

SE-3: Supporting Emotional Expression and Regulation

The Emotional Brain Under Construction

ZERO TO THREE Critical Competencies for Infant-Toddler Educators™

To understand how best to support very young children's emotional development in everyday interactions, we first need to think more deeply about what is meant by "emotional development."

- How does the human brain process emotion?
- How does that processing develop as children's brains mature and are shaped by experiences?
- How does brain development affect young children's emotional understanding, expression, and regulation?

When we understand what very young children need, and are capable of, then we can be much more effective in offering support during this important period of emotional development.

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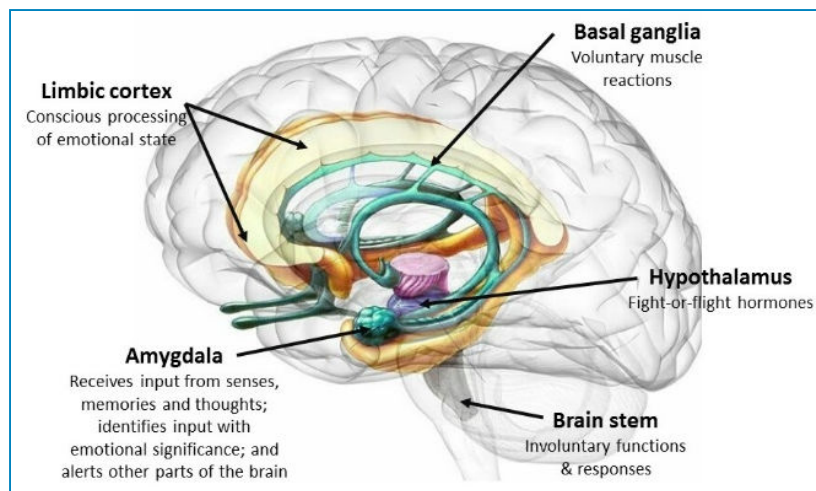


How the Mature "Emotional Brain" Works

To understand the progression of emotional development, let's start with a simplified picture of how the brain processes and produces emotions when it is at full capacity in an adult. The "emotional brain"—the part of the brain that creates and manages one's emotions and receives and processes emotional signals from others—is a large set of structures called the **limbic system**. At maturity, it has several separate parts in charge of different functions that are all connected to each other as well as to the rest of the brain.

The **limbic system** is a complex set of structures that includes the **hypothalamus**, the **hippocampus**, the **amygdala**, and several other nearby areas. It is primarily responsible for our emotional life. It controls the basic emotions (fear, pleasure, anger) and drives (hunger, sex, dominance, care of offspring). It also plays a major role in the formation of memories.

One of the most helpful things to understand about the emotional control center of the brain is its location. "Limbic" comes from the Latin word for "border," because the limbic structures straddle the boundary between the **brain stem**, which is the center of all our involuntary functions and responses that keep us alive (breathing, heart rate, etc.), and the **cerebral cortex**, where the rest of the brain registers and controls all our conscious experience. In other words, the limbic system is responsible for both our *involuntary/uncontrolled* emotionally charged responses AND our *intentional/voluntary* emotionally charged responses because of where it sits in the brain. A closer look at the parts and functions of the brain will help explain these processes.



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How the Brain Processes Emotion

Right in the middle of the limbic system lies its command center: a pair of small, egg-shaped structures, one on each side of the brain, called the **amygdala**. They function as the reception desk for the system, receiving emotion-tagged input from real, imagined, or remembered experiences, then sending messages out to the parts of the system that need to respond.

When the amygdala receives incoming information, it alerts two parts of the **lower limbic system**:

- the **hypothalamus**, which immediately releases hormones into the body that trigger *involuntary* physical changes such as increased heart rate and breathing, enlarged pupils, and sweating; and
- the **basal ganglia**, a group of structures that control body movements, including *voluntary* motor functions and *involuntary* reflexive muscle responses in the face and body.

In a mature brain, the amygdala also sends signals to the limbic cortex, or the higher limbic system. This is a collection of areas that form a layer around the lower limbic system. It's here where connections are made to nearly every other part of the conscious brain, allowing us to:

- consciously recognize the feeling the situation generated by a situation (i.e., the message from the amygdala);
- connect the emotion of a present situation to memories of similar situations from our past; and
- assemble all the other "clues" in a situation to decide what it means and how it might affect us.

Based on the input from these conscious thoughts, the higher limbic cortex then manages the impulses of the lower brain by attempting to calm or inhibit them or by using them as motivation to act.

The Emotional Brain of Infants and Toddlers

Why does understanding how the brain processes emotional input matter for understanding how to support infants and toddlers? Often, adults tend to underestimate very young children's capabilities, but in the case of emotional understanding, control, and intentionality, the opposite is often true. We overestimate, or simply don't understand, what children under 3 years old are capable of when it comes to emotions. Understanding their developing emotional brain can be very eye-opening!

At birth, babies come equipped with roughly half of their limbic system developed and functioning....and it's the lower half. The brain stem, which controls breathing, heart rate, reflexes, and other involuntary functions necessary for survival, has been "online" since early pregnancy. The amygdala is well developed and connected to the brain stem at birth. That means newborns respond to discomfort with the full range of involuntary physical distress responses, such as elevated heart rate, rapid breathing, a facial grimace, and tense body. Newborns respond to pleasant, familiar sounds, smells, tastes, sights, and touches with all the involuntary physical signs of contentment. In other words, newborn brains and bodies react to both pleasant and unpleasant situations with basic emotional expressions.



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But the growth of the neural wiring of the higher limbic system—the structures that enable awareness, thought, control of, and intentional response to emotional signals—takes about *2 years* for the brain to complete. And that's just the basic wiring. It then takes many, many more years for those connections to become insulated with **myelin**, a substance that ensures signals between areas of the brain are strong, clear, and efficient. In fact, the part of the higher limbic system that allows us to choose to *act* differently than we *feel* like acting is one of the slowest areas of brain to become **myelinated**.

In short, infants and toddlers experience the full power of their own raw emotions but are only just beginning to have the capacity to be consciously aware of, and (perhaps most importantly in a group setting) modify or control, those emotions.



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NOTE: Definitions for terms in green font can be found in the glossary for the *ZERO TO THREE Critical Competencies for Infant-Toddler Educators Professional Development Series*.