

# 42nd Annual InterCourt Conference



Session 2E: Wired for  
Survival: Understanding  
Youth Through  
Neuroscience

March 12, 2026  
Hilton Columbus at  
Easton Town Center  
Columbus, OH

## FACULTY BIOGRAPHIES

**LESLIE DRUMMOND, Ph.D.** is the Research Manager at UCCI. She works with both the research and implementation teams to measure success within the Institute and with external partners. She leads a project funded by the Office of Juvenile Justice and Delinquency Prevention focused on system reform, while also managing, training, and assessing for the Correctional Program Checklist (CPC).

She holds a PhD in Cognitive Neuroscience from George Washington University. Her background is in Experimental Psychology/Physiology with performance in extreme environmental conditions (e.g., hypoxia, spatial disorientation, fatigue) and she has worked with academic, industry, and military collaborators in support of vulnerable and underserved populations.

# **Wired for Survival: Understanding Youth Through Neuroscience**

**Leslie Drummond, PhD**

*Research Manager*

*University of Cincinnati Corrections Institute*



**UCCI:**  
OHIO INTERCOURT  
CONFERENCE 2026

*Bracket Busters: Breaking the Mold,  
Defying the Odds*

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## Wired for Survival: Understanding Youth Through Neuroscience

University of Cincinnati Corrections Institute  
*Positively impacting lives and shaping safer communities by researching, developing,  
disseminating, and implementing best practices in corrections.*

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## Meet the Presenter!

 Leslie Drummond, Ph.D.  
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Research Manager, UCCI

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## Learning Objectives

- Learn the basic functions of the brain.
- Understand typical behavior relative to developmental stages of the brain.
- Learn how risk factors can alter developmental stages of the brain.

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## Mythbusters: UCCI Edition

**BUSTED**

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Section One

## A CRASH COURSE IN NEUROSCIENCE

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## The Brain

- An incredibly complex organ
  - Enables everything from basic survival functions to complex cognitive abilities.
- Comprised of white and gray matter.
  - Gray matter (40%)
    - Outer layer (the folded part)
    - Processes and interprets information
  - White matter (60%)
    - Inner layer
    - Transmits information to other parts of the nervous system



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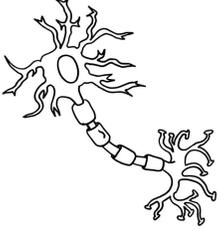
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## Neurons

- 100 billion nerve cells in brain
- Communication networks.
- Sensory Neurons
  - Touch, sound, light
  - Relay signals to brain spinal cord.
- Motor Neurons
  - Muscle contractions, glandular output
  - Receive signals from brain/spinal cord.
- Interneurons connect neurons within the same brain region or spinal cord.



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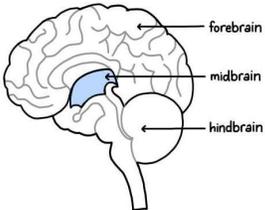
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## Major Areas

- The brain is divided into 3 major areas:
  - Hindbrain (“lizard brain”)
  - Midbrain (“relay station”)
  - Forebrain (“thinking brain”)



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## Hindbrain

- Medulla Oblongata
- Pons
- Cerebellum

pons  
medulla  
spinal cord  
cerebellum

KAPWING

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## Midbrain

- Tegmentum
- Tectum

thalamus  
superior colliculus  
inferior colliculus  
tectum  
tegmentum

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## Forebrain

- Telencephalon
- Diencephalon

cerebral cortex  
cingulate gyrus  
corpus callosum  
thalamus  
hypothalamus  
amygdala  
hippocampus

limbic system

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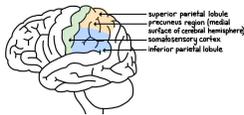
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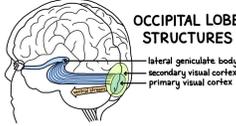
## Lobes

