Wired to Feel:
Understanding Adolescent Brain Development and Suicidal Risk

Kevin's Song Annual Education Summit

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rethink

Objectives

- Explain the neurodevelopmental changes in the adolescent brain and how they contribute to impulsivity and emotional dysregulation
- Identify the biopsychosocial factors that increase risk for non-suicidal self injury and suicidal ideation during adolescence
- Describe the impact of social media and instant-gratification culture on adolescent resilience
- Demonstrate evidence-based strategies to promote distress tolerance and emotional regulation in youth

Wired to Feel: Understanding Risk

Risk

- Suicide remains a leading cause of death among U.S. adolescents.
  - Suicide is one of the top three causes of death for ages 10–18.

- In the past year:
  - Approximately 20% of high school students have seriously considered attempting suicide.
  - Nearly 10% report having had a suicide attempt.

Youth Risk Behavior Study (YRBS),2023

Risk

- Nearly 40% of students report persistent feelings of sadness or hopelessness lasting two weeks or more, a strong predictor of suicidal thoughts and behaviors.

- For every suicide death, attempts and emergency department visits for self-harm increase.
    - Mortality figures significantly underrepresent the overall burden of adolescent suicidality.

Youth Risk Behavior Study (YRBS),2023

Prevalence

- According to the Substance Abuse and Mental Health Services Administration (SAMHSA), 12% of adolescents aged 12–17 had serious thoughts of suicide in the past year, and hundreds of thousands attempted suicide.

- Suicidal ideation:
  - Roughly 1 in 5 adolescents seriously consider attempting suicide each year.

- Suicide attempts:
  - Close to 1 in 10 high school students report an attempt within a 12-month period.

Youth Risk Behavior Study (YRBS),2023

SAMSHA 2024

Trends Over Time

- Over the past 10 years:
  - Suicidal behaviors and self-harm visits to emergency departments have risen sharply.
    - This suggests higher distress and unmet mental health needs among youth.

SAMSHA 2024

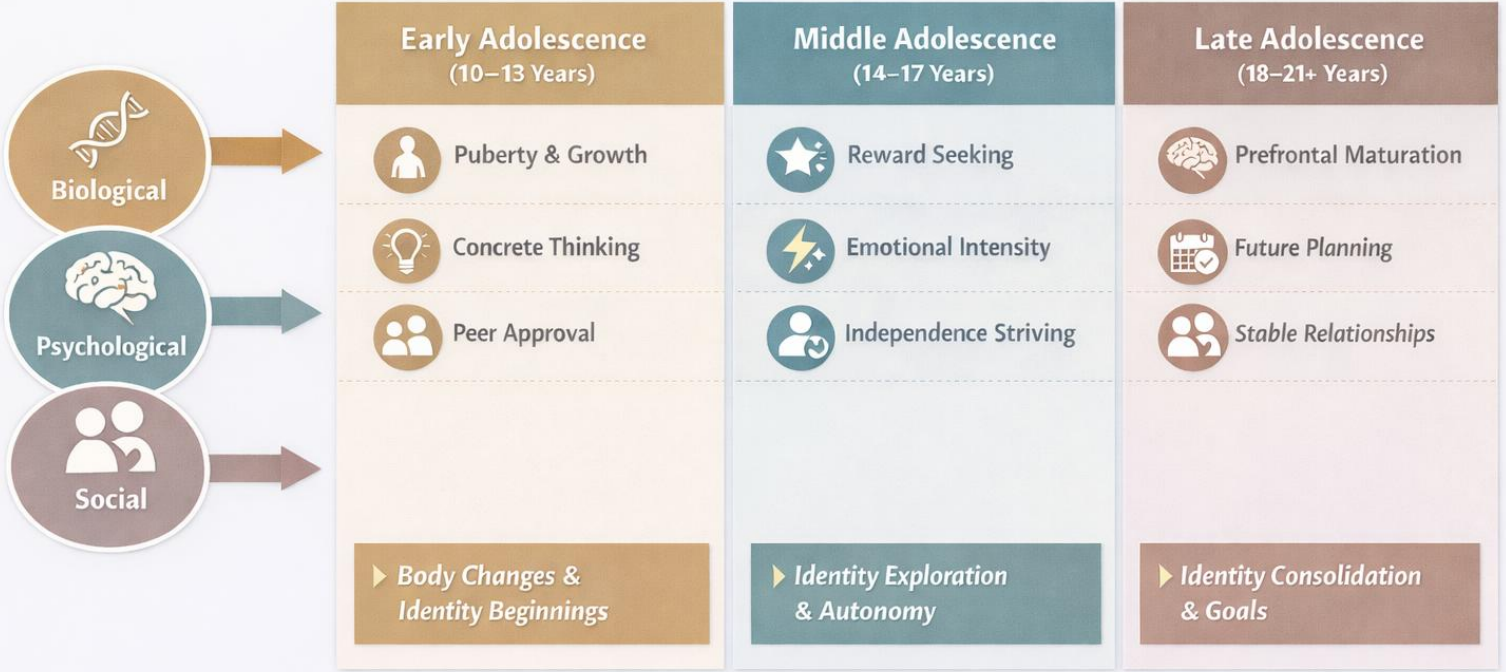
Wired to Feel:
The Architecture of Adolescent Development

