Brain Development

During Adolescence
Physical Transformations

White Matter
- Myelinated Nerve Fibers increases
  - Prefrontal cortex
  - Parietal Lobes
  - Corpus Callosum
  - Increase Brain Weight

Gray Matter
- Neurons & Supportive Material declines
  - Synapses pruning of the Cerebral Cortex
    - Prefrontal Cortex
  - Linkage occurs
    - Cerebral Hemispheres
    - Corpus Callosum
Sculpting of the Adolescent Brain

Diverse Cognitive Skills
- Improved Processing Speed
- Inhibition
- Attention
- Memory
- Planning
- Increased Capacity for information integration
- Increased cognitive & emotional self-regulation
Cognitive Control Network

- Occurs gradually
- Recruit connections less than adults
- Decreased task performance
  - Require inhibition
  - Planning
  - Future Orientation
  - Challenging self-regulating situations
- Require fine-tuning
Emotional/Social Network

- Increased neuron response
  - Excitable
  - Prone to stress
  - Sensitive to pleasurable stimuli

- Impulse imbalances
  - Experimenting w/ drugs & alcohol
  - Unprotected sex
  - Delinquent activity
Puberty & Sex Hormones

- Oxytocin surges during puberty
- Heightened sensitivity
  - Pre-frontal cortex & inner-brain structures
  - Amygdala
- Enhanced Oxytocin sensitivity
  - Self-consciousness
  - Overly sensitive to outside opinions
  - Peer-influences
What does this all mean?

That only over time will young people be able to effectively manage their emotions.
Hormonal Changes

Kari Richard
Hormones

- Complex hormonal changes occur and are taking place by age 8 or 9.

- The pituitary gland releases growth hormone and stimulates other glands to produce hormones.

- Secretions of growth hormone and thyroxine leads to gains in body size and skeletal maturity.
Boys and Girls

Estrogens and androgens are present in both sexes, but we think of estrogens as female hormones and androgens as male hormones.

The boy’s testes release large amounts of testosterone which leads to muscle growth, body and facial hair, and other male characteristics.
Estrogens released by girls’ ovaries cause the breasts, uterus, and vagina to mature.

Due to the estrogen, the body will take on feminine proportions and fat will accumulate.

Adrenal androgens cause height spurts and growth of underarm and pubic hair.
Body Growth

Amy Harris
Growth spurt: the first outward sign of puberty and rapid gain in height and weight.

Girls age 10, boys age 12 ½

Estrogen vs. Androgen

Girls taller and heavier in early adolescence
At 14 years old: boys start to grow, girls finish

Complete growing, girls: 16   boys: 17 ½

Adolescences-
~10-11 inches in height
~50-75 pounds
~ 50% adult body weight

In one year- boys: 4 inches and 26 pounds   girls: 3.5 inches and 20 pounds
Body Proportions

- Hands, legs, and feet grow first, then torso.
- Pattern - awkward stage in life
  - proportions are off
  - long legs with huge feet and hands
- Differences appear due to sex hormones
- Boys: shoulders grow relative to hips, large and in charge, legs are longer in relation to their body
- Girls: hips grow relative to shoulders and waist
Muscle-fat Make up and other internal changes

- Age 8 girls add more fat than boys on arms and legs ~where as in boys this tends to decrease
  ~ Both girls and boys gain in muscle. This increase is 150%. It's greater in boys who develop larger skeletal muscles, hearts and lung capacity and number of red blood cells- ability to carry oxygen from lungs to the muscles (increase in boys)

- Boys gain way more muscle strength than girls ~this is why boys are better performers in the teenage years
Motor Development and Physical Activity

Chelcee Villa
Puberty brings steady improvement in gross motor performance, but the pattern change differs from boys to girls.

Girls genes are slow and show gradual leveling off by age 14.

Boys show a dramatic spurt in strength, speed, and endurance that continue through the teenage years.

By middle adolescence, girls perform as well as boys in running speed, broad jump, and throwing distance.
Gender segregation in physical education usually begins during middle or junior high.

