

**Adolescent HIV and the Developing Teen Brain**

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**Financial Disclosure Slide**

I have no real or perceived financial disclosures to any commercial products or therapies.

I will not promote the use of any commercial products during this discussion.

I receive HRSA Part D funding for working with Adolescents living with HIV.

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**Objectives**

- Identify the milestones of adolescent development and recognize how HIV can affect these
- Recognize the barriers to care for adolescents and young adults living with HIV
- Identify tangible steps to make your practice more friendly for adolescents living with HIV

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### Psychosocial tasks of Adolescence<sup>1</sup>

- Emotional separation from parents
- Greater sense of personal identity
- Identification with a peer group
- Assigning increased importance to body image and acceptance of one's body

Establishing sexual, vocational and moral identities



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### Psychosocial development

- Early- 10 to 13 years
- Middle- 14 to 16 years
- Late- 17 to 21 years
- Young Adulthood- 21 years and beyond



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### Early Adolescence<sup>1</sup>

- Physical Changes
  - Initiation of puberty
  - Preoccupation with self image
- Cognitive State
  - Concrete thought process
- Social Context
  - Reliance on parents
- Sexuality
  - Crushes and beginning sexual experimentation



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### Middle Adolescence<sup>1</sup>

- Physical
  - Completion of puberty
- Cognitive
  - Some abstract thinking
  - Deficit of risk consequence reasoning
- Emotional
  - Risk taking and experimentation
- Social
  - Peer influence increases
  - Diminished family influence
- Sexual
  - Intense romantic relationships
  - Serial monogamy



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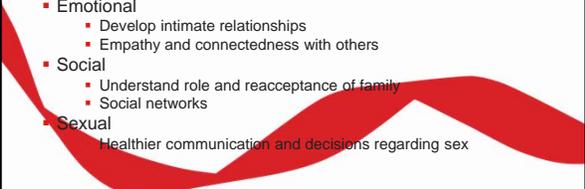
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### Late Adolescence<sup>1</sup>

- Physical
  - Reproductive maturity
- Cognitive
  - Abstract reasoning
  - Understand risk consequence logic
- Emotional
  - Develop intimate relationships
  - Empathy and connectedness with others
- Social
  - Understand role and reacceptance of family
  - Social networks
- Sexual
  - Healthier communication and decisions regarding sex



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### Young Adulthood<sup>2</sup>

- Physical
  - Acceptance of self and image toward others
- Cognitive
  - Beginning to master delayed gratification
- Emotional
  - Beginning to master emotional regulation
- Social
  - Broader networks of social connections
  - Transition into vocational goals
- Sexual
  - Fully establishing sexual identity and preferences in the context of social culture



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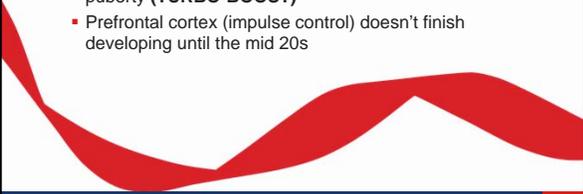
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### Adolescent Brain Development<sup>3</sup>

- Based on functional MRI studies we see a **mismatch** in brain development
  - Limbic System (drives emotions) intensifies during puberty (**TURBO-BOOST**)
  - Prefrontal cortex (impulse control) doesn't finish developing until the mid 20s



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### Adolescent Brain Maturation

- Proliferation
- Pruning
- Myelination



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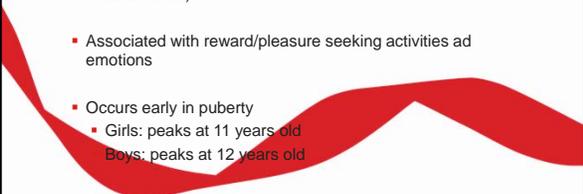
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### Proliferation