**PARIETAL LOBE SUBSTRUCTURES**



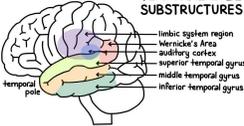
- superior parietal lobule
- precuneus region (medial surface of cerebral hemisphere)
- somatosensory cortex
- inferior parietal lobule

**OCCIPITAL LOBE STRUCTURES**



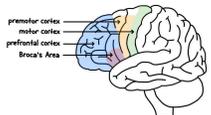
- lateral geniculate body
- secondary visual cortex
- primary visual cortex

**TEMPORAL LOBE SUBSTRUCTURES**



- limbic system region
- Hernick's Area
- auditory cortex
- superior temporal gyrus
- middle temporal gyrus
- inferior temporal gyrus

**FRONTAL LOBE SUBSTRUCTURES**



- premotor cortex
- motor cortex
- prefrontal cortex
- Broca's Area

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Section Two

## DEVELOPMENTAL TIMELINE

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## What plays a role in brain development?

- Genetics
- Prenatal Environment
- Early Experiences
- Nutrition
- Sensory Stimulation
- Sleep
- Physical Activity
- Social Interactions
- Stress & Trauma

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## Typical: In Utero

- Most structural features of the brain appear.
- Neurons multiply, migrate, and form connections.
- Axons myelinate (get insulated) for efficient communication.
- The cerebral cortex matures.
- Genetic and environmental factors influence cell division.



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16

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## In Utero: What does development look like?



8 Weeks 20 Weeks  
12 Weeks 26 Weeks

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## Typical: Infancy

- Newborn brain is 25% of its adult size.
- Continues rapid growth and maturation.
- Neurons form connections and basic sensory functions emerge.
- Development is unique based on genetics, environment, and experiences – early experiences shape synaptic connections.



Age Range: Birth to 1 Year

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## Infancy: What does development look like?

- Babies cry when hungry, wet, tired, etc.
  - Our responses create a connection in their brain.
- They develop an attachment to their primary caregivers.
  - Anxiety around strangers can develop around 9 months.
- They start to smile, babble, and otherwise engage with their world.
- They sleep (hopefully) a lot.

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## Typical: Toddlerhood

- In the first year, the brain's size doubles.
- By age 3, it's 80% of its adult size.
- The amount of neuronal connections doubles beginning at age 2.
- A language "explosion" occurs – they can learn up to 10 new words a day.



*Age Range: 1 to 3 Years*

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## Toddlerhood: What does development look like?

- Toddlers start to have opinions.
  - So. Many. Opinions.
- They begin testing boundaries: hitting, biting, throwing, etc.
- They love to say "NO".
- Big feelings start to emerge, but they don't have the words to express them.
- Start to engage in dramatic play, AKA "make believe."

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## Typical: Childhood

- The brain continues to grow – by age 6, it is 95% of its adult size.
- Cognitive abilities are constantly enhancing; learning and memory processes become more sophisticated while reasoning, problem-solving, and creativity are refined.
- Motor skills, language comprehension, and emotional regulation develop.
- Social and emotional skills blossom as children engage with their environment and peers.
- Brain plasticity remains high, allowing for adaptability and learning.
- Connections related to executive functions strengthen.
- Children become more independent and self-aware.



Age Range: 3 to 11 Years

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## Childhood: What does development look like?

- Better – *not good* – control over impulses.
- Developing a social circle, learning norms like sharing and taking turns.
- Gaining a sense of their own identity – New interests may appear out of the blue
- Gaining awareness of differences: cultural, racial, etc.
- May experiment with lying.

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## Typical: Adolescence

- Although the brain stops growing in size by early adolescence, the teen years are all about fine-tuning how the brain works.
- The Prefrontal Cortex is still developing.
  - Responsible for skills like planning, prioritizing, and making decisions.
- The Limbic System is highly active.
  - Influences emotions, experimentation, and risk-taking behavior.
- The reward pathway is more active in teens.
  - More dopamine receptors and dealing with a larger supply of dopamine circulating in their brains.