The Biopsychosocial Lens

- Adolescent development occurs across biological, psychological, and social systems **ASYNCHRONOUSLY.**

- Risk and resilience emerge from the interaction between these as opposed to a SINGLE factor.

Biopsychosocial Stages *of* Adolescent Development



The Biopsychosocial Lens

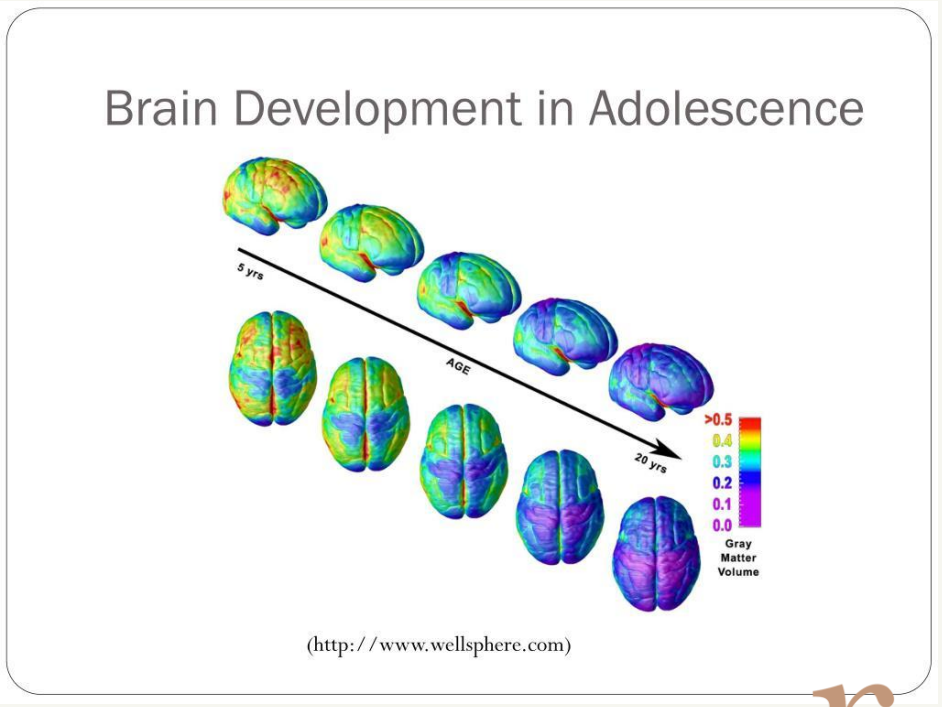
Stage of Adolescence	Biological Development	Psychological Development	Social Development	Primary Developmental Goals
Early Adolescence (~10–13 years)	Onset of puberty Rapid physical growth Hormonal changes **Increase emotional reactivity**	**Concrete thinking predominates** Heightened emotional sensitivity **Limited impulse control**	Increased reliance on peer approval Beginning separation from parents	Adjust to bodily changes **Begin identity awareness** Establish peer belonging
Middle Adolescence (~14–17 years)	Continued brain remodeling **Heightened reward sensitivity** Limbic system highly active	Emerging abstract thinking **Emotional intensity and volatility** Increased risk-taking	**Strong peer influence** Desire for autonomy Romantic relationships begin	Identity exploration **Autonomy from caregivers** Emotional self-definition
Late Adolescence (~18–21+ years)	**Ongoing prefrontal cortex maturation** Improved executive functioning	Improved emotional regulation Future-oriented thinking Increased self-reflection	More stable relationships Greater independence and responsibility	Identity consolidation Long-term planning Integration of self-concept

Wired to Feel:
The Developing Brain

The Developing Brain

Adolescents are neurologically primed for learning and adaptation but also for risk.