- Sub-cortical areas of the brain show significant development during adolescence
- Limbic system: amygdala, nucleus accumbens (addiction reward center)
- Associated with reward/pleasure seeking activities and emotions
- Occurs early in puberty
  - Girls: peaks at 11 years old
  - Boys: peaks at 12 years old



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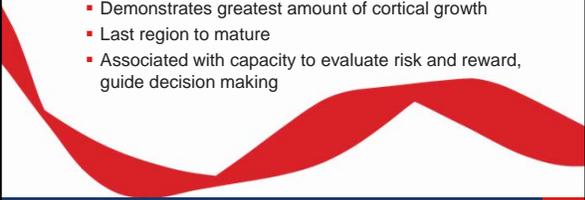
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### Proliferation

- Cortical areas develop later on during adolescence
- Ventromedial prefrontal cortex
  - Demonstrates greatest amount of cortical growth
  - Last region to mature
  - Associated with capacity to evaluate risk and reward, guide decision making



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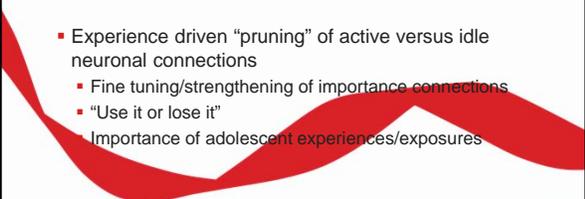
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### Pruning

- Decrease in cortical gray matter
  - Occurs simultaneously in areas of proliferation
  - Significance unclear
- Experience driven “pruning” of active versus idle neuronal connections
  - Fine tuning/strengthening of importance connections
  - “Use it or lose it”
  - Importance of adolescent experiences/exposures



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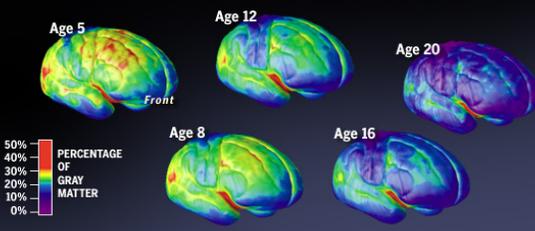
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### Time-Lapse Brain

■ Gray matter wanes as the brain matures. Here 15 years of brain development are compressed into five images, showing a shift from red (least mature) to blue.



Age 5      Age 12      Age 20

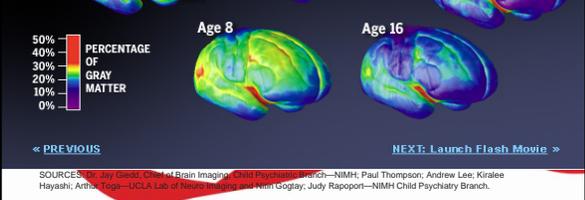
Age 8      Age 16

50% — PERCENTAGE OF GRAY MATTER  
40% —  
30% —  
20% —  
10% —  
0% —

Front

« PREVIOUS      NEXT: Launch Flash Movie »

SOURCES: Casey C. et al.—Med Brain Imaging; Child Psychiatric Branch—NIMH; Paul Thompson; Andrew Lee; Kiralee Hayashi; Aron Toga—UCLA Lab of Neuro Imaging; and Veni Gogtay; Judy Rapoport—NIMH Child Psychiatry Branch.



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### Myelination

- Significant increases in white matter volume during adolescence
  - Focal recruitment of pathways over time
- Believed to represent myelination of frequently used pathways
- Facilitating connections among cortical-subcortical regions
  - Strengthening of connections
  - "Optimum efficiency"



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### Development Mismatch<sup>4</sup>

- Relative imbalance between limbic and cortical systems during adolescence
- fMRI: greater activity in amygdala versus prefrontal cortex in younger adolescents in response to "emotional situations"
- Heightened response to rewards/pleasure with decreased capacity to control/weigh risks
- Limbic system is highly sensitive to hormones



