Adolescent Development and Implications for Influencing Road Behavior

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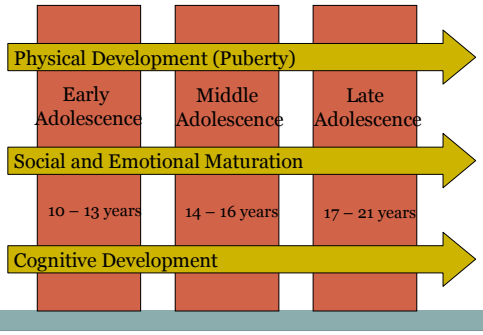
NCIOM North Carolina Institute of Medicine
shaping policy for a healthier state

Objectives

- Describe the relevant aspects of physical, cognitive, emotional and social development during the teenage years
- Discuss why teenagers take risks
- What we know about how to promote healthy behaviors among you

Adolescent Development



Relevant Impacts of Puberty

- Heightened emotional intensity
- Increase in risk-taking and sensation-seeking
  - Likely related to increases in dopamine (chemical responsible for feeling pleasure) during early adolescence

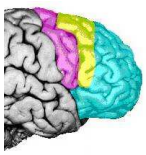
Cognitive Development

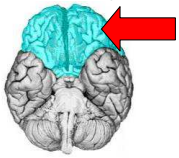
- The brain experiences dramatic changes during adolescence (~ ages 10-25)
  - These changes are focused on improving and refining existing capabilities
- Increased ability to think abstractly
- Greater impulse control
- Improved ability to assess risk vs. reward
- Improved use of working memory (the information in memory available for working on a problem)

Cognitive Development

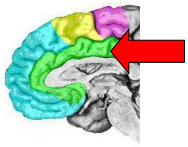
- Areas of the brain associated with more basic functions (e.g. motor and sensory areas) mature earlier
- Areas associated with more complex functions (e.g. executive function, attention, risk assessment) mature later
- As this is occurring, adolescents my be more vulnerable to poor decision making

Brain Anatomy and Function





Prefrontal cortex
*Develops Last
-Impulse control
-Setting priorities
-Formulating plans
-Decision-making
-Envisioning consequences of actions



Limbic system
*Develops Early
-Impulsiveness
-Sensation-seeking

Impact of Staged Brain Development

- The cognitive processes associated with decision making and complex reasoning are not fully mature in adolescents.
  - More difficult for teenagers to
    - Control impulsive behavior
    - Inhibit inappropriate behavior
    - Stay focused
    - Make sound judgments about possible outcomes
- Human brains continue to develop until approximately age 25

Emotional Regulation and Social Context

- Adolescent and adult reasoning and decision-making capabilities are similar in laboratory settings (cool cognition)
- In the real world, adolescents have more trouble making decisions (hot cognition)
  - Adolescents have more trouble making good decisions when the emotional centers of the brain are activated
  - Making decisions real world settings usually involves multiple parts of the brain
    - Prefrontal cortex helps regulate emotions and behaviors by anticipating consequences. While prefrontal cortex is still developing, the affective systems exert more influence
    - Coordination and integration of the various parts of brain develops over time

Emotional Regulation and Social Context

- The systems of the brain involved in thinking through a problem in "cold" cognition are mature by around 16 years
- The systems of the brain involved in responding to a problem in "hot" cognition do not fully mature until age 25

Social and Emotional Development

- Teenagers are developing their own identities
  - Less time spent with parents, more time spent with peers
  - However, parents remain the primary role model
- Risk-taking and experimentation are an important part of developing one's identity
  - Taking risks and experimenting allows youth to challenge themselves and learn more about themselves
  - Learning a new skill (like driving) is a type of risk-taking/experimenting
  - From an evolutionary perspective, youth are supposed to leave their parents and find a mate during this time so risk-taking is good and necessary
- Challenge for adults is to help youth take healthy risks while avoiding unhealthy risk behaviors

Risk Taking

- During adolescence a combination of factors increase risk-taking behaviors
  - Puberty linked to increases in emotional intensity, risk-taking, sensation-seeking
  - Cognitive development related to decision-making and emotion and behavior control develop over time
    - Emotional centers develop before the control center matures making emotional regulation more challenging for adolescents
  - Risk-taking is a critical component of developing one's identity

Risk Taking

- From a brain development perspective, middle adolescence (ages 14-17) are the period of heightened vulnerability to risk-taking
  - Sensation-seeking is high
  - Self-regulation is immature
- Somewhat related, there is also research showing adolescents are more prone to engage in risk-taking in the presence of peers

Risk Taking

- Research shows teens are more likely than adults to overestimate risks BUT they weigh the benefits more heavily than the risks
- How to counteract this
  - Provide supervision and remove risks
  - Allow teenagers to practice making the right decision in risky situations.
    - In this case, more time supervised on the road will lead to better driving responses

Implications for Influencing Road Behavior

- Graduated driver's license fits with what we know about adolescent brain development
  - Teaching new skills but in an environment crafted so that adolescents can learn safely and gradually confront more challenging driving environments
  - Keeps peers out of the car during initial learning experience
  - Teens start learning in a "cold" environment
- When working on education and social marketing messages, placing emphasis on negative outcomes is not particularly effective