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## WELCOME

Welcome to the second webinar of a five-part webinar series on adolescent health topics, including:

Webinar	Date/Time
Transitioning Youth to Adult Healthcare for Pediatric Providers: Training and Resources	Recording Available at: <a href="http://illinoisAAP.org/projects/medical-home/transition/trainings-and-events/">http://illinoisAAP.org/projects/medical-home/transition/trainings-and-events/</a>
Teen Brain Development: Effects on Health and Behavior	February 22, 2019 12-1pm CT
Counseling Teens on Sexual Health and Risky Behaviors	March 22, 2019 12-1pm CT
Bright Futures Guidelines: Implementation for Adolescents (11-21 years)	April 26, 2019 12-1pm CT
Use of Social Media for Patient Outreach	May 24, 2019 12-1pm CT

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## WEBINAR PLANNING GROUP

- Sara Parvinian, MD, FAAP
- Rachel Caskey, MD, MaPP, FAAP
- Kathy Sanabria, MBA
- Olyvia Phillips, BS, MPH Candidate, Albert Schweitzer Fellowship Recipient 2018-2019

- CME Application Reviewers: Karen Judy, MD, FAAP, Mathew Leischner, MD, FAAP
- Content Reviewer: Karen Judy, MD, FAAP

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## Commercial Disclosures

Rachel Caskey, MD, MaPP, presenter, Olyvia Phillips, moderator, and the planning group have no financial relationships to disclose.

*Funding for this webinar is provided, in part, by the Illinois Department of Public Health through funding for the Adolescent Health Program CFSA number 482-00-1598, CFDA number 93.994.*

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## CME Accreditation Statement

 The Illinois Chapter, American Academy of Pediatrics is accredited by the Illinois State Medical Society (ISMS) to provide continuing medical education for physicians.

The Illinois Chapter, American Academy of Pediatrics designates this live webinar activity for a maximum of 1 *AMA PRA Category 1 Credit(s)*<sup>™</sup>. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

- Nurses and Nurse Practitioners can submit Certificates of Attendance to their accrediting board for credit for participation in the live webinars.
- Funding for this webinar series is provided, in part, by the Illinois Department of Public Health through funding for the Adolescent Health Program, CFSA 482-00-1598, CFDA 93.994

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## CE Credit Information

The Illinois Department of Human Services, Division of Developmental Disabilities has approved this live webinar for 1 continuing education hours (CEs) for the January 25, 2019 training event "Transitioning Youth to Adult Healthcare for Pediatric Providers" for the following licensed professionals:

- Licensed Clinical Professional Counselor
- Licensed Clinical Psychologist
- Licensed Clinical Social Worker
- Licensed Nursing Home Administrators
- Licensed Occupational Therapist & Occupational Therapy Assistant
- Licensed Physical Therapist & Physical Therapy Assistant
- Licensed Professional Counselor
- Licensed Social Worker
- Registered Nurse, Licensed Practical Nurse, and Advanced Practice Nurse

Qualified Intellectual Disabilities Professionals (QIDPs) may apply the same hours of continuing education units earned from this conference toward their twelve hour annual continuing education requirement.

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## Webinar Information

This webinar is being recorded and will be made available on demand following the webinar at [Illinoisaap.org](http://Illinoisaap.org).

For more information, contact Olyvia Phillips [ophillips@illinoisaap.com](mailto:ophillips@illinoisaap.com) | 312.593.1128 ext. 209

*Participants are muted during the webinar. Please type questions into the chat box. They will be answered at the conclusion of the presentation.*

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## Webinar Information

At the conclusion of the Webinar, attendees will be Emailed a link to complete an online evaluation. Once the evaluations are submitted, Olyvia Phillips will send participants a certificate of participation for your CME/CE records. This will occur the week of March 3.

