The Basics of Brain Development

Presented by:

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Learning Objectives

- Recognize the basic parts of the brain and how nerve cells communicate and connect.
- Identify factors that affect brain growth and development.
- Describe strategies to support healthy brain development.

How Big is a Baby's Brain?

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The Growing Brain

Share a guess for how much a newborn's brain typically weighs.

From Baby to Grown-Up

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Newborn brain

12 oz to 14 oz
(less than a pound)

Adult brain

2 lbs 14 oz to 3 lbs 8 oz

Objective 1:

Recognize the basic parts of the brain and how nerve cells communicate and connect.

The Nervous System

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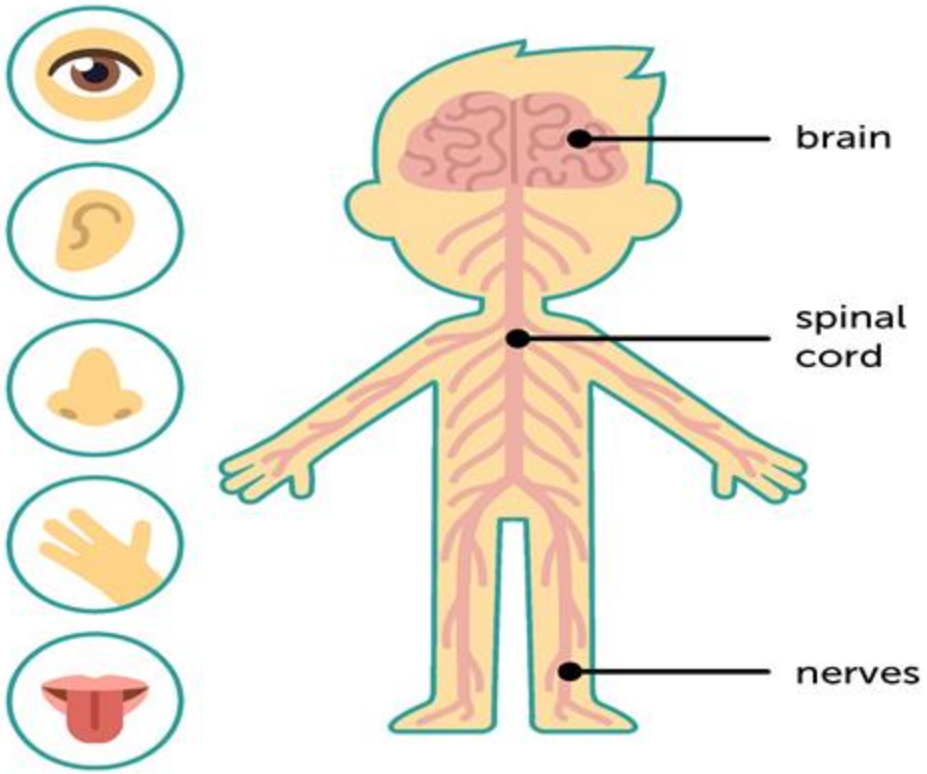

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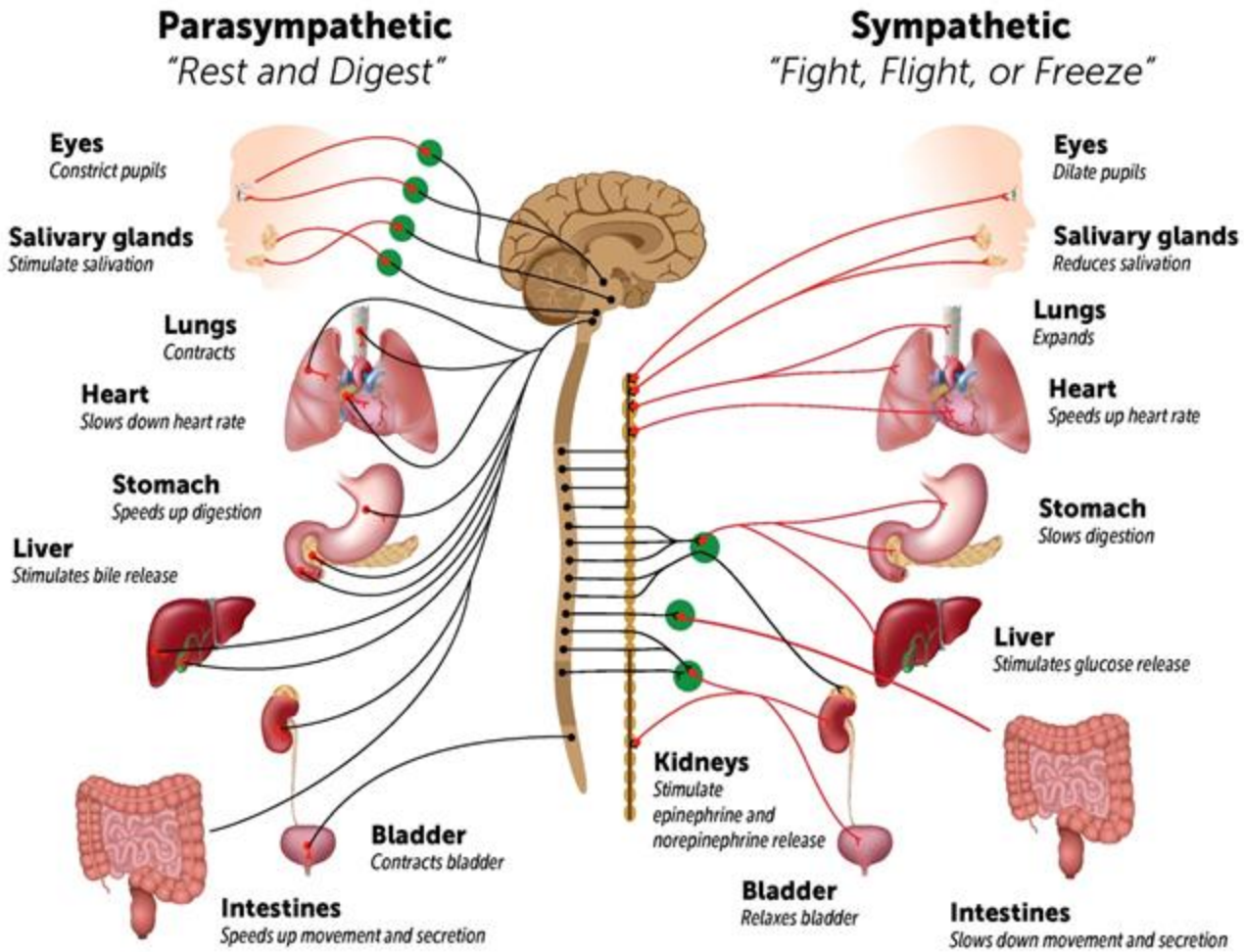

