Slide 1

The Brain: A Work in Progress

Slide 2

The Adolescent – Myth or Fact?

- Adolescence is a time when they are in rebellion against parents and their parents' values
- Adolescence is a time of storm and stress and is the hardest stage of development.
- Adolescents tend to be responsible and hardworking
- Adolescents should be encouraged to work at least 20 hours a week

Slide 3

The Brain – Myth or Fact?

- We use only 10% of our brain
- Children learn better in a pastel environment
- New neurons growth ceases during childhood
- If the first three years are not enriched, then no chance for future brain growth
Slide 4

The Mozart Effect

- Physicist Gordon Shaw and Cellist/Psychologist Frances Rauscher
- 36 college students; 10 minutes of Mozart’s Sonata for Two Pianos
- Scored higher on paper folding and cutting task; other non-spatial tasks unaffected
- Effect lasted 10 minutes

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The Mozart Effect

- Books, CDs, programs
- National Academy of Recording Arts and Sciences foundation gave free CDs to hospitals for newborns
- Tennessee and Georgia started programs giving Mozart CDs to every newborn
- Florida – Daycares receiving state aide must include ½ hour of Mozart daily
- Not replicated
- No experimental support in children

Slide 6

Left Brain/Right Brain

- What are you?
- Based on research on split and intact brains
- Popular culture
- Left – logical, verbal, sequencing
- Right – emotionally intuitive, expressive, spatial relations, able to deal with things all at once
Caution!!
Complex activities (science or art) require the integration of both hemispheres
Doreen Kimura

Being Wise Consumers of Information

From J. W. Santrock, 1995
Be cautious about what is reported in the media.

- Television, radio, newspapers, magazines
- Information is reported by journalists and reports
- Not all information comes from professionals with good credentials
- A lot of information is sensationalized
- Public often not given the whole picture
- Be careful about overgeneralizations or single studies

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Know Difference Between Nomothetic Research and Idiographic Needs

- Nomothetic Research – conducted at the group level
- Idiographic Needs – what is important for the individual, not the group

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Don’t Overgeneralize from a Small Sample

- Small samples require care when making generalizations
- Sample may be biased
**Slide 13**

**Single Studies are Usually Not the Final Word**

- Rare for one study to come up with conclusive answers
- Usually studies are conflicting
- Most “answers” emerge gradually over time

**Slide 14**

**Remember that Correlational Studies Do NOT Show Causation**

- Correlation – “co” “relate” – two variables measured to see how they relate
- Does NOT mean that one variable CAUSES the other

**Slide 15**

**Consider the Source of the Information**

- All studies are not automatically accepted
- Media has different levels of credibility
I think it has the potential to go either way. Which way depends on how we educators interpret and use the research. Unfortunately, some consultants and educators are proposing "brain-based" programs and strategies that have not been tested in classrooms. Running ahead of the research before sound clinical trials and testing of new hypotheses have been completed makes us vulnerable to the criticism of jumping on yet another bandwagon.

Pat Wolfe, EdD
Brain reaches 90% of adult weight by age 4
Past scholars and researchers believed “hardware” in place by early childhood and “software” resulted in maturity

“Hardware” changes occur past early childhood, through adolescence and into young adulthood
These changes may influence adolescent behavior and thinking
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What happens to the brain in childhood and adolescence?


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- Structural changes occur
- Gray matter waxes and wanes in different parts of the brain at different times in development


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- "Use it or lose it" theory (Giedd, 2000)
- Neuronal connections will be maintained if used or disappear if unused

"Teens thus have the power to determine their own brain development."
Slide 34

**Limbic System**

- Generates emotions, motivated behavior
- Increases in testosterone result in growing amygdala (almond shaped structure in temporal lobe that generates fear and anger; guides gut reaction)
- Especially pronounced in boys
- Estrogen increases enlarge the hippocampus (processes memory)

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**Limbic System**

- Neurotransmitters in this area change levels (dopamine, serotonin)
- More emotional, more responsive to stress, less responsive to rewards
- Decline in reward sensitivity may increase vulnerability to depression, substance abuse, and mental illness

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**Limbic System**

- Adults brains use frontal lobes to control emotional responses; activity in frontal lobes higher than in amygdala relative to adolescents
- Adolescent brains still in process of developing this ability; activity in amygdala is higher than in frontal lobes relative to adults
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Limbic System

- Discrimination of facial expressions is poor in adolescence
- Adult brains light up in limbic system and prefrontal cortex; teens light up in limbic system
- Teens not as adept at reading social signals or discriminating between emotions in others