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## Resources



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## Learning Objectives

- Understand the **basics** of adolescent brain development
- Recognize the implications of **new** brain research for serving adolescents
- Develop anticipatory **guidance** and **education** for adolescents and their families
- Expand **strategies** for providing teens developmentally appropriate medical care
- Respond to **unique** needs of adolescent moms

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## AAP Values Healthy Brain Development

- **Care of Adolescent Parents and Their Children** (December 2012)
- **Addressing Early Childhood Emotional and Behavioral Problems** (December 2016)
- **The Pediatrician's Role in Optimizing School Readiness** (September 2016)
- **Poverty and Child Health in the United States** (April 2016)
- **Early Childhood Adversity, Toxic Stress, and the Role of the Pediatrician: Translating Developmental Science Into Lifelong Health** (July 2012)
- **Media and Young Minds** (November 2016)
- **Literacy Promotion: An Essential Component of Primary Care Pediatric Practice** (August 2014)

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## Outline

1. Brain Maturation
2. Biological, Physical, and Emotional Development
3. Behavior
4. Teen Pregnancy



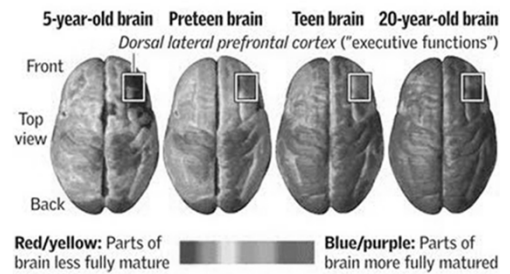
12

# THE FRONTAL CORTEX

Changes During Adolescence

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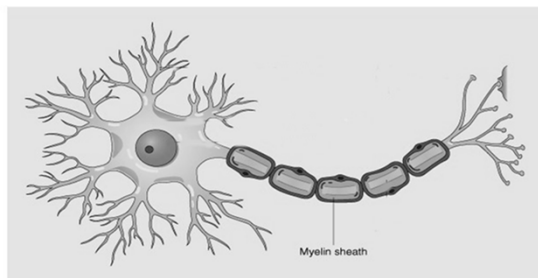
## Brain Development in Adolescence



Source: National Institutes of Mental Health, Denver Post

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## Change #1

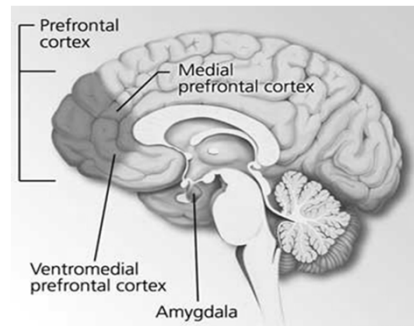


© 2000 John Wiley & Sons, Inc.

Source: Blakemore, SJ; Choudhury, S

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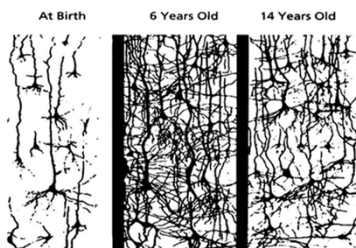
## White Matter



Source: Blakemore, SJ; Choudhury, S

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## Change #2



**SYNAPTIC DENSITY:** Synapses are created with astonishing speed in the first three years of life. For the rest of the first decade, children's brains have twice as many synapses as adults' brains.

Drawings supplied by H.T. Chugani.

Source: Families and Work Institute

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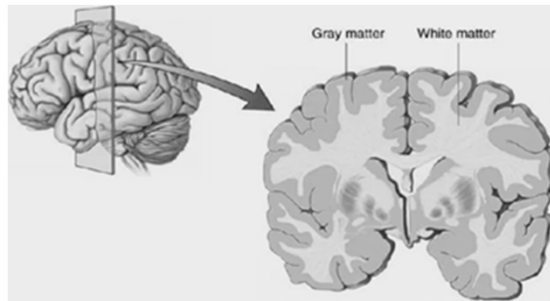
## Importance of Synaptic Pruning

- Essential for honing the key functional networks of brain tissue
- Strengthened new connections  $\Rightarrow$  better focus, more complex thought processes
- Development of cognitive processes continues throughout adolescence and into early adulthood

Source: Blakemore, SJ; Choudhury, S

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## Brain Gray Matter



Source: Blakemore, SJ; Choudhury, S

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## Brain Development Differences by Sex

A study conducted by the National Institute of Mental Health (NIMH) found developmental variations in female versus male brains.

### Key Study Points:

- Female peak brain size is around 10.5 years old vs. Males at 14.5 years old
- Male brain size is 9-12% larger than female brain size
- Differences exist in size of other areas such as hippocampus and amygdala



Source: National Institutes of Mental Health, Lenroot, RK, & Giedd, JN

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## Brain Development Differences by Sex

Studies suggest sex steroid receptors are distributed throughout the brain and are influential during development.