The Sympathetic and Parasympathetic Nervous Systems

Major Regions of the Brain

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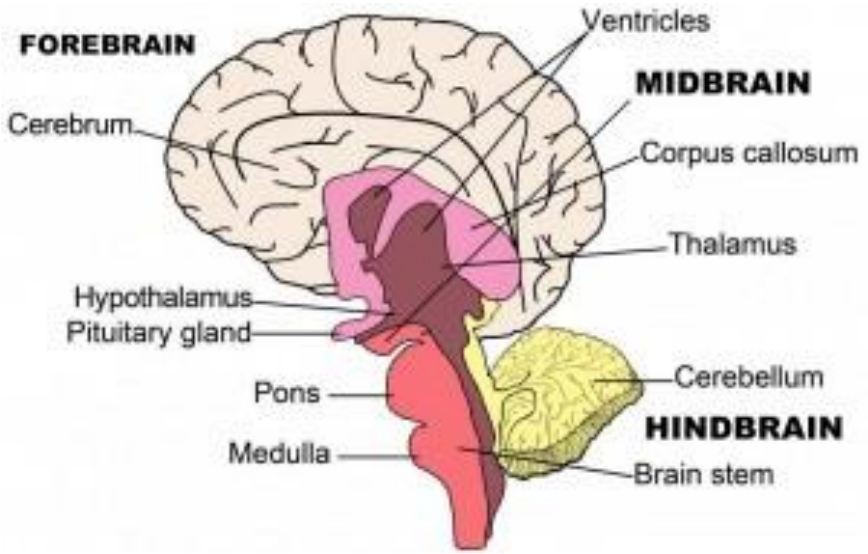