- Adolescent brain development is prolonged, nonlinear and experience dependent
- Brain maturation continues into mid-20s
- Emotional and reward systems mature before regulatory systems
- Creates a “developmental mismatch”



Casey et al., 2023

Fuhrmann et al., 2022

Prefrontal Cortex

- Functions:
  - Impulse control
  - Planning and judgment
  - Emotional regulation
  - Future-oriented decision making
- Developmental reality
  - PFC maturation is slower than emotional and reward systems
- Adolescents may understand consequences cognitively but fail to regulate behavior emotionally

Luna et al., 2023
Steinberg, 2022
Casey et al., 2023

Limbic System

Key limbic structures

- Amygdala
  - Threat detection
  - Fear response
- Ventral striatum
  - Reward processing
- Hippocampus
  - Emotional memory

Limbic System

During adolescent development there is:

- Increased amygdala reactivity to social and emotional stimuli
- Heightened sensitivity to rejection, loss, and perceived failure
- Stronger emotional memory encoding

McLaughlin et al., 2022
Tottenham, 2023
Blakemore & Mills, 2023

Reward Sensitivity

- Reward sensitivity
  - Dopamine-driven novelty seeking
  - Increased risk-taking

- Behaviors driven by reward
  - Preference for immediate rewards
  - Greater susceptibility to habit formation (adaptive or maladaptive)

Larsen & Luna, 2022
Steinberg, 2022
Hooley & Franklin, 2023

Neuroplasticity

- Neuroplasticity
  - The brain's ability to reorganize itself based on experience
  - Especially high during adolescence

- Repeated behaviors strengthen neural pathways

- Coping strategies, healthy or harmful, can become ingrained.

Fuhrmann et al., 2022
Blakemore 2023
Hooley & Franklin, 2023

When Development Increases Vulnerability

Development and Risk of NSSI and SI

- Adolescence is a time of high risk
  - High emotion in the presence of low regulation
  - Peer salience
  - Identity vulnerability
  - Increased exposure to stressors
  - First onset of many psychiatric disorders

Casey et al., 2023
Blakemore, 2023
Solmi et al., 2022

Development and Risk of NSSI and SI

- Emergence of Mental Health Concerns
  - ~75% of lifetime mental health disorders emerge by age 24
  - Untreated symptoms increase NSSI and SI risk
  - Shame and stigma delay help-seeking

Casey et al., 2023
Blakemore, 2023
Solmi et al., 2022

Risk of Non-Suicidal Self-Injury (NSSI) and Suicidal Ideation (SI)

- Non-Suicidal Self-Injury (NSSI)
  - Peak onset: ages 12–16
  - Often co-occurs with mood and anxiety disorders
  - A coping mechanism for intense emotional states

- Prevalence:
  - Approximately 18% of adolescents report lifetime NSSI

Gillies et al., 2023

NSSI relationship to SI

- NSSI increases risk for later suicidal behavior.
  - Repeated self-injury may reduce fear of pain and death, increasing capability for suicide (Joiner's Interpersonal Theory).
  - Acute stressors, interpersonal conflict, or psychiatric symptoms can trigger transition from NSSI to suicidal behavior.

- It is important to remember, a NSSI history warrants risk assessment and safety planning.

King et al., 2025;
Klonsky et al., 2023
Ribeiro et al., 2022

Impulsivity and Emotional Dysregulation

- Act First, Think Later
  - Impulsivity
    - Rapid action during distress
    - Less time between thought and behavior
    - Strong link to impulsivity and NSSI and SI
      - Increased danger during acute emotional crises

  - Emotional Dysregulation
    - Emotional dysregulation is a core driver of self-harm behaviors
    - NSSI often functions to downregulate overwhelming affect

Luna et al., 2023
Sanz-Gómez et al, 2024
McLaughlin et al., 2022
Crowell et al., 2023

Development and Risk of NSSI and SI

- Peer Influence
  - Peer feedback shapes self-worth
  - Social comparison intensifies distress
  - Social rejection activated the limbic system threat circuitry

- Identity Formation
  - Identity uncertainty increases vulnerability to self-harm as a (maladaptive) coping skill

Steinberg & Monahan, 2022
Blakemore & Mills, 2023
Pfeifer & Berkman, 2023
Schwartz et al., 2021

The Role of Social Media

Digital Development

- Adolescents spend 6–9 hours/day on screens.
  - Social media is highly important
- Online activity overlaps with peer identity formation.
- Social media magnifies both positive reinforcement and peer rejection.
  - Social media has become an extension of adolescent development.
  - Feedback is immediate, real and constant.