### Sex steroid receptors in:

- Hypothalamus
- Amygdala
- Hippocampus
- Cerebellum



Source: National Institutes of Mental Health, Lenroot, RK, & Giedd, JN

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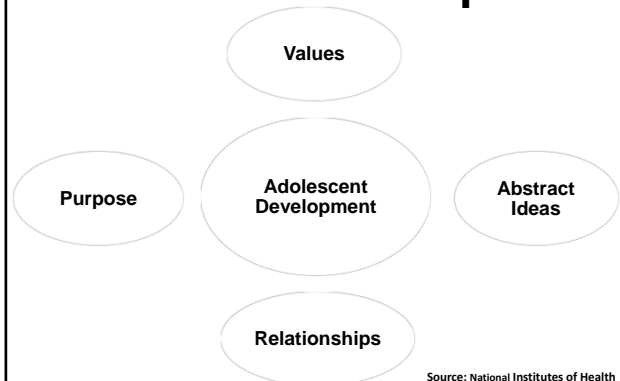
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## What Is Going On?

The research behind the question

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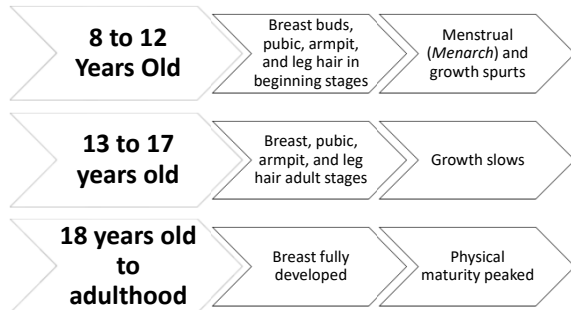
## Adolescent Development



Source: National Institutes of Health

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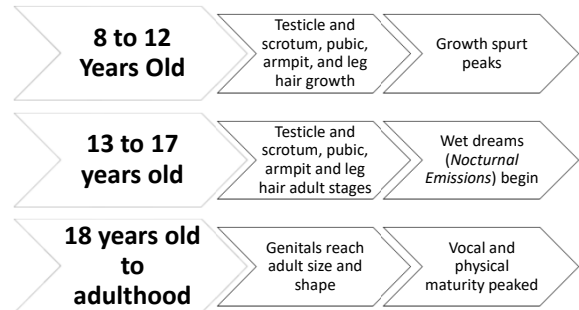
## Physical Development: Females



Source: National Institutes of Health

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## Physical Development: Males



Source: National Institutes of Health

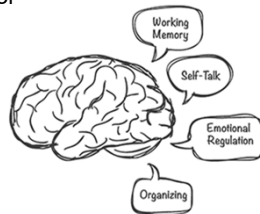
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## Executive Function

The *executive function* describes the capacity to control and coordinate thoughts and behavior.

**Skills included in this area are:**

- Selective attention
- Decision making
- Voluntary response inhibition
- And, working memory



Source: Blakemore, SJ; Choudhury, S

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## Development of Executive Function: fMRI Visualization

A function MRI (fMRI) is a noninvasive tool to study interactions between brain and behavior.

**Findings include:**

- Frontal cortex regions were activated during tasks
- Widespread activity in prefrontal cortex in children, compared to adults
- Difference in reaction times compared to a mature adult brain



Source: Casey, BJ; Jones, RM; &amp; Hare, TA.

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## Development of Executive Functions: Prospective Memory

Prospective memory is the ability to hold an intention in mind and then carry out the action at a future time.

In association with the frontal lobe, it develops throughout adolescent into adulthood.

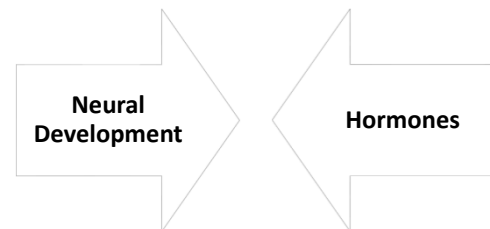


Source: Blakemore, SJ; Choudhury, S

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## Social Cognition Development

Social cognition development is a two-way process, affected by neural development and hormones while being dependent on the social world around us.