Age Range: 12 to 18 Years

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## Adolescence: What does development look like?

- Craving for separation, independence, and privacy
- Heightened emotional responses
- Pushing boundaries and testing limits
- Prioritizing friends over family
- Risk-taking and seeking out new experiences

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Section Three

## ADDING A LAYER: RISK

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## Criminogenic Risk Review

- History of Anti-Social Behavior
- Anti-Social Personality
- Anti-Social Cognition
- Anti-Social Peers
- Family
- Education/Employment
- Leisure Time/Recreation
- Substance Use

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## In Utero



**Typical**

- The brain is building its architecture:
  - Lots of healthy neural connections,
  - Forming the first neural circuits
  - Developing sensory systems
  - Establishing stress-response systems

**+ Risk**

- Mother uses substances, or experiences domestic violence:
  - Smaller body/brain size
  - Birth defects
  - Withdrawal

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## Infancy



**Typical**

- Newborns form a secure attachment to their primary caregivers through **consistent** caregiving.

**+ Risk**

- Caregivers display anti-social personality traits, behave irresponsibly, and are not concerned by an infant's needs/distress:
  - Baby will eventually stop crying because it's needs are not met.
  - The brain will rewire.

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## Toddlerhood



**Typical**

- Learn emotional regulation and boundaries through predictable routines.

**+ Risk**

- Model aggression, mistrust, or impulsivity due to exposure to instability or violence.

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## Childhood



**Typical**

- Develop social skills and moral reasoning through positive school and family interactions.

**+ Risk**

- Start internalizing anti-social attitudes and opinions
- Lack of achievement or emphasis on education
- Lack of prosocial leisure activities
- Seeing substance abuse as normative behavior

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## How Early Development Shapes the Adolescent You Meet

- All of this has happened to impact the youth, their thoughts, behaviors, etc.
- You meet your client as an adolescent.
- Risky behavior comes from their early experiences and development to this point.

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32

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## Adolescence



**Typical**

- Mood swings
- Pushing limits
- Seeking independence,
- **Occasionally** making impulsive choices that don't seriously affect safety or functioning

**+ Risk**

- More persistent or intense
  - Aggression
  - Substance user
  - Running away
  - Actions that harm themselves, others, or their daily functioning

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## What does risk look/sound like? (Anti-Social Peers)




Substance Use

Education

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## What does risk look/sound like? (Substance Use)




Anti-Social Peers

Family

Leisure Time

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## What does risk look/sound like? (Family/Relationships)




Substance Use

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Section Four  
**SUMMARY**

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37

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**Review Learning Objectives**

- Learn the basic functions of the brain.
- Understand typical behavior relative to developmental stages of the brain.
- Learn how risk factors can alter developmental stages of the brain.

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**Reflections**

**WHY** is it important to differentiate between typical adolescent behavior and criminogenic behavior?

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39

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## CCP Skills

- Quality Relationships
- Modeling
- Effective Use of Authority
- Effective Reinforcement
- Effective Disapproval
- Cognitive Restructuring
- Structured Learning
- Problem Solving

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## Reflection

How does knowing the difference between age-appropriate behavior and risky behavior change how you might respond to clients in the future?

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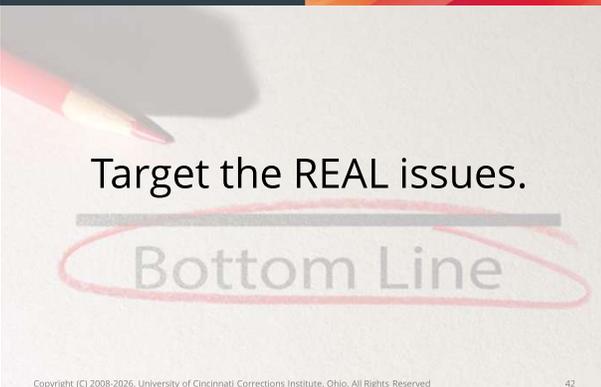
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Target the REAL issues.