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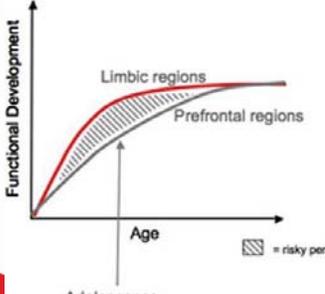
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### Development Mismatch



Functional Development

Age

Adolescence

Limbic regions

Prefrontal regions

= risky period



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### Adolescent Invincibility

- “Nothing bad can happen to me”
- Results in Risk taking
- Teens believe they will be exception to the rule that actions have consequences
- Results from the mismatch of development and egocentrism

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### HIV and the developing brain<sup>5</sup>

- Literature from other chronic conditions (Cystic fibrosis, Diabetes, Cancer, substance abuse) shows a significant delay in cognitive maturity compared to controls
- Chronic conditions affect the emotional regulation of the invincibility fable (If I am dependent on taking ART or insulin every day for survival I'm really not invincible like my peers)
- Newer studies have started to show white matter changes associated with HIV infection in children (maybe less white matter to begin adolescence)

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### Barriers to care for youth living with HIV

- “I can't go in that waiting room because my partner doesn't know I have HIV. She is from a very large family and it will get back to her if someone sees me in there.”
- “Every time I go to the doctor it is focused on my HIV care, I don't feel comfortable talking about other healthcare concerns.”
- “I live with my grandmother and she doesn't approve of me being gay so getting to clinic visits is challenging.”
- “The way I found out I had HIV was very traumatic for me and it affects me to this day.”
- “I've been taking this pill daily for ten years and we don't talk about it. So obviously this is something we shouldn't talk about.”

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### Barriers to care for youth living with HIV

- Stigma
- Disclosure fear or trauma
- Marginalization
- Co-morbidities – Substance abuse, mental health issues



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### The Cycle of Stigma for People living with HIV<sup>6</sup>



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graph TD; A[Anticipated Stigma] --> B[Social Isolation]; B --> C[Internalization And Shame]; C --> D[Fear of Disclosure]; D --> E[Enacted Stigma: Discrimination, Alienation, Social exclusion]; E --> A;
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### Disclosure<sup>7</sup>

- Inadvertent self disclosure can occur in youth who have perinatal acquired HIV (internet, peers, health care providers, family)
- Inadvertent disclosure to others can undermine trust in social situations or health care settings and potentially reinforce social isolation
- For young adults who are in a relationship concealing their status could create major barriers to seeking care and therapy



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### Marginalization

- Cultural Discrimination
  - 50% of children and adolescents living with HIV in Nashville are born abroad (Colombia, Haiti, Congo, Russia, India)
  - Very difficult for providers and all team members to be attuned to cultural norms for a diverse group of families
- Gender Identity and Sexual preference discrimination
- Racial Discrimination and resource allocation



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### Comorbidities as barriers to care<sup>8</sup>

- Generally the rates of depression/anxiety and substance use/abuse were similar for Adolescents living with HIV and age controls.
- Depression and anxiety were associated with lower ART adherence and higher viral loads in adolescents
- Persistent substance use and abuse were associated with ART nonadherence.



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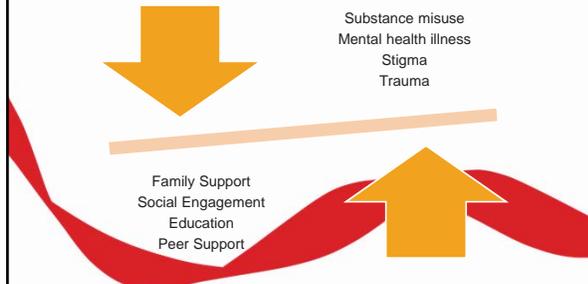
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### The balance beam of resilience in Adolescents and Young Adults



Substance misuse  
Mental health illness  
Stigma  
Trauma

Family Support  
Social Engagement  
Education  
Peer Support



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### Youth Friendly Services (YFS)<sup>9</sup>

- YFS are “accessible, acceptable, equitable, appropriate and effective to address the specialized needs of adolescents.”