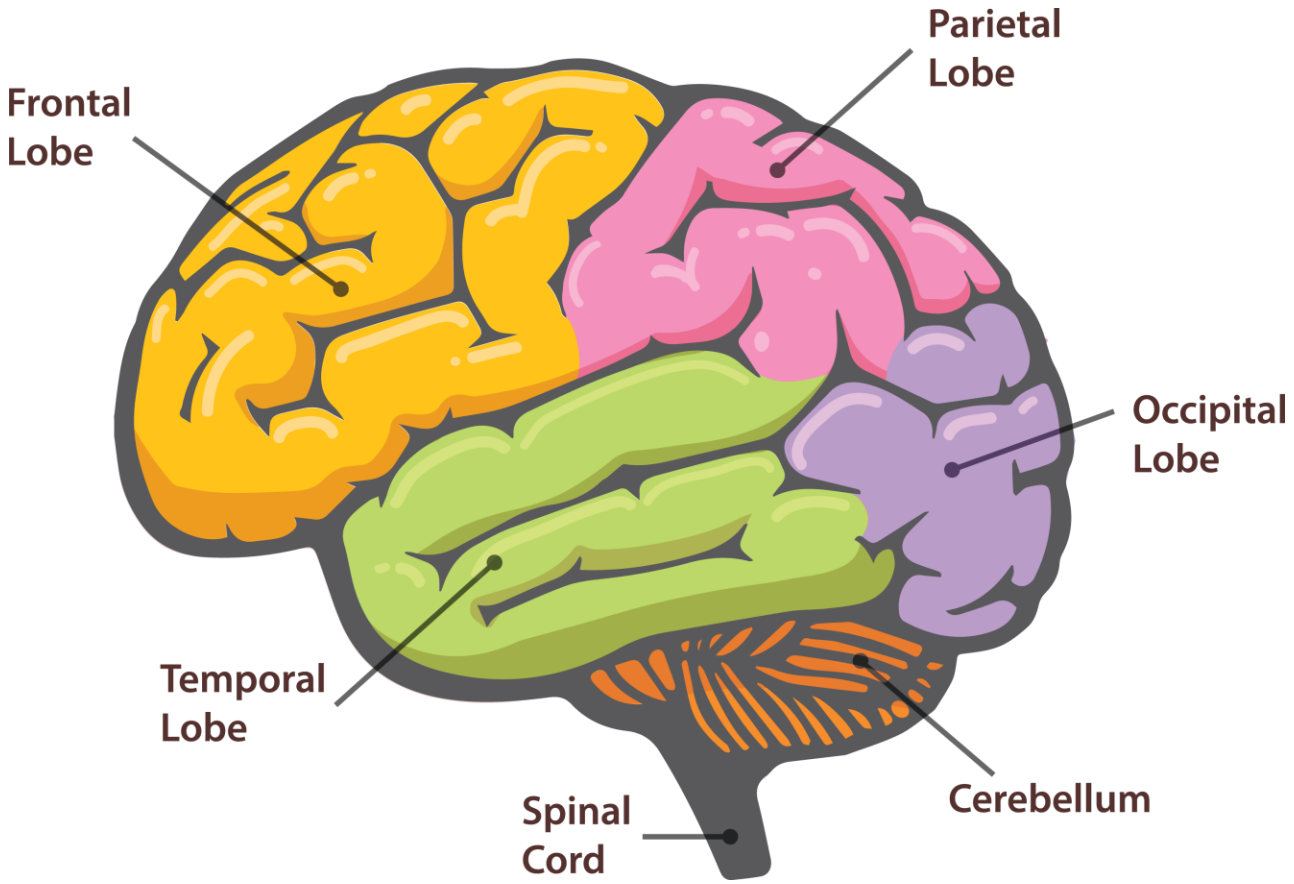

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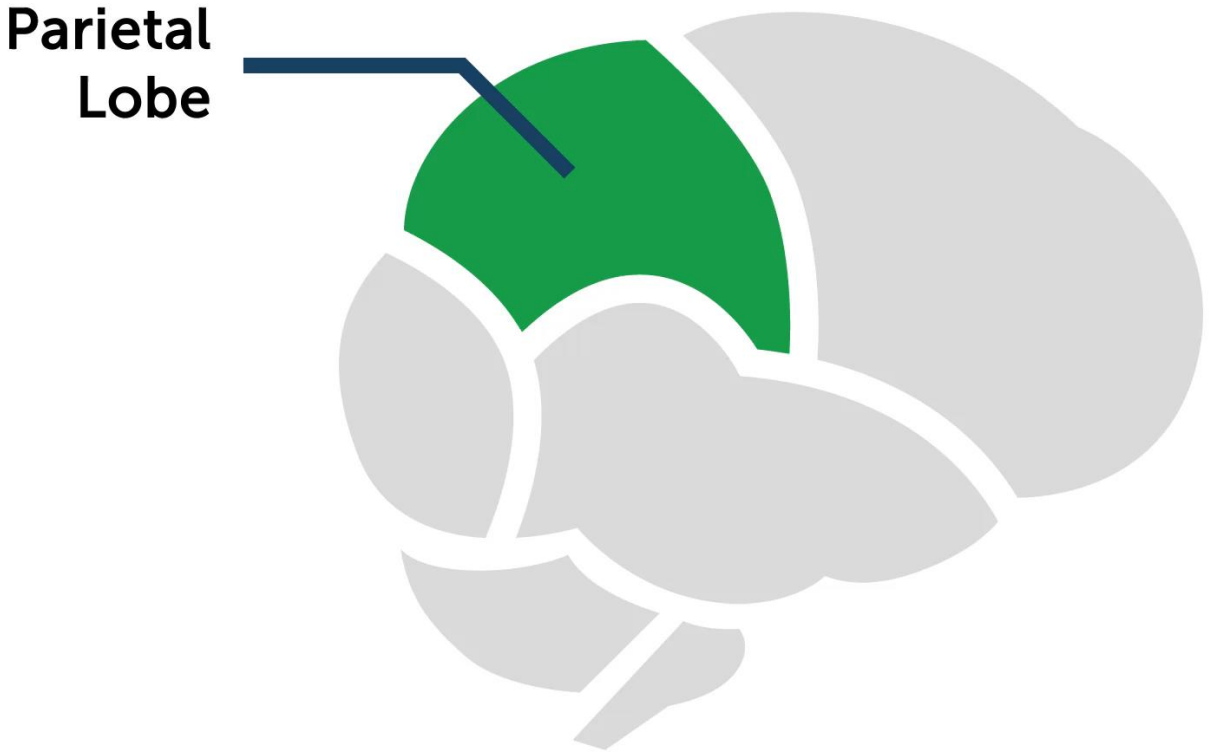