Blakemore, 2023;
Pew Research Center, 2023

Social Media and Risk

- Social comparison
  - Viewing peers' curated lives can increase hopelessness
- Sleep disruption
  - Late-night scrolling affects mood regulation and sleep quality
- Cyberbullying
  - Direct harassment and exclusion increases stress
- Exposure to self-harm content
  - Normalizes maladaptive coping skills

Nagata et al., 2025;
Nesi et al., 2021
Marchant et al., 2021

Instant Gratification and Reduced Resilience

- Algorithm-driven feedback loops create expectation of immediate reward.
- Reduces tolerance for delayed gratification or frustration.
- Less practice in coping with normal distress, which is protective.

Instant gratification online, and in general, reinforces neural pathways that favor quick emotional escape over adaptive coping.

Montag & Hegelich, 2020
Odgers & Jensen, 2023
Sequeira et al., 2022

Risk is Real.
Resilience is Possible.

Understanding is Key

- Living with a developing brain can be overwhelming and confusing.
- Developmentally tailored education improves emotional insight and coping.
- Teaching adolescents how their brain works:
  - Normalizes emotional intensity
  - Reduces shame and self-blame
  - Increases help-seeking

Pfeifer & Allen, 2021
Blakemore & Mills, 2023

Counteracting the Culture of Instant Gratification

- Adolescent brains are reward-sensitive.
  - Digital environments reinforce:
    - Immediate relief
    - Avoidance of discomfort
    - Low frustration tolerance

- Teach adolescents that discomfort is survivable and meaningful.

Steinberg, 2022
Odgers & Jensen 2020

Be Okay Not Being Okay

- Emotional pain is not inherently dangerous.

- Attempts to eliminate distress often increases risk behaviors.
  - Acceptance-based approaches reduce self-harm urges.
  - Distress tolerance predicts lower suicide risk.

- Aim to:
  - Normalize distress as part of development
  - Reduce urgency to “fix” feelings.
  - Separate emotions from actions.

Linehan, 2015
Wolff et al., 2023

Exercise the Prefrontal Cortex

- Strengthening executive function skills includes:
  - Impulse control
  - Planning
  - Delaying gratification
  - Problem-solving when stressed

- Practice makes progress
  - Skill building when calm
  - Visual reminders
  - External scaffolding (lists, routines)

Luna et al., 2023
Diamond & Ling, 2016

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Blakemore & Mills, 2023
Prinstein et al., 2020

The Role of Supporters

- Family connectedness is one of the strongest buffers against suicide risk.

- It is important that supporters:
  - Validate vs Minimize
  - Provide predictable structure
  - Model distress tolerance and acknowledge that adults still struggle with this when falling short

Miller et al., 2022
Brent & Bridge, 2023

Nutrition and Healthy Brain Development

- Nutrition is important in supporting healthy brain development and decreasing risk for maladaptive behaviors.
  - A dysregulated brain is harder to regulate when it is underfed.

- Adolescence is the second most rapid period of brain development after early childhood

- The brain accounts for 20–25% of total energy consumption.
  - Myelination (white matter growth)
  - Synaptic pruning
  - Neurotransmitter synthesis

Marx et al., 2021
Jacka et al., 2022

Nutrition and Healthy Brain Development

- A dysregulated brain is harder to regulate when it is underfed.

- Lack of nutrition can lead to:
  - Mood instability
  - Impulsivity
  - Symptoms of anxiety and depression
  - Decreased efficacy of therapeutic interventions and psychotropic medications

Marx et al., 2021
Jacka et al., 2022

Hope as a Neurodevelopmental Intervention

- Adolescence is a time of vulnerability AND opportunity.
- The same plasticity that increases risk also increases capacity for change.
- Adolescents, with the help of the trusted adults in their lives, can improve knowledge, build skills and create routines that will decrease risk and build resilience.

Luna et al., 2023
Diamond & Ling, 2016

questions.

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