

The Brain



Brain Development



The basic development of the brain happens over time beginning before birth and continuing into adulthood. It is through the interactive influences of genetics and experiences that the actual physical development of the brain occurs. There are specific, sensitive periods of time during which some parts of the brain grow and develop the best. Genetics determine when the different electrical and chemical “circuits” of the brain are formed and our experiences shape how those circuits are built.¹

While there are many parts of the brain that perform different functions, there are three main parts that are important to understand when addressing trauma: the brainstem, the limbic region and the cortex.

Brainstem

Brain development occurs from the bottom up. The brainstem is located at the very bottom of the brain. This is where basic biologic functions are controlled including heart rate, breathing and body temperature regulation. It also controls states of arousal like hunger; relaxation; sleep; wakefulness; and the fight, flight and freeze responses that are responsible for survival during times of danger.

Limbic Region

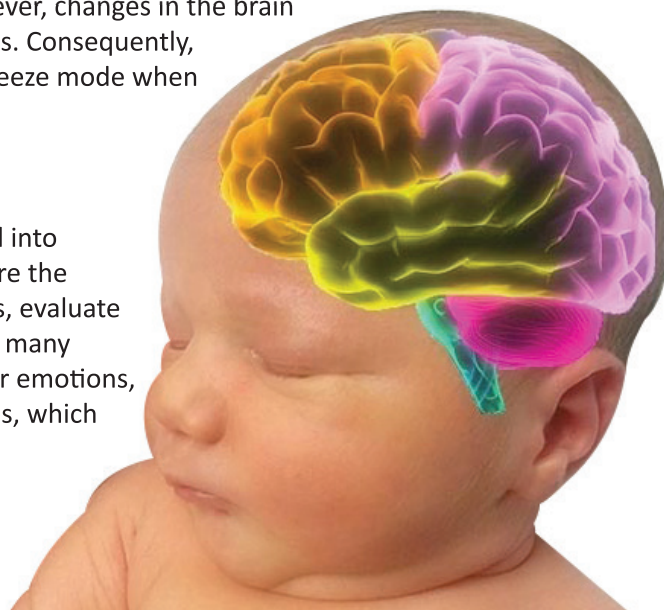
Directly above the brainstem is the limbic region. This part of the brain works closely with the brainstem to create and manage emotions and is responsible for making decisions about whether something is good or bad. It also plays a critical role in how we become emotionally attached to others and thus form relationships. The need for attachment is “hardwired” into the brain and causes us to seek connection with one another. This hardwiring actually means that being in relationship with others is critical not only to healthy growth and development but also to survival itself.

The limbic area also controls stress hormones. When faced with overwhelming situations with which we cannot adequately manage or cope, stress hormone levels often stay elevated over time. Traumatic experiences can cause changes to this area of the brain resulting in stress hormone levels that not only interfere with the proper growth and development of the brain, but may actually become toxic. Once these changes occur, the brain becomes overly sensitive to danger, resulting in difficulty determining which situations are “real danger” and which are not. Because of this, the traumatized brain often perceives danger in situations where none exists.

Another function of the limbic region is the creation of different forms of memory. These memories help us recognize danger at an instinctual level. This is important for survival. However, changes in the brain due to trauma can cause it to “misread” or misinterpret situations. Consequently, memories of past experiences can push us into a fight-flight-or freeze mode when there is no danger.

Cortex

The cortex makes up the outer layer of the brain and is separated into two different parts: the cortex and the prefrontal cortex. These are the brain’s “thinking” parts and allow us to plan, anticipate outcomes, evaluate situations and experiences, and coordinate interactions between many areas of our brain. This area also helps us thoughtfully control our emotions, giving us the ability to manage frustrations and build relationships, which helps us be more successful in school, work, and life.