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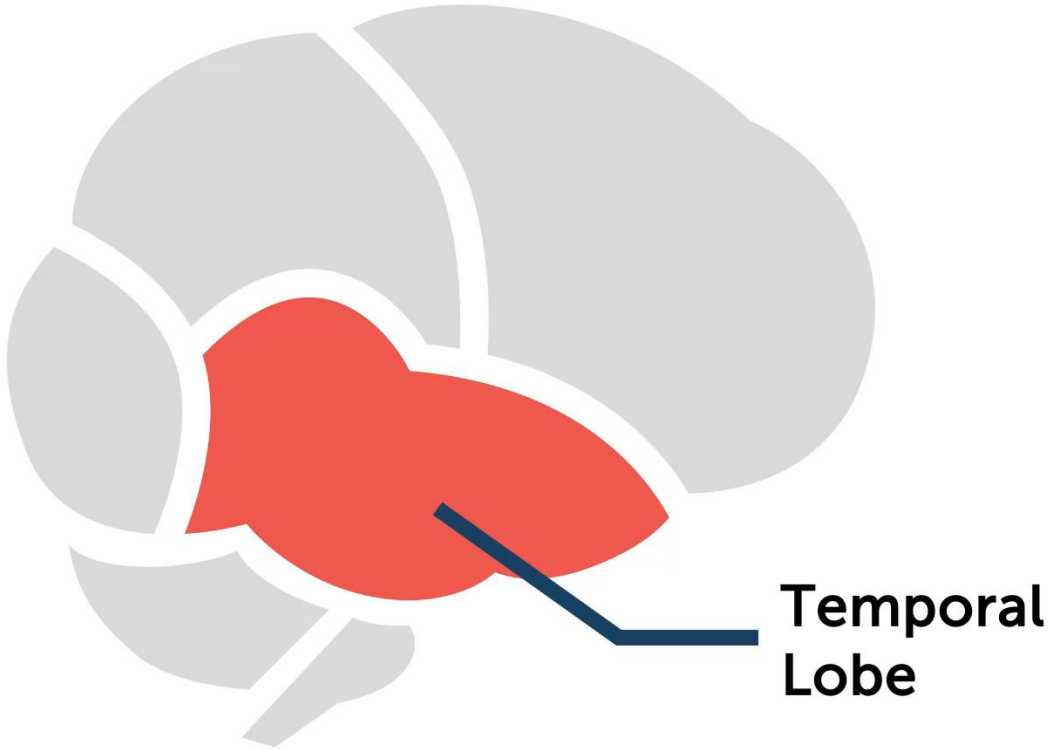

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Brain Campaign Activity

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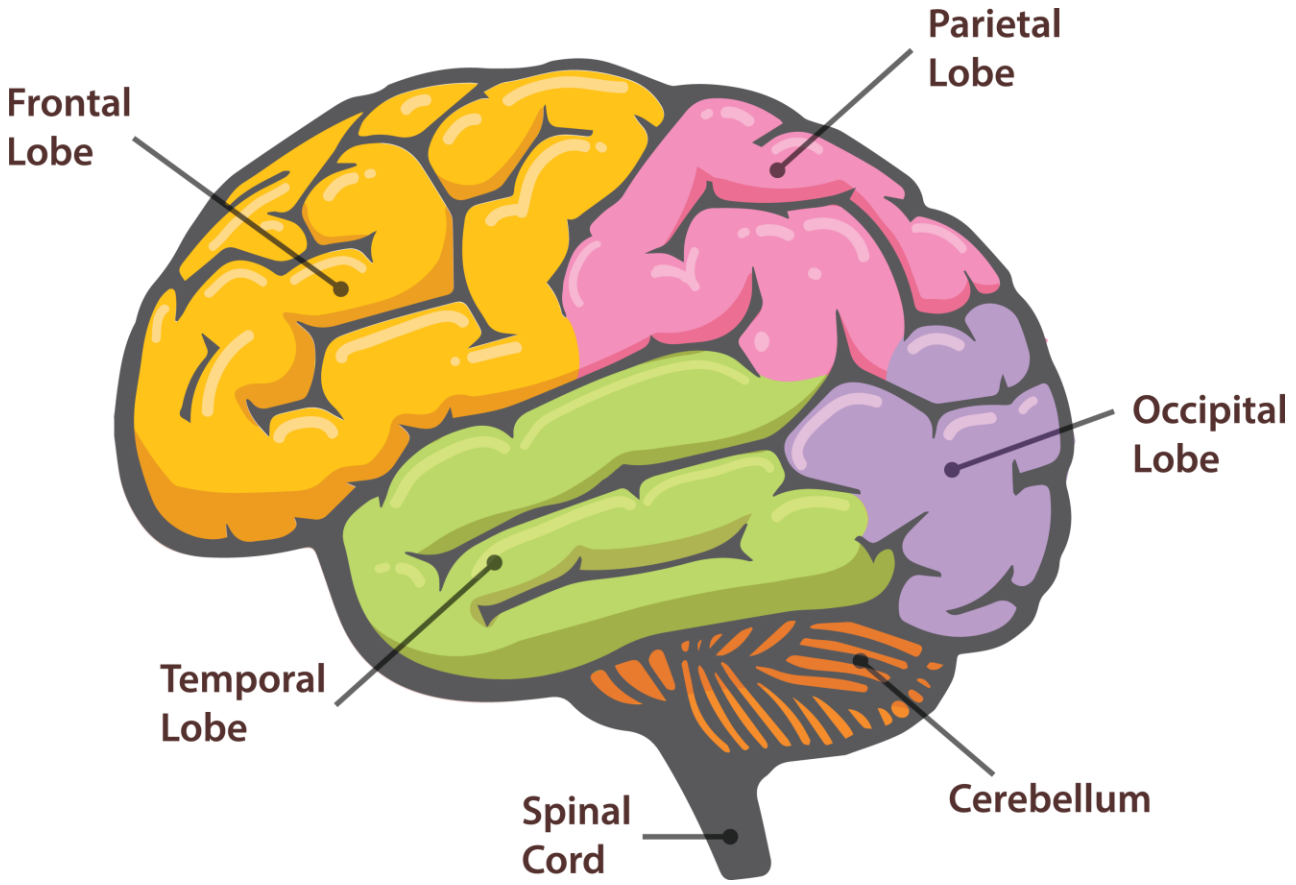
Think of a slogan or jingle or find a picture to represent a part of the brain. Be sure to include the function.