Source: Blakemore, SJ; Choudhury, S

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## Perspective

The *simulation theory* describes how we can understand other people's perspective by mentally stimulating their thoughts, actions, and motivations.

Thoughts

Actions

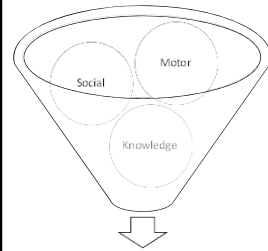
Motivations

Source: Blakemore, SJ; Choudhury, S

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## Perspective

Functional neuroimaging studies have shown that the parietal and frontal cortices are associated with making distinctions with the motor, visuo-spatial, conceptual, and emotional levels between 1<sup>st</sup> and 3<sup>rd</sup> person perspectives.



The organization of each factor has been found to be intertwined with one another.

Source: Blakemore, SJ; Choudhury, S

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## Emotional Recognition



Source: Lawrence, K, Campbell, R, & Skuse, D.

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## The Changing Brain and Teens

Emotional responses are fully functional, however the parts of the brain that restrain emotional and impulsive responses are still developing.



Source: Blakemore, SJ; Choudhury, S

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## Points to Remember

- fMRI studies suggest that the responses of teens to emotionally loaded images and situations are **heightened** relative to younger children and adults.
- Enormous hormonal changes take place **during** adolescence.
- In terms of sheer intellectual power, the brain of an adolescent is a **match** for an adult's.

Source: Blakemore, SJ; Choudhury, S

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## Changing Behaviors

Impulses and Sensation Seeking

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## Changes in Behavior and Cognition

*Sensation-seeking* is one of the developmental contributors to risk behaviors and is more likely to emerge during adolescence than any other time period.



Source: National Institutes of Health

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Adolescents are **notorious** for engaging in risky behavior, and for making poor decisions, especially when risk is involved.

Adolescents are driven to seek **more extreme** rewards to compensate for low recruitment of motivational brain circuitry, such as in the right ventral striatum, and the right side of the amygdala.

Source: Baird, A, Fugelsang, J, & Bennett, C.

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## Behavioral Changes

Adolescents undergo several changes in behavior and decision making skills.

Physical

Mental

Emotional

Source: National Institutes of Health

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## MYTHS

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## Adolescent Myth #1

I am always "on stage" and other people's attention is constantly centered on my appearance or actions.

Source: National Institutes of Health

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## Adolescent Myth #2

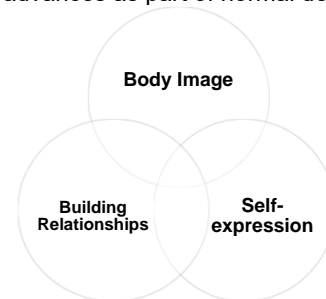
“It will never happen to me.”

Source: National Institutes of Health

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## Sexual Identity

In mid- to late- adolescence, teens establish their sexual identity. They learn to express and receive intimate or sexual advances as part of normal development.



Source: National Institutes of Health

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## Alcohol

- Teens tend to drink in **larger quantities** than adults.
- Evidence suggests the adolescent brain responds to alcohol differently than the adult brain, perhaps related to an **elevated risk of binge drinking** during youth.
- Regular drinking during youth, and intense drinking, are both **risk factors** for later alcohol dependence.

Source: The National Institute on Drug Abuse Blog Team

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## Substance Abuse

- Next to alcohol, marijuana is the **most common** recreational drug among adolescents
- Drugs can mimic brains natural chemical messengers and stimulate the '**reward circuit**' of the brain
- Long term use can **permanently change** neurons and brain circuitry
  - Increase in mental health disorder, addiction, impair executive functioning
- Legalization of marijuana may lead to **increased use** among youth

Source: The National Institute on Drug Abuse Blog Team

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## Marijuana



Sources: Healthy Children and Massachusetts Behavioral Health Partnership

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## Teens often do:

- Act on **impulse**
- Misread or **misinterpret** social cues and emotions
- Get involved in **accidents** of all kinds
- Get involved in **fights**
- Engage in **risky** or even dangerous behavior

Source: The American Academy of Child and Adolescent Psychiatry

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## Teens often do not:

- Think **before** acting
- Pause to consider the potential **consequences** of their actions
- Modify their **dangerous** or inappropriate behaviors

Source: The American Academy of Child and Adolescent Psychiatry

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## Points to Remember

1. Adolescent brain differences **do not mean** that young people cannot make good decisions or tell the difference between right and wrong.
2. Brain differences do not mean that adolescents should not be **held responsible** for their actions.