¹ National Center for Infants, Toddlers, and Families. “Zero To Three Brain FAQ.” Accessed Aug. 31, 2015. http://main.zerotothree.org/site/PageServer?pagename=ter_key_brainFAQ

The Brain on ACEs

Adverse Childhood Experiences (ACEs) are the “not ok” events that sometimes happen in our lives. These events can adversely or negatively affect our brain growth and development and often have long term negative health outcomes. In fact, research shows that there is a direct correlation between the number of ACEs a person experiences and the ability to form healthy relationships as well as how memory works and consequently the ability to learn. ACEs are common and tend to occur in clusters rather than as a single experience, thereby increasing the risk for adverse effects on the brain and other body systems, as well as social, emotional, and intellectual impairments. These experiences can have lasting effects on both the structure and function of the brain.

Since the brain functions on a “use it or lose it” basis, the parts of the brain that are most stimulated are the parts that are the most developed or “strongest.” Consequently, when ACEs are prevalent in our lives those most primitive parts of our brain (brain stem and limbic systems) grow stronger while our cortex and prefrontal cortex become underdeveloped. Radiologic studies show that brains exposed to a high number of ACEs are actually smaller than brains that have had fewer ACEs (or none). There is also less activity in the higher brain structures as opposed to the limbic and brain stem regions.

Resiliency

The good news is that the negative effects of ACEs can be minimized as resiliency is increased. This is true across the age spectrum. Resiliency is what helps us to bounce back when bad things happen and overcome the negative effects that ACEs can have. By working on building safe, nurturing relationships and learning to regulate emotions we can help the brain to heal, opening the opportunity to live rich, successful and fulfilling lives while minimizing the long term negative effects of the adverse events in our lives (see toolkit section titled Resilience).



MORE INFORMATION



Stress and Early Brain Development: Understanding Adverse Childhood Experiences (ACEs) handouts

From ACEs Connection Blog

Reading this in print? Go here:

www.acesconnection.com/blog/handouts-for-parents-about-aces-toxic-stress-and-resilience



Stress and Early Brain Development: Understanding Adverse Childhood Experiences (ACEs) handouts



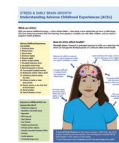
Original



Version 1



Version 2



Version 3

What are ACEs?

ACEs are significant childhood traumas as identified below which can result in actual changes in brain development. These changes may affect a child's learning ability, social skills, and can result in long-term health problems. The Centers for Disease Control and Prevention (CDC) views ACEs as one of the major health issues in the 21st century.

Adverse Childhood Experiences can include:

1. Emotional abuse
2. Physical abuse
3. Sexual abuse
4. Emotional neglect
5. Physical neglect
6. Mother treated violently
7. Household substance abuse
8. Household mental illness
9. Parental separation or divorce
10. Incarcerated household member

Exposure to childhood ACEs can increase the risk of:

- Adolescent pregnancy
- Alcoholism and alcohol abuse
- Chronic obstructive pulmonary disease (COPD)
- Depression
- Early initiation of sexual activity
- Early initiation of smoking
- Fetal death
- Health-related quality of life
- Illicit drug use
- Ischemic heart disease (IHD)
- Liver disease
- Multiple sexual partners
- Risk for intimate partner violence
- Sexually transmitted diseases (STDs)
- Smoking
- Suicide attempts
- Unintended pregnancies

How do ACEs affect health?

Through stress. Frequent or prolonged exposure to ACEs can create toxic stress which can damage the developing brain of a child and affect overall health.