Brain Connectivity

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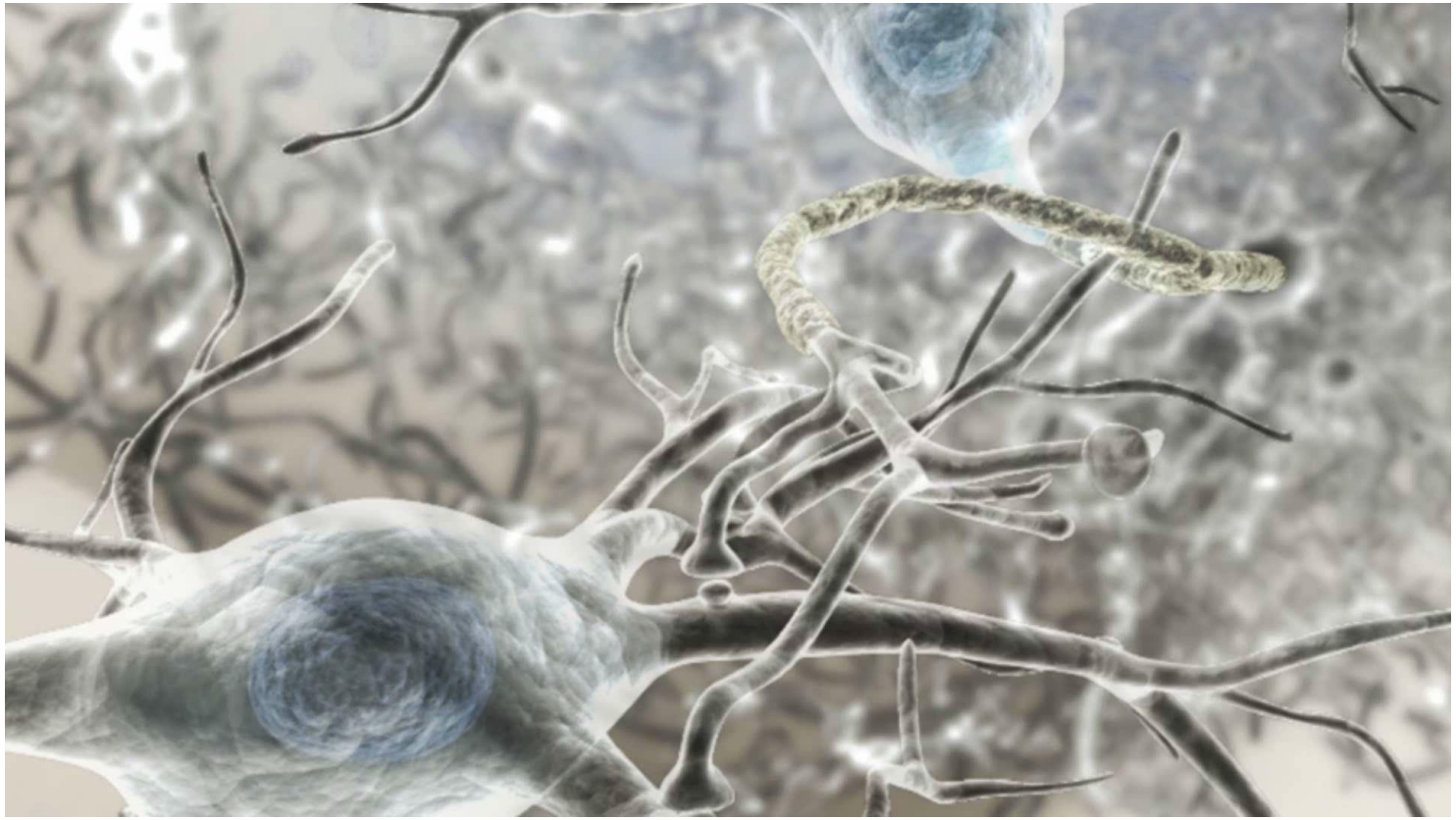

Neuroplasticity

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- The brain's potential to create or change networks of neurons based on experiences.
- Infants have a great deal of flexibility, or neuroplasticity, in their brains.

