THE BRAIN



- Sex hormones impact limbic system and frontal cortex
- Rapid increases in dopamine activity (beginning in early adolescence) that is linked to thrill-seeking and increases in risk-taking behavior



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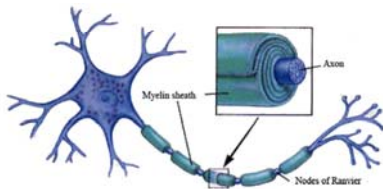
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## PRUNING & MYELINATION

**“USE IT, OR LOSE IT” results in better integration and more efficient brain**



After pruning **myelin** enables remaining neurons to communicate with each other with more coordination and greater speed



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**WHAT CAN DISRUPT TYPICAL ADOLESCENT HEALTH AND DEVELOPMENT TRAJECTORIES?**



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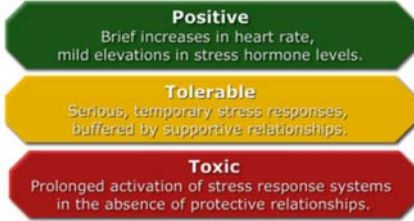
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## STRESS RESPONSES



Source: Center on the Developing Child, 2014



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## TYPICAL ADOLESCENT STRESS



- Rapid biological / cognitive changes (**intrapersonal**)
- Dynamic social relationships (**interpersonal**)
- Changing social contexts (**environmental**)



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## ADVERSE CHILDHOOD EXPERIENCES (ACEs)

According to parental report, the child has ever:

- Lived with a parent or guardian who was divorced or separated
- Lived with a parent or guardian who died
- Lived with a parent or guardian who served time in jail or prison
- Lived with anyone who was mentally ill or suicidal, or severely depressed for more than a couple of weeks
- Lived with anyone who had a problem with alcohol or drugs
- Witnessed a parent, guardian, or other adult in the household behaving violently toward another
- Been the victim of violence or witnessed violence in the neighborhood
- Experienced economic hardship "somewhat often" or "very often" (i.e., family found it hard to cover costs of food and housing)

Source: Child Trends, 2014 using 2011/12 National Survey of Children's Health (NSCH) data

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## ARCHITECTURE OF THE BRAIN

**Environmental factors can alter the structures of the brain**



Social and environmental experiences modify the brain and other body systems (i.e., immune response, hormone activity).



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## IMPACT ON EDUCATION



**Chronic stress** is linked to over 50% of all absences, and...

- Impairs attention and concentration
- Reduces cognition, creativity, and memory
- Diminishes social skills and social judgment
- Reduces motivation, determination, effort
- Increases impulsive behavior and likelihood of depression



Resulting in a greater likelihood the student will underperform academically

Source: Jenson, E. (2009). Teaching with Poverty in Mind.



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## BRAIN IS MALLEABLE AND ADAPTABLE



**Interventions can diminish, or even reverse, the negative effects of stress or adversity**



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## IMPLICATIONS FOR PUBLIC HEALTH

- Health Promotion
- Prevention
- Raise Public Awareness
- Develop/Assess Policies
- Create Programs or Innovative Solutions
- Research and Evaluation



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## IMPLICATIONS FOR SBHCs



- Educate and inform
- Advocate for developmentally appropriate school policies
- Safe places to regroup
- Teach and model positive coping
- Implement skill-building programs
- Facilitate access to intensive services
- Be that supportive, caring adult
- Promote schools as physically and emotionally safe setting



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## Presenter's Bio



Olga Acosta Price, Ph.D., is director of the Center for Health and Health Care in Schools (CHHCS) at the George Washington University Milken Institute School of Public Health, and is associate professor in the Department of Prevention and Community Health. She is a clinical psychologist with postdoctoral training in school mental health. Dr. Acosta Price has experience implementing prevention and early intervention programs that address the mental health needs of vulnerable children and their families, and has developed and evaluated programs promoting mental health and resilience conducted in school and community settings. Dr. Acosta Price received her Masters and Ph.D. in clinical psychology from the State University of New York at Buffalo and her undergraduate degree from Vassar College.



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**Thank You**



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