Reduces ability to respond, learn, or process effectively which can result in problems in school

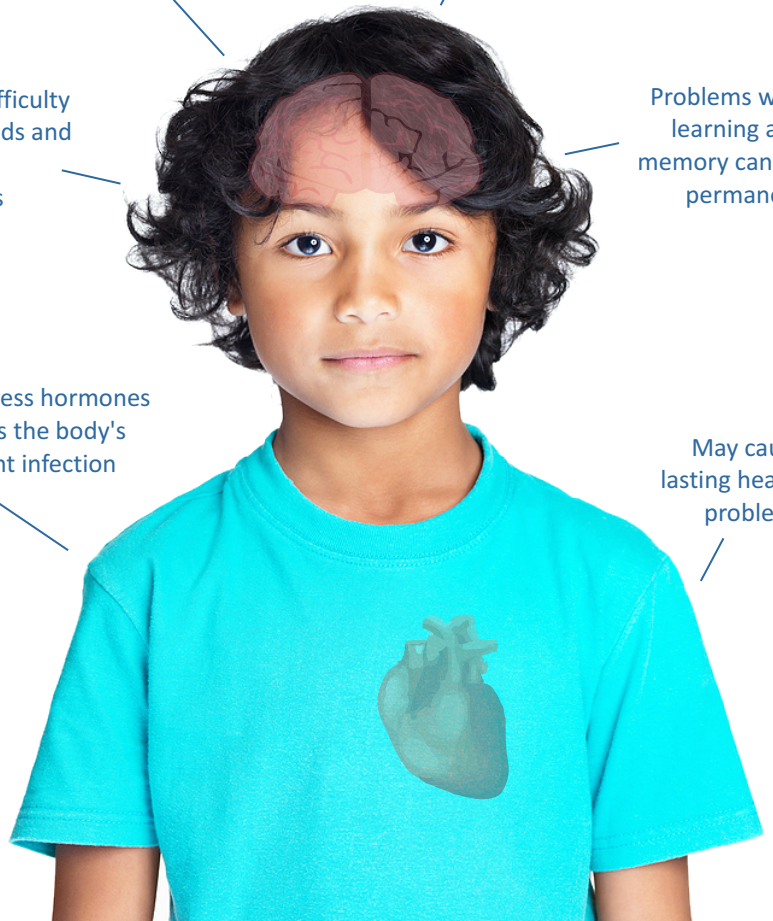
Lower tolerance for stress can result in behaviors such as aggression, checking out, and defiance

May have difficulty making friends and maintaining relationships

Problems with learning and memory can be permanent

Increases stress hormones which affects the body's ability to fight infection

May cause lasting health problems



A **Survival Mode Response** is one that increases heart rate, blood pressure, breathing and muscle tension. When a child is in survival mode, self-protection is their priority. In other words:

"I can't hear you, I can't respond to you, I am just trying to be safe."

The good news is resilience brings hope!



What is Resilience?

Resilience is the ability to adjust (or bounce back) when bad things happen. Research shows resilience helps reduce the effects of ACEs. Protective factors are internal and external resources that help us to build our resilience.

Resilience trumps ACEs!

Parents, teachers and caregivers can help children by:

- Gaining an understanding of ACEs
- Creating environments where children feel safe emotionally and physically
- Helping children identify feelings and manage emotions
- Creating protective factors at home, schools and in communities

What are protective factors?

- 1. Parental resilience**
Increasing parents' ability to problem-solve and build relationships with their child and others
- 2. Nurturing and attachment**
Listening and responding to a child in a supportive way and discovering and paying attention to the child's physical and emotional needs
- 3. Social connections**
Having family, friends or neighbors who are supportive and willing to help or listen when needed
- 4. Concrete supports**
Having their child's basic needs met, such as housing, food, clothing and health care
- 5. Knowledge of parenting and child development**
Increasing parents' knowledge of their child's development and appropriate expectations for their child's behavior
- 6. Social and emotional competence of children**
Helping their child to interact positively with others, manage emotions and communicate feelings

Resources:

Parent Help 123
www.parenthelp123.org
1-800-322-2588

Resilience Trumps ACEs
www.resiliencetrumpsaces.org

Washington Information Network
www.win211.org
1-877-211-WASH (9274)

CDC Adverse Childhood Experiences (ACE) Study
www.cdc.gov/ace/about.htm

STRESS & EARLY BRAIN GROWTH

Understanding Adverse Childhood Experiences (ACEs)

What are ACEs?

