

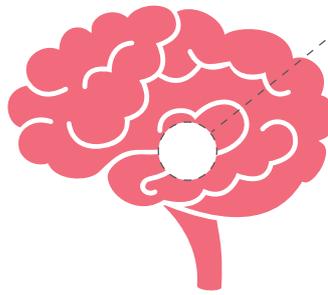
# How Teens' Brains Are DIFFERENT

## A Developmental Gap

The dual systems model posits a developmental mismatch in maturational rates between limbic and prefrontal structures.

### Limbic System

The regions of the brain responsible for emotions, impulses, and passions are "active" by age 15.



### Prefrontal Cortex

The regions of the brain responsible for controlling those impulses and passions do not fully mature until the mid-20s.



### Age

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### Developmental Mismatch

There is nearly a 10-year gap between the ability to fully experience emotions and passions and the ability to control them. This gap is thought to be responsible for many of the "turbulent" behaviors associated with teenagers.

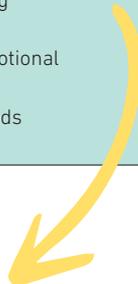
Educators are keenly aware that adolescents can be—choose your adjective—moody, irrational, impulsive, and emotional. But did you know that researchers have recently zeroed in on a neurological explanation for this behavior? Simply put, the emotional part of the human brain—known as the limbic system—develops more quickly than the prefrontal cortex, the part that governs executive function and impulse control. The following figure, from John Medina's *Attack of the Teenage Brain* (ASCD, 2018) illustrates the range of this "developmental mismatch."

## A Tale of Two Brains

What this gap means is that, neurologically speaking, as Thomas Armstrong writes in *The Power of The Adolescent Brain* (ASCD, 2016), “adolescence is a time when the accelerator is being pushed down to the floor while the brakes have yet to be fully installed.” To illustrate, Armstrong provides a breakdown of the functions of the two brain systems.



Limbic System	Prefrontal Cortex
<p>Mostly developed by early adolescence.</p>	<p>Mostly developed by mid-adolescence, but the capacity to function smoothly with the limbic system and other parts of the brain doesn't mature until the early 20s.</p>
<p>Functions include</p> <ul style="list-style-type: none"> <li>• Risk taking</li> <li>• Motivation</li> <li>• Hunger</li> <li>• Sleep cycle</li> <li>• Long-term memory</li> <li>• Sensation seeking</li> <li>• Reward seeking</li> <li>• Novelty seeking</li> <li>• Impulsivity</li> <li>• Primacy of emotional expression</li> <li>• Immediate needs</li> </ul>	<p>Functions include</p> <ul style="list-style-type: none"> <li>• Decision making</li> <li>• Planning</li> <li>• Working memory</li> <li>• Prioritizing</li> <li>• Inhibiting impulses</li> <li>• Reflecting</li> <li>• Organizing</li> <li>• Strategizing</li> <li>• Self-control</li> <li>• Coordinating thought and emotion</li> <li>• Delaying gratification</li> </ul>



## Structures of the Limbic System

So adolescents *are* different. But being aware of the way the teen brain functions can help educators respond, rather than react, to students' “immature” behaviors and create the climates of safety and emotional stability they need. Specific recommendations on cultivating “brain-friendly” practices in middle and high schools are provided in Medina's and Armstrong's books, available at [www.ascd.org](http://www.ascd.org).

—Anthony Reboria

