Brain development is impacted by both our genetics and our experiences. As children grow, their brains develop basic functions first (breathing) before progressing to more sophisticated functions (complex thought).

**Healthy Brain Development**

**Early Brain Development**
- Before and after birth, neurons are created and form connections.
- The brainstem and midbrain develop first, governing functions necessary for life, like heart rate, breathing, eating, and sleeping.

**Young Child Brain Development**
- Formation of synapses occur at a high rate.
- Higher function brain regions (governing emotion, language, and abstract thought) develop gradually and at different rates throughout childhood and adolescence/early adulthood.
- By age 2, a child has formed 100 trillion synapses.
- Synapses are eliminated as experiences deem them unnecessary (pruning).
- By age 3, a child’s brain is 90 percent of its adult size.

**Adolescent Brain Development**
- Prior to puberty, there is a growth spurt in the areas of the brain governing planning, impulse control, and reasoning.
- While these areas develop, teenagers can act impulsively, make poor decisions, and take increased risks (all normal behaviors for this stage).
- More pruning and myelination occurs in the teenage years.
- Growth and transformation of the limbic system.

**Parts of the Brain**
- **Neuron**: a unique type of cell found in the brain and body that is specialized to process and transmit information.
- **Brainstem**: one of the four major parts of the brain. It monitors basic vital functions such as heartbeat, body temperature, and digestion. The brainstem is the first part of the brain to develop.
- **Midbrain**: the part of the brain that regulates auditory and visual processing, motor control, arousal, and alertness.
- **Synapse**: the site between neurons where the transmission of messages occurs.
- **Pruning**: the selective elimination or “weeding out” of non-essential synapses based on a child’s specific experiences.
- **Myelination**: the strengthening of necessary connections between neurons.
- **Limbic System**: a network of brain structures that governs emotions and memory.

**Other Factors Impacting Development**

- **Responding to Stress**: The timing and type of stress determines the impact on the brain.
  - **Positive Stress**: moderate, brief, and generally normal part of life.
  - **Tolerable Stress**: more severe and long-lasting difficulties; can be damaging unless the stress is time-limited and buffered by relationships with adults that help the child adapt.
  - **Toxic Stress**: strong, frequent, and prolonged activation of body’s stress response system that disrupts healthy development.

- **Sensitive Periods**: Windows of time in development when certain parts of the brain may be more susceptible to certain experience (e.g. strong attachments to caregivers formed during infancy).

- **Memories**: Systems of neurons that have been repeated and strengthened.

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Trauma-induced changes to the brain can result in varying degrees of cognitive impairment and emotional dysregulation that can lead to a host of problems, including difficulty with attention and focus, learning disabilities, low self-esteem, impaired social skills, and sleep disturbances.

-Child Welfare Information Gateway, Supporting Brain Development in Traumatized Children and Youth

FUNCTIONS OF THE DIFFERENT PARTS OF THE BRAIN

- **Prefrontal Cortex:** regulation
- **Amygdala:** fear
- **Frontal Lobe:** executive functions and developmental milestones
- **Limbic System:** brain reward system
- **Temporal Lobe:** social interactions

EFFECTS OF MALTREATMENT

**On Behavior, Social, and Emotional Functioning**

- Permanent fear response to certain triggers, even when they pose no actual threat
- Fear response is automatically triggered without conscious thought
- Destabilization of emotion and stress regulation

- Diminished executive functions like memory, attention, impulse control, etc.
- Delayed developmental milestones
- Decreased response to positive feedback or rewards
- Social interactions made more difficult

CONFIRMED CHILD VICTIMS OF MALTREATMENT IN GEORGIA, BY AGE

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POLICY AND PRACTICE CONSIDERATIONS

Prevention and early intervention remain the most effective methods for minimizing the effect of maltreatment on development. Other promising trends include:

- Trauma informed care and evidence-based practices
- Family-centered practice and case planning, including parent-child interaction therapy
- Individualized services for children and families
- Child advocacy centers offering interviews, assessments, and services in a child-friendly environment
- The promotion of evidence-based practices

Sources: [https://tinyurl.com/MaltreatmentBrainRefs2019](https://tinyurl.com/MaltreatmentBrainRefs2019)