ACEs are serious childhood traumas -- a list is shown below -- that result in toxic stress that can harm a child's brain. This toxic stress may prevent child from learning, from playing in a healthy way with other children, and can result in long-term health problems.

Adverse Childhood Experiences can include:

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2. Physical abuse
3. Sexual abuse
4. Emotional neglect
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6. Mother treated violently
7. Household substance abuse
8. Household mental illness
9. Parental separation or divorce
10. Incarcerated household member
11. Bullying (by another child or adult)
12. Witnessing violence outside the home
13. Witness a brother or sister being abused
14. Racism, sexism, or any other form of discrimination
15. Being homeless
16. Natural disasters and war

Exposure to childhood ACEs can increase the risk of:

- Adolescent pregnancy
- Alcoholism and alcohol abuse
- Depression
- Illicit drug use
- Heart disease
- Liver disease
- Multiple sexual partners
- Intimate partner violence
- Sexually transmitted diseases (STDs)
- Smoking
- Suicide attempts
- Unintended pregnancies

How do ACEs affect health?

Through stress. Frequent or prolonged exposure to ACEs can create toxic stress which can damage the developing brain of a child and affect overall health.

Reduces the ability to respond, learn, or figure things out, which can result in problems in school.

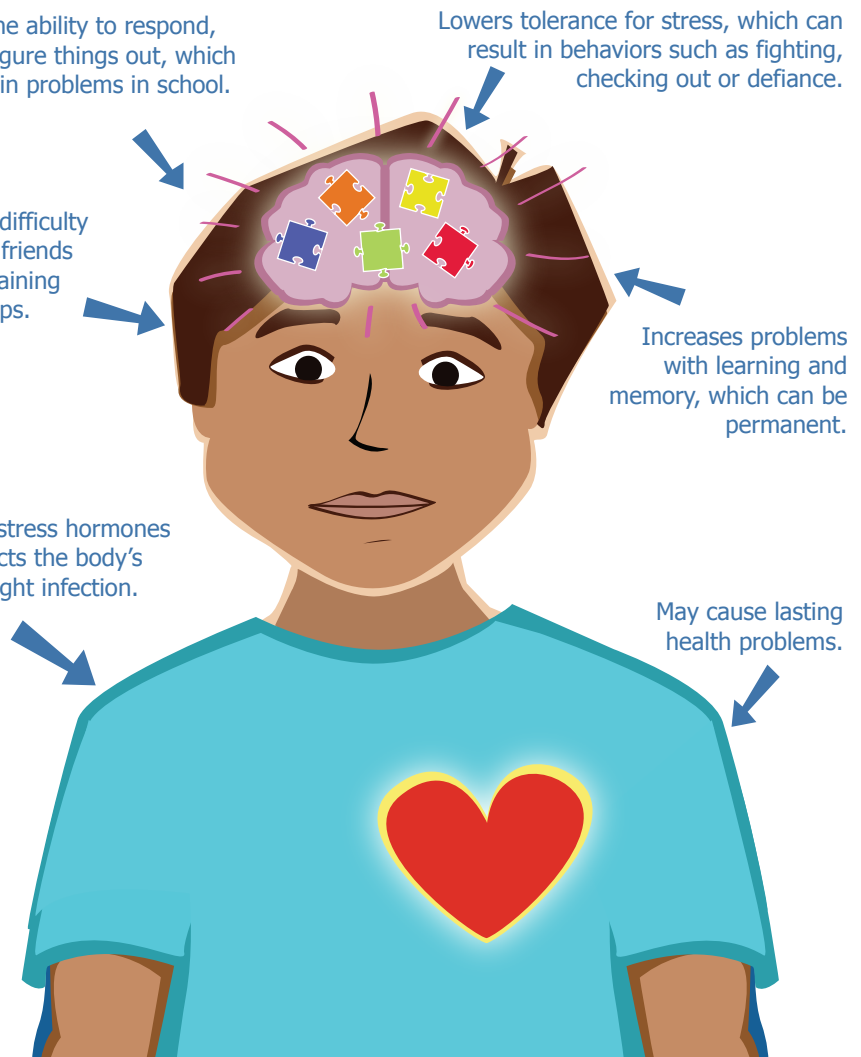
Lowers tolerance for stress, which can result in behaviors such as fighting, checking out or defiance.