Timing — Sensitive and Critical Periods

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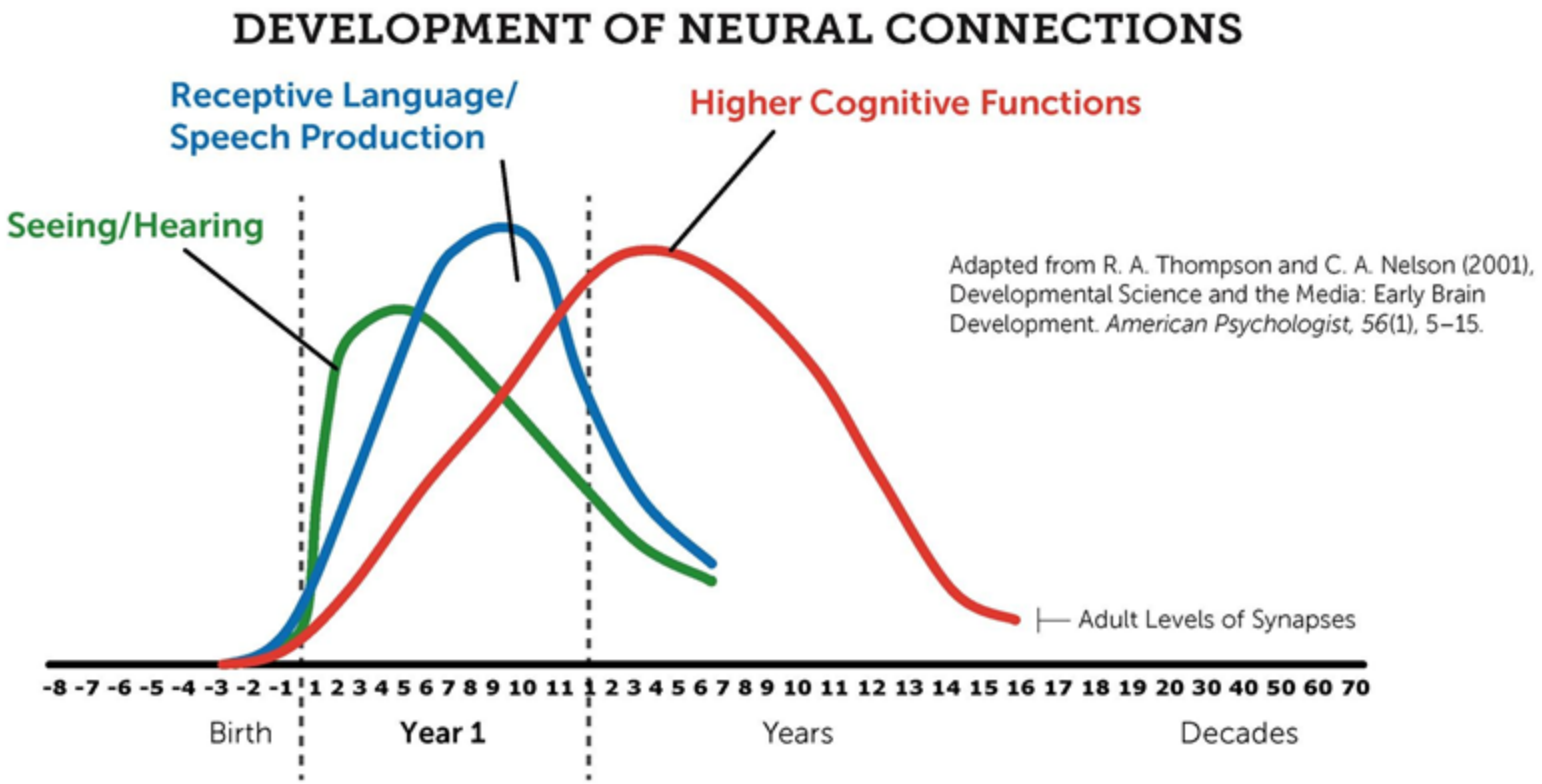

Pruning

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→ Circuits that "fire" more often are kept, whereas those that are not used are removed.

→ Pruning allows the brain to adapt to its environment.

Objective 2:

Identify factors that affect brain growth and development.

Factors Affecting Healthy Brain Growth and Development

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- → Gene – environment interactions
- → Nutrition
- → Sleep
- → Exposure to toxic substances
- → Neurological disorders
- → The role of relationships
- → Stress response

Gene – Environment Interactions

While DNA gives the body a plan, or blueprint, for building the brain, the environment can influence its ultimate development

Nutrients

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- → The development of the brain is influenced by nutrients.
- → Mother's diet during pregnancy AND child's diet in early years MATTERS!
- → Severe malnutrition can have long-lasting, negative effects.

Where do you get information regarding balanced nutrition for the children in your care?

How do you talk to families about nutrition?

Sleep

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Adequate sleep (especially deep or REM sleep) is extremely important for brain growth and development
(Graven & Browne, 2008).

Daily recommended amount of sleep

- → Infants (4–12 months): 12–16 hours
- → Toddlers (1–2 years): 11–14 hours
- → Preschoolers (3–5 years): 10–13 hours

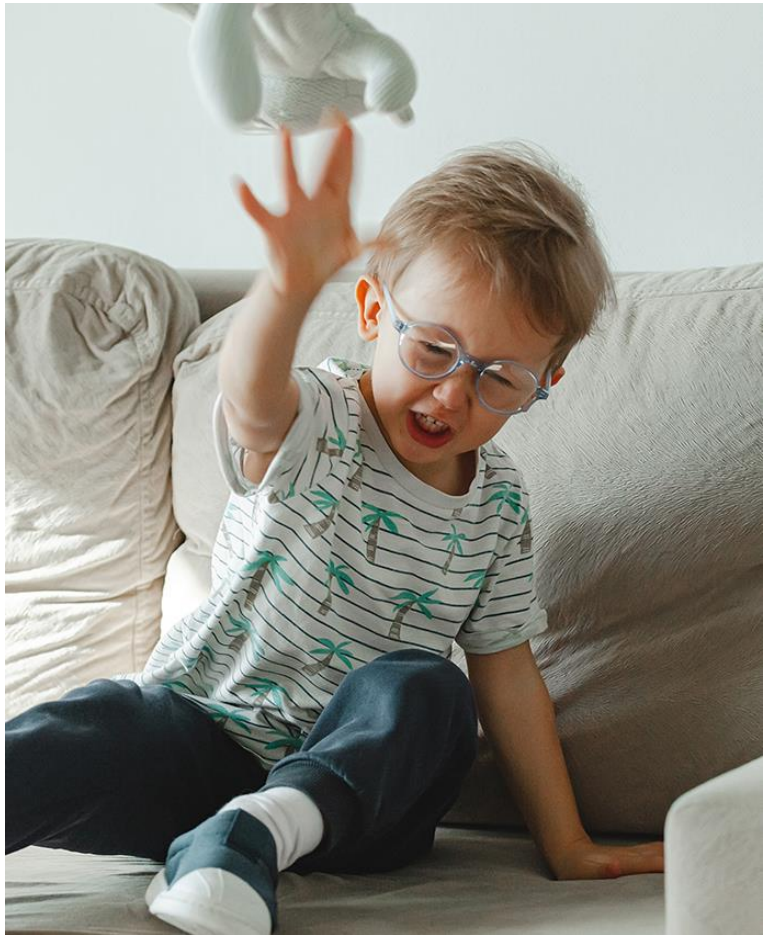
(American Academy of Pediatrics, 2016)