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Temporal Lobes

- Processes language and emotional control
- Reach gray matter maximum at 16 years before pruning

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Parietal Lobes

- Integrate information (auditory, tactile, visual)
- Continue to mature through the midteens
- Gray matter peaks between 10 and 12 in these lobes
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**Corpus Callosum**

- Cable of nerves connecting right and left hemispheres
- Appears to be related to intelligence, consciousness, and self-awareness
- Continues growing into the 20s

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1. Frontal forceps
2. Corpus callosum commissural fibers
3. Short arcuate fibers
4. Occipital forceps
5. Indusium griseum
6. Medial longitudinal stria
7. Lateral longitudinal stria

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**Frontal Lobes**

- Responsible for "executive" functions; i.e., self-control, judgment, emotional regulation, organization, and planning
- Frontal lobes undergo the greatest change during adolescence
- Grow between 10 and 12, then shrink into the 20s
Myelination

Myelination not complete until the early 20s (including areas regulating emotion, judgment, and impulse control)

Myelination completed earlier in girls; boys' myelination may not equal girls' until age 30

So what does this mean?
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Teenage Drinking

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• Adolescent’s brain different; responds differently
• One drink impairs learning more in 21-24 y/0s than in 25 to 29 y/0s

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Binge Pattern Ethanol Exposure in adolescent and Adult Rats: Differential Impact on Subsequent Responsiveness to Ethanol

Aaron M. White, Amol J. Ghia, Edward D. Levin, and H. Scott Swartzwelder
August 2000
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Does alcohol exposure during adolescence produce changes in thinking that go beyond adolescence?

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Method
- 28 male Sprague Dawley rats
- 14 were 30 days old (adolescents)
- 14 were 70 days old (adult)

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Results and Conclusions

- The groups of rats did not differ in learning the maze without alcohol.
- The rats that had been treated with ethanol in adolescence had a very difficult time with the maze when they had been given moderate amount of alcohol; the rats that hadn’t been treated in adolescence did not have this problem.

Other effects??

- Interferes with memory formation in youth
- Alcohol less sedative in adolescents
Drugs and Alcohol

• Ideas surrounding depression and other mental problems continue to change
• Use of medication for teens and younger increasingly popular
• Most such medication untested on children and teens…today’s teens are guinea pigs

Drugs and Alcohol

• Some meds have been found to affect size of brain
• Effective non-drug treatments available for many mental disorders, including depression, anxiety, obsessive-compulsive disorder
• Economics may be determining treatment

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So what DO we know?

- Experience shapes the brain — Brains are “sculpted”
- Different parts of the brain are developing on different timetables
- The teen brain is affected differently by substances such as alcohol and drugs

Suggestions for Educators...

- Become literate about the brain
- Learn how to determine the validity of a study
- Be cautious about applying research to the classroom
- Consider findings in all fields, not just brain research

Suggestions for Educators...

- Encourage young people to be involved in many things
- Consider the teen’s sleep needs
- Help youth find healthy sources of stimulation
- Take a strong stand on drinking and drug use in adolescence
- Mentor youth — provide example and guidance through choices
Suggestions for Educators...

- Provide leadership opportunities
- Encourage education
- Help youth to develop a positive self-concept
- Encourage healthy and positive parenting of youth

What Works and What Doesn’t for Addressing School Violence

Effective Strategies
- Primary Prevention: Universal Skills training
- Behavior monitoring and reinforcement
- Behavioral techniques for classroom management
- Building school capacity
- Continuous progress programs
- Cooperative learning
- Positive youth development programs

Effective Strategies
- Secondary Prevention: Selected Parent training
- Home visitation
- Compensatory education
- Moral reasoning
- Social problem solving
- Thinking skills
### What Works and What Doesn’t for Addressing School Violence

#### Effective Strategies
- Tertiary Prevention: Indicated
- Social perspective taking, role taking
- Multimodal interventions
- Behavioral interventions
- Skills training
- Marital and family therapy by clinical staff
- Wraparound services

#### Ineffective Strategies

#### Primary Prevention: Universal
- Peer counseling, peer mediation, peer leaders
- Nonpromotion to succeeding grades

#### Secondary Prevention: Selected
- Gun buyback programs
- Firearm training * Social casework
- Mandatory gun ownership * Redirecting youth behavior
- Shifting peer group norms
What Works and What Doesn’t for Addressing School Violence

Ineffective Strategies

Tertiary Prevention: Indicated

- Boot camps
- Residential programs
- Milieu treatment
- Behavioral token programs
- Waivers to adult court