Increases difficulty in making friends and maintaining relationships.

Increases problems with learning and memory, which can be permanent.

Increases stress hormones which affects the body's ability to fight infection.

May cause lasting health problems.



A Survival Mode Response to toxic stress increases a child's heart rate, blood pressure, breathing and muscle tension. Their thinking brain is knocked off-line. Self-protection is their priority. In other words:
"I can't hear you! I can't respond to you! I am just trying to be safe!"

The good news is resilience can bring back health and hope!

What is Resilience?

Resilience is the ability to return to being healthy and hopeful after bad things happen. Research shows that if parents provide a safe environment for their children and teach them how to be resilient, that helps reduce the effects of ACEs.

Resilience trumps ACEs!

Parents, teachers and caregivers can help children by:

- Gaining an understanding of ACEs
- Helping children identify feelings and manage emotions
- Creating safe physical and emotional environments at home, in school, and in neighborhoods

What does resilience look like?

1. Having resilient parents

Parents who know how to solve problems, who have healthy relationships with other adults, and who build healthy relationships with their children.

2. Building attachment and nurturing relationships

Adults who listen and respond patiently to a child in a supportive way, and pay attention to a child's physical and emotional needs.

3. Building social connections

Having family, friends and/or neighbors who support, help and listen to children.

4. Meeting basic needs

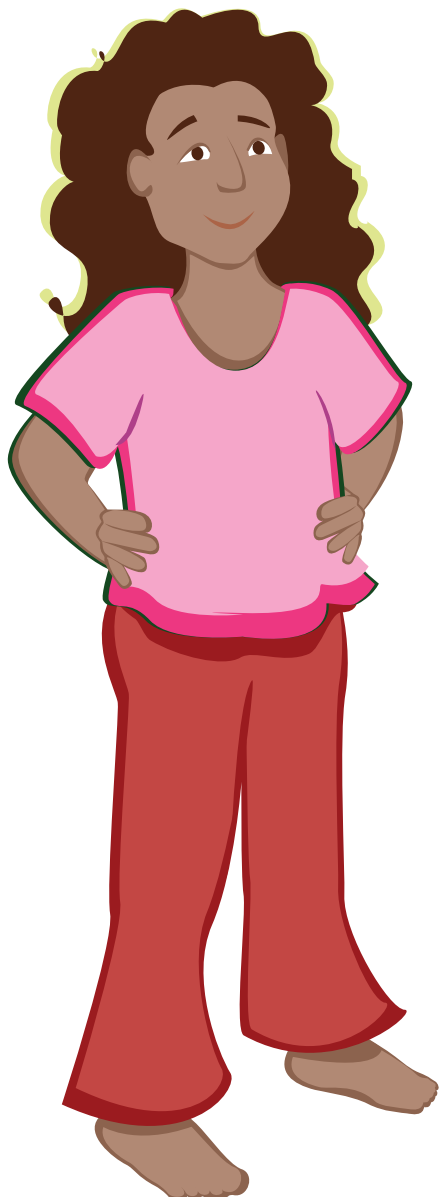
Providing children with safe housing, nutritious food, appropriate clothing, and access to health care and good education.

5. Learning about parenting and how children grow

Understanding how parents can help their children grow in a healthy way, and what to expect from children as they grow.

6. Building social and emotional skills

Helping children interact in a healthy way with others, manage their emotions and communicate their feelings and needs.