In 1972 it became required that schools provide equal opportunities for males and females in all educational programs, including athletics.

In high school, only 58% of US boys and 55% of girls are enrolled in physical education; just one third of students experience a daily physical education class.
Performance Enhancers

- Athletic competence is strongly related to peer admiration and self-esteem.

- Some adolescents become so obsessed with physical power that they turn to performance-enhancing drugs.

- Approximately 8% of high school seniors, mostly boys, reported using Creatine and over-the-counter substances that enhance short-term muscle power.

- Side effects range from acne, excessive body hair, and high blood pressure to mood swings, aggressive behavior, and damage to the liver and reproductive organs.
Benefits

Besides improving motor performance, sports and exercise influence cognitive and social development.

Regular physical activity is associated with lasting health benefits such as functioning of the immune system, cardiovascular health, better sleep quality, and improved psychological well-being.

Physical education also provides lessons in teamwork, problem solving, and competition.
Sexual Maturation

Jeff Amerling
Primary sexual characteristics involve the reproductive system directly.

For women it consists of the ovaries, uterus, and vagina; for men it is the penis, scrotum, and testes.

Secondary sexual characteristics consist of armpit hair, pubic hair, and for women, breast development.
Females

- During sexual maturation in girls, budding in the breast takes place, as well as growth spurts.

- Around age 12, after the peak of the growth spurt, the first menstruation cycle takes place.
  - Breast development and pubic hair growth are both complete.
  - It begins without releasing an ovum from the ovaries, and does not get counted on for protection against pregnancies.
  - This period of sterility does not occur in all girls.
Males

- The first sign of puberty in boys is the testes get larger.
  - This is accompanied by the changes in the texture and color in the scrotum and soon after, pubic hair starts growing.

- Shortly after pubic hair starts growing, the penis starts to get enlarged.

- Scrotum and penis are near full size.

- Just after the growth spurt, armpit hair and facial hair starts to appear.

- The larynx enlarges and the voice gets deeper at the peak of the growth spurt and isn’t over till puberty is over.
Individual Differences in Pubertal Growth

Tia Parker
Timing of pubertal changes

- Heredity
- Twins
- Nutrition and exercise also make a difference
  - Females - sharp rise in body weight and fat may trigger sexual maturation
  - Females who do rigorous athletic training at an early age or not eat well usually experience later puberty
Variations in pubertal growth also exists between regions of the world and between SES and ethnic groups.

Physical Health

Poverty Stricken regions malnutrition and infectious diseases

Industrialized nations

African American girls

Early family experiences may also affect pubertal timing
Critics Explanation

- Mothers who reached puberty early are more likely to bear children earlier which increases the likelihood of material conflict and separation.

- U.S girls – from birth through age 15 confirmed the former chain of influence:
  - From harsh parenting in childhood to earlier menarche, to increased sexual risk taking in adolescence.
The Secular Trend

Kaitlin Hagle
- From 1900 to 1970 there was a steady decline in the age of menarche.
  - Menarche is a girl's first menstrual cycle

- In this period of time, nutrition, health care, sanitation, and control of infectious disease were improving greatly.

- Boys have also reached puberty at an earlier age in recent decades.
The secular trend in pubertal timing lends added support to the role of physical well-being in adolescent growth.

In the United States and some European countries, overweight and obesity rates are responsible for the continuing trend toward earlier menarche.

In most industrialized nations the trend toward earlier menarche has stopped or has slightly reversed.

Girls will feel pressure to act much older than they are if they reach sexual maturity at an earlier age.
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Brenda Holland
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Changing States of Arousal

Ashley Maxwell
Changes occur in the way the brain regulates sleep

- Due to increased neural sensitivity to dark light

- Result: go to bed later (Phase Delay)

- Still need 9 hours of sleep
Teens get less sleep than earlier generations

- TV
- Video Games
- Computers
Sleep deprived teens suffer from....

- Performing poorly on cognitive tasks in the morning
- Depressed moods
- Engaging in high risk behaviors
Catching up on sleep leads to difficulty falling asleep on weekdays

Messes up your sleep schedule
The End!