Exposure to Toxic Substances

Some substances used by the mother during pregnancy can negatively affect brain development.

- → Alcohol, cigarettes, street drugs, some prescription drugs, and more
  (National Scientific Council on the Developing Child, 2006)
- → Heavy metals such as mercury, lead, and manganese
  (National Scientific Council on the Developing Child, 2006)

Neurological Disorders



- → Cause dysfunction in the brain or nervous system
- → Physical, psychological/behavioral, or cognitive symptoms may arise
- → May be present at birth or develop later

Role of Relationships: Attachment

- → Relationships that very young children have with their regular caregivers affect brain growth and development.
- → Attachment is the enduring bond that children form with their regular caregivers, beginning in their early years.

Stress Response

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- A small amount of stress reaction can be helpful.
  - Alert, focused, and poised.
- "Fight, flight, or freeze" response.

The Stress Continuum

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Positive Tolerable Toxic

Brain Scan: Effects of Toxic Stress

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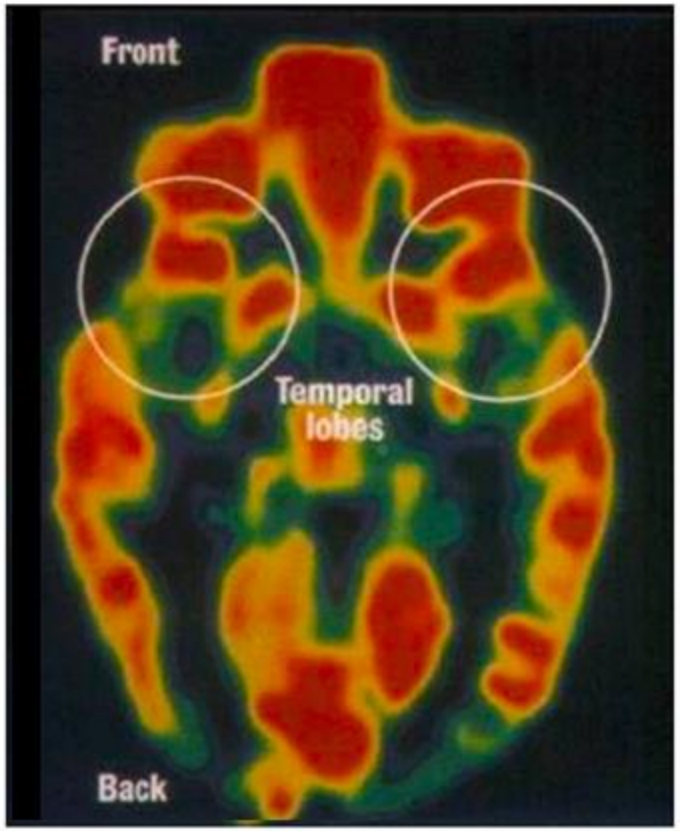
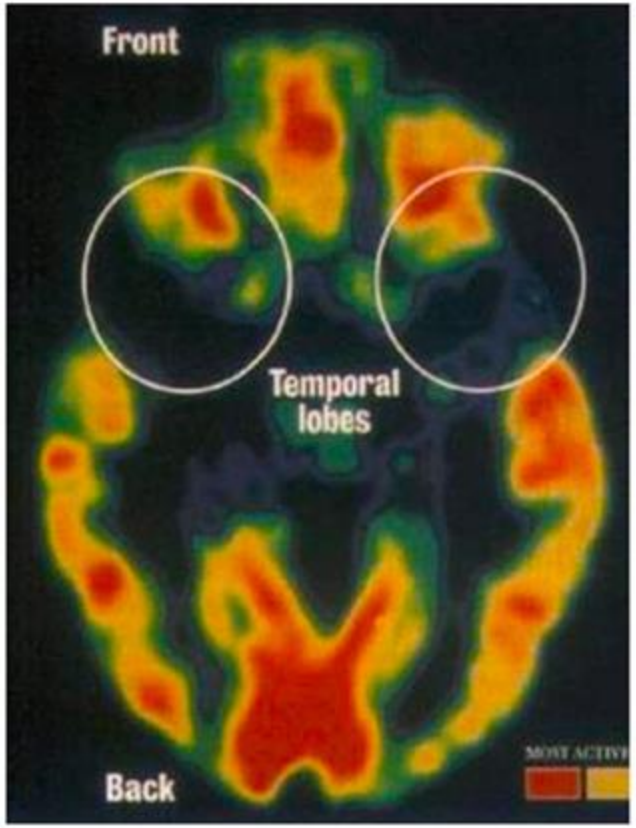