Resources:

ACES 101

<http://acestoohigh.com/aces-101/>

Triple-P Parenting

www.triplep-parenting.net/glo-en/home/

Resilience Trumps ACEs

www.resiliencetrumpsACEs.com

CDC-Kaiser Adverse Childhood Experiences Study

www.cdc.gov/violenceprevention/acestudy/

Zero to Three Guides for Parents

<http://www.zerotothree.org/about-us/areas-of-expertise/free-parent-brochures-and-guides/>

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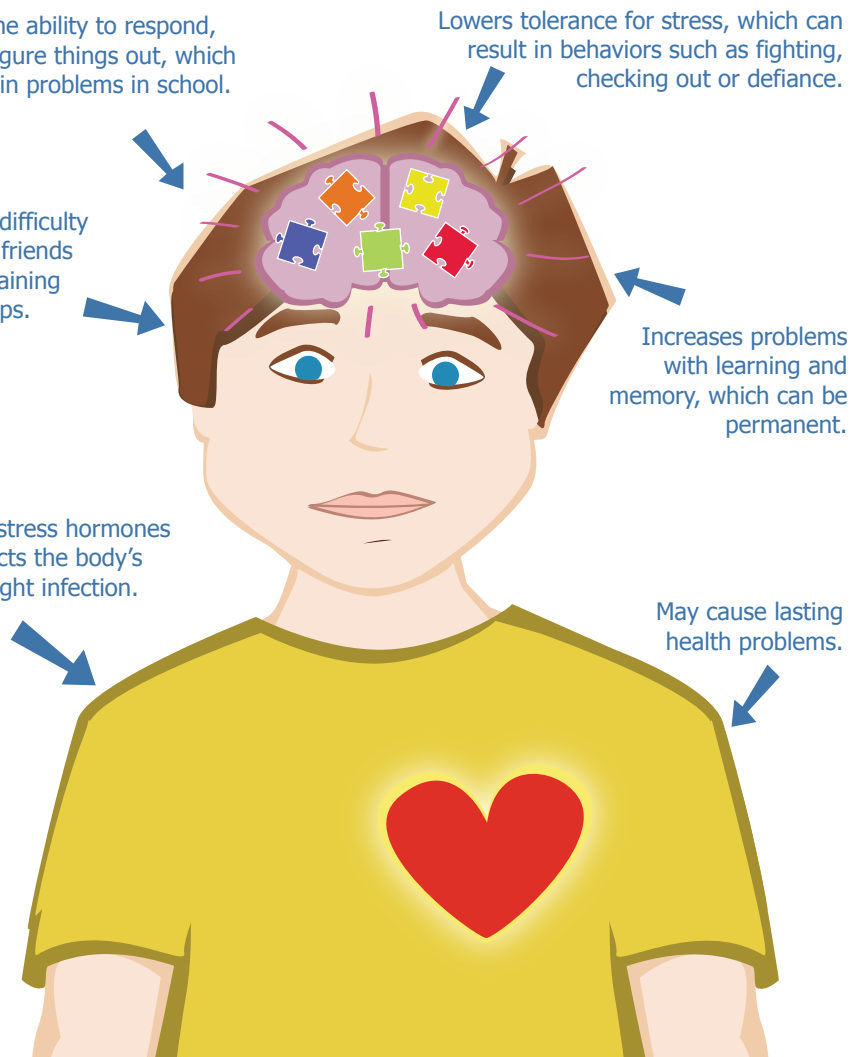
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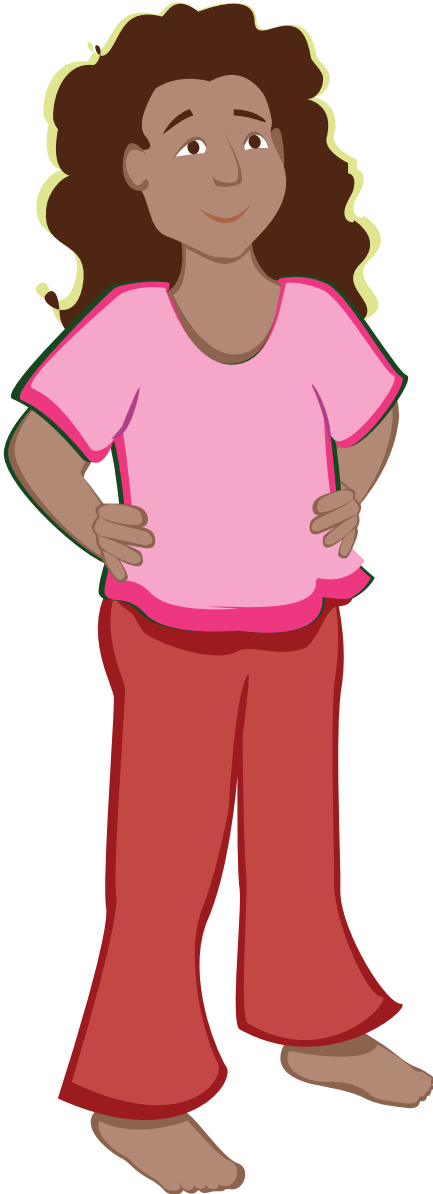
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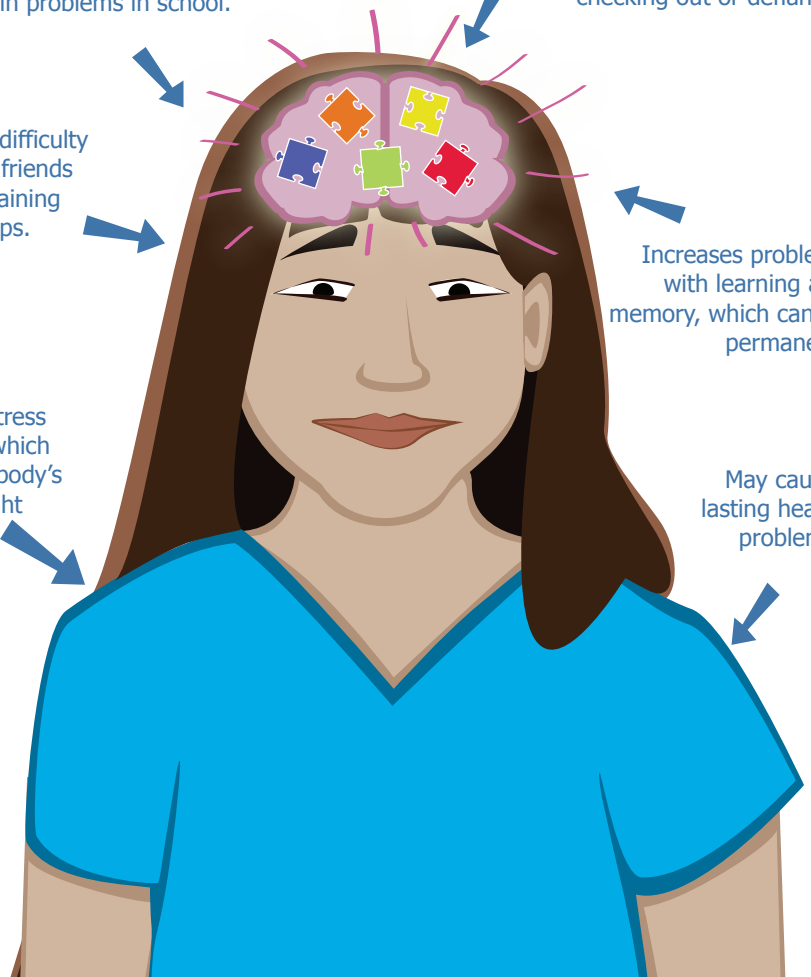
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