Bottom Line

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## Wired for Survival: Neuroscience Handout

### The Brain

The brain is made of \_\_\_\_\_ and \_\_\_\_\_ matter.

\_\_\_\_\_ matter is the wrinkled outer layer of the brain responsible for decision-making and higher thinking.

\_\_\_\_\_ matter is the inner layer of the brain that helps transmit signals quickly and efficiently between different brain regions.

The nervous system is divided into the \_\_\_\_\_ and the \_\_\_\_\_ nervous systems.

The spinal cord's main job is to \_\_\_\_\_ information to and from the brain.

The brain communicates using \_\_\_\_\_ signals and \_\_\_\_\_ chemicals.

### Neurons

The brain contains about \_\_\_\_\_ billion neurons.

A neuron sends and receives \_\_\_\_\_ signals.

\_\_\_\_\_ neurons bring information from the senses to the brain.

\_\_\_\_\_ neurons send signals from the brain to muscles and glands.

\_\_\_\_\_ connect neurons within the brain and spinal cord.

### Major Brain Areas

The brain is divided into **three major regions**:

1. **Hindbrain** – Controls \_\_\_\_\_ functions (breathing, balance).
2. **Midbrain** – Acts as a \_\_\_\_\_ station for incoming and outgoing signals.
3. **Forebrain** – Responsible for \_\_\_\_\_, emotions, and complex thinking.

And **four lobes**:

1. The **frontal lobe** is responsible for \_\_\_\_\_, \_\_\_\_\_, and controlling \_\_\_\_\_.
2. The **parietal lobe** helps the brain process \_\_\_\_\_ information such as touch, temperature, and \_\_\_\_\_.
3. The **temporal lobe** is involved in \_\_\_\_\_, \_\_\_\_\_, and understanding \_\_\_\_\_.
4. The **occipital lobe** is the main center for \_\_\_\_\_ processing.

## Brain Development

1. In Utero: The brain develops rapidly as neurons \_\_\_\_\_, migrate, and form \_\_\_\_\_.
2. Infancy: The brain reaches about \_\_\_\_% of its adult size and forms millions of new \_\_\_\_\_.
3. Toddlerhood: Children may learn up to \_\_\_\_ new words per day.
4. Childhood: Skills in \_\_\_\_\_, memory, and problem-solving improve.
5. Adolescence: The \_\_\_\_\_ cortex (decision-making area) is still developing.

## Risk Factors and the Brain

Early exposure to chronic stress can cause the brain to stay in a constant state of \_\_\_\_\_, making it harder to focus and learn.

When a child experiences inconsistent caregiving, the brain may develop pathways that prioritize \_\_\_\_\_ over exploration and curiosity.

Substance exposure during pregnancy can interfere with how neurons \_\_\_\_\_ and \_\_\_\_\_ during fetal development.

Growing up in an environment with frequent conflict or instability can heighten activity in the \_\_\_\_\_ system, which manages emotional responses.

Lack of positive stimulation during early childhood can reduce the formation of strong \_\_\_\_\_ connections in the brain.

Trauma can alter the development of the \_\_\_\_\_ cortex, making impulse control and decision-making more difficult during adolescence.

Chronic exposure to unpredictable environments can make the brain more sensitive to \_\_\_\_\_, the body's main stress hormone.

A child who witnesses repeated risky or antisocial behavior may develop \_\_\_\_\_ patterns that normalize those behaviors.

Limited access to supportive relationships can weaken the brain's development of \_\_\_\_\_ skills, such as emotional regulation.

When the reward system develops faster than the decision-making system in teens, they may seek \_\_\_\_\_ experiences even when aware of the risks.