Source: The American Academy of Child and Adolescent Psychiatry

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## ...However

An awareness of these differences can help medical providers to explain to parents, teachers, advocates, and policy makers how to better **understand, anticipate, and manage** the behaviors of teens.

Source: The American Academy of Child and Adolescent Psychiatry

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## Adolescent Resilience

*Resilience* is the ability of an individual to function competently in the face of adversity or stress.

### Factors that promote resilience among adolescents include:

- Caring relationships with adults
- Easygoing disposition
- Cognitive skills
- Confidence
- Strong internal values



Source: Murphey, D, Barry, M, Vaughn, B.

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## Adolescent Resilience

Adolescents who are resilient may be better able to avoid risky behaviors, such as violence, substance use, and adolescent pregnancy than other adolescents.

### Ways to reduce the negative effects of stress and build resilience include:

- Regular physical exercise
- Avoiding substance use
- Practicing meditation
- Among other techniques



Source: Murphey, D, Barry, M, Vaughn, B.

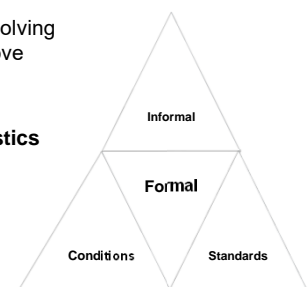
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## Adolescent Resilience

School- or community-based programs can teach problem solving and social skills that can improve resilience.

### Community-level characteristics impact resilience:

- Informal support
- Formal support
- Community conditions
- Community standards



Source: Murphey, D, Barry, M, Vaughn, B.

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## The Teen Mom

Risk and Development

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## Risks to the Adolescent Mother



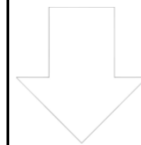
Source: AAP Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## Risks to the Adolescent Mother



**Increased** use of alcohol and cigarettes during first 6 months postpartum.



**Decreased** use of alcohol, cigarettes, marijuana, and crack cocaine during gestation.

Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## Repeat Adolescent Pregnancy

Repeat births have been linked to decreased educational achievement, increased dependence on governmental support, infant mortality, and low birth weight.

**Risk factors associated with repeat pregnancy include:**

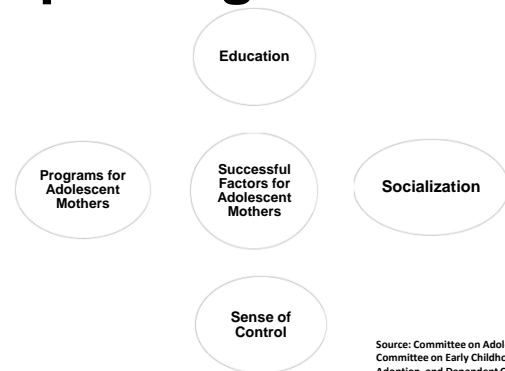
- Not returning to school within 6 months
- Marriage or living with partner
- Receiving child care assistance



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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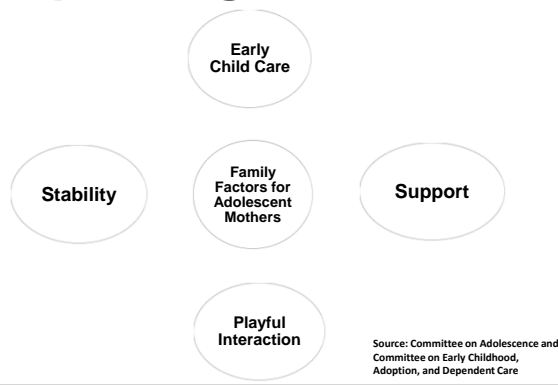
## Improving Outcomes



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## Improving Outcomes



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## Adolescent Fathers

There are fewer adolescent fathers than adolescent mothers. Adolescent fathers are more likely to live in poverty, and is often repeated from one generation to the next, like adolescent motherhood.