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### How can clinicians provide YFS?

- Training in adolescent specific needs
  - Importance of Confidentiality
  - HEADDSSS psychosocial review
  - Incorporation of family in collaborative decision making
- Training and comfort with sexual and reproductive health services
  - Contraceptive services
  - Fertility/Pregnancy counseling
- Training in comprehensive care of youth
  - Mental health, social determinants of health
  - Providers must be comfortable and adept at addressing non HIV related medical care “Do you have any other unmet health needs?”

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### How can we make Youth friendly Clinic Structure?

- Training all staff in Youth friendly services and competency (Front desk, nurses, clinical assistants, social workers, pharmacists, and managers)
- Overt symbols and signs of acceptance, safety, and equality
  - Transgender Youth are welcome (Electronic Records that can allow gender preference)
  - Lesbian Gay, Bisexual youth are welcome
  - Homeless youth are welcome
  - Persons from all races and nationalities are welcome (Map of the World)
- Waiting room with other adolescents and young adults
- Adolescent friendly clinic hours and cancellation/late policy and friendly patient health information portals

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### How can we meet the needs and preferences of the client?

- Motivational interviewing to meet the client where they are in the stages of change in behavior or acceptance of health issues
- Remain nonjudgmental and non-biased with open ended questions and dialogue
- Strengths based approach – make sure the client is aware of their own resiliency factors (family, education or work, peers)

Flexibility and reassurance that we are in this provider-client relationship for the longer term



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### How can we meet the needs and preferences of the client?<sup>9</sup>

- Younger Adolescents (10-14) need direct support of family and caregivers
- Older Adolescents (15-19) require sexual and reproductive health resources and mental health resources
- Young Adults (20-25) need help disclosing status to partners and help with prevention of transmission to others



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### Differentiated Models of Care<sup>9</sup>

- Promote use of family based approach to collaborate for young people's care
- Integration of psychosocial support and sexual and reproductive services
- Peer Education and support groups



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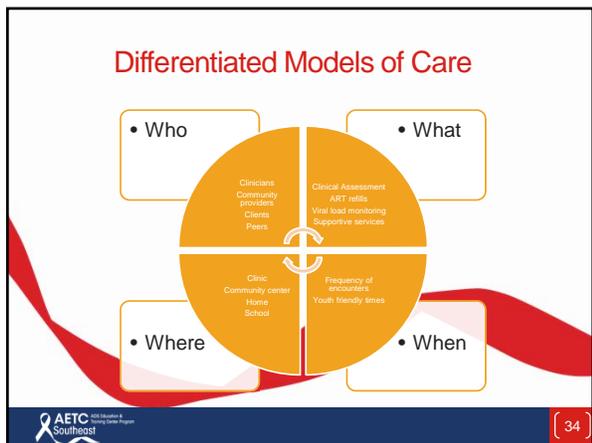
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- ### Differentiated Models of Care<sup>10-13</sup>
- Social Groups (Teen Club, Saturday Club)
    - Have shown improved retention of care for youth living with HIV
    - Have not shown benefit for patients who have adherence challenges or who are lost to care
    - Increasing social engagement and resilience factors and perhaps accountability
  - Multi- Month Script program for adolescents who have demonstrated adherence have shown lower attrition and mortality
  - Community based programs in Haiti and Zimbabwe have shown benefit from school based or home visits and peer education support
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- ### Key Summary Points
- Health Care providers should recognize the developmental mismatch in the adolescent brain which results in high risk behavior
  - Providers should recognize the important barriers to care and adherence for young people living with HIV and individualize discussions using a strengths based approach.
  - We can enhance access to care for YPLWH by focusing on client needs, youth friendly environments, and social engagement in care.
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