Typically Developing Brain



Brain of Child Exposed to Neglect, Trauma, and Abuse

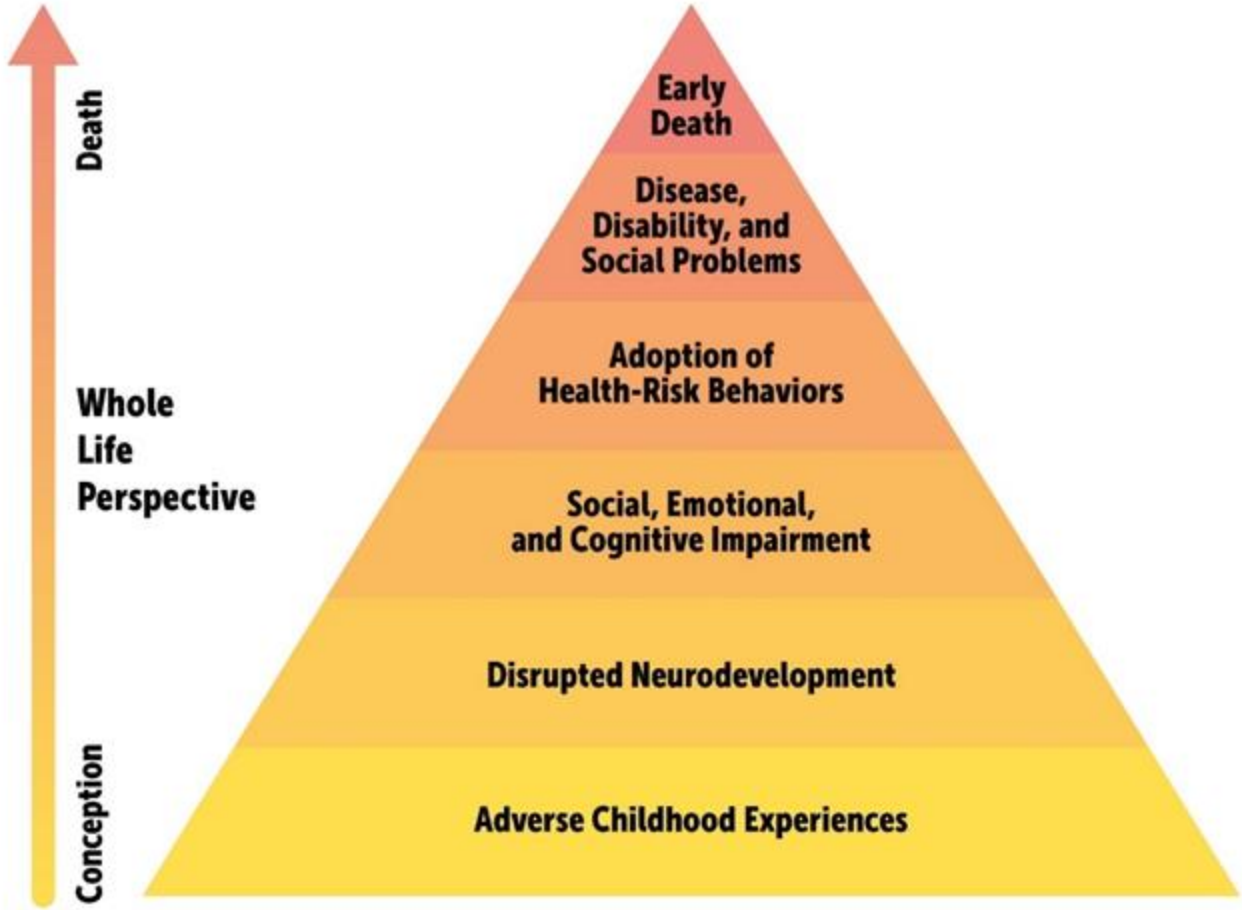
The Long-Term Impact of Toxic Stress

Excessive elevations in:

- Heart Rate
- Blood Pressure
- Stress Hormones

Can impair

- Brain Architecture
- Immune Status
- Metabolic Systems
- Cardiovascular Function



Objective 3:

Describe strategies to support healthy brain development.

What Can You Do? The 5 R's of Healthy Brain Development

***R**elationships*

***R**esponsive interactions*

***R**espect*

***R**outines*

***R**epetition*

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Relationships

Warm, loving, secure attachment relationships give children the foundation they need for healthy development.

Responsive Interactions

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- → Caregiver follows the child's lead.
- → Sensitive, back-and-forth interactions.
- → Adult tunes into the child.

Respect

- → Treating all children as valuable individuals.
- → Teach and guide, not punish and shame.
- → Empathy.
- → Understand misbehavior.
- → Provide understanding and support.

Routines

- → Safety and security.
- → Calms bottom functions.
- → Allows top functions.

Repetition

- → Set realistic expectations based on brain development.
- → Be aware that the experiences we provide are building brain architecture.
- → Provide positive relationships and supportive, enriching environments.

What “R” You Implementing?

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***R**elationships*

***R**esponsive interactions*

***R**espect*

***R**outines*

***R**epetition*

Key Messages

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- → The brain is not fully developed at birth. It grows in size and connectivity at a very rapid rate.
- → The brain grows from the back to the front, from the bottom up.
- → Experiences a child has determine what connections are made and kept.
- → We have a powerful role to play in helping children regulate their stress and build healthy brains.

Thank You!

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