### Examining adolescent women pregnancies:

- 30% to 50% involve a father  $\leq 20$  years
- Socioeconomic and psychological disadvantages
- Likelihood of generational repetition



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## Risks to Children

Infants born to adolescent mothers are at increased risk for various developmental, social, emotional, and mental factors.

### Risk factors associated with birth to an adolescent mother:

- Increased incidence of low birth weight, prematurity, developmental disabilities, and poor developmental outcomes
- Brain structure development may be hindered by negative life experiences
- Increased rate of school dropout, depression, incarceration, and adolescent parenthood



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## Support and Interaction

One of the most important predictors of child development is the quality of the parent-child interaction.



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## Support and Interaction

The home literacy environment contributes to child development.



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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## AAP Recommendations for Adolescent Parents

1. Provide continuity of care and a "medical home" for adolescent parents, as well as for their children. Support adolescent's role as a parent.
2. Care for parenting adolescents should be multidisciplinary and comprehensive using community resources, social services and school-based services as needed.
3. Promote breastfeeding by all adolescent mothers.
4. Contraceptive counseling should be initiated during pregnancy and continued after the pregnancy with an emphasis on long-acting methods coupled with condom use.
5. Emphasize the importance of completing high school.

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## AAP Recommendations

6. Encourage the continuation of healthy lifestyles that may have been initiated during pregnancy. Information on the effect of substance use and cigarette smoking.
7. Assess for risk of domestic violence.
8. Stress the importance of the adolescent parent caring for the child even if other adults are involved in the caregiving.
9. Adapt their counseling to the developmental level of the adolescent, using office-based and school-based interventions that incorporate intensive instruction on infant care and development, discipline, and the stress associated with parenting.

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## AAP Recommendations

8. Pediatricians should stress the importance of the adolescent parent caring for the child even if other adults are involved in the caregiving (eg, grandmothers and great-grandmothers). These other caregivers need support and education to allow optimal infant development while helping the adolescent to achieve her own developmental milestones.
9. Pediatricians should adapt their counseling to the developmental level of the adolescent, using office-based and school-based interventions that incorporate intensive instruction on infant care and development, discipline, and the stress associated with parenting.

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## AAP Recommendations

10. Pediatricians should maintain a heightened sense of awareness to attend to the development of both infant and adolescent parent. The pediatrician should ensure that both quality community resources are available and that quality programs are used by adolescent parents such as competent home visits, sensitive and effective preterm and infant classes, quality child care giving programs, and well-managed programs supported by Head Start and Individuals with Disabilities Education Act-Part C (for children ages 0 to 3 years with disabilities or at risk) when available and appropriate.

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## AAP Recommendations

11. Pediatricians should provide positive reinforcement for success, including praising adolescents who are successful (eg, graduating from high school or college; abstaining from use of drugs, alcohol, and nicotine; continuing breastfeeding; keeping the child's immunizations current; and attending all well-child visits).
12. Further studies are needed on interventions involving fathers of infants born to adolescents and on the influence of grandmothers assisting in child rearing or as primary caretakers.
13. Short- and long-term outcome evaluations should be conducted on adolescent parenting programs.

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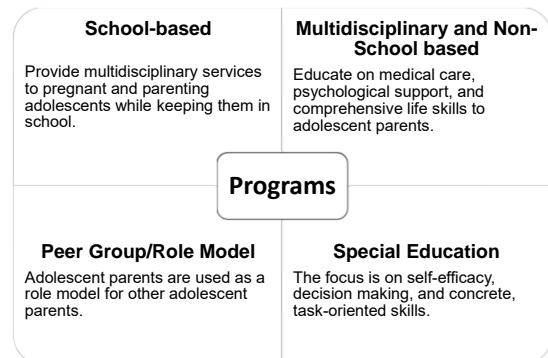
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## Using Recommendations in Practice

- Any interventions put into place need to account for the adolescent's developing brain function and seek to enhance these executive brain functions
- Toxic stress has several negative effects in children; therefore, identifying children at risk must be a priority for pediatricians

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## Intervention Models



Source: Committee on Adolescence and Committee on Early Childhood, Adoption, and Dependent Care

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The AAP and ICAAP are  
**committed** to mitigating the  
negative effects of toxic  
stress in children.

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Thank you!

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