



Brain development

Brain development affects children and young people's ability to form healthy, satisfying relationships and to succeed in learning and social environments.

Healthy brain development

This depends on several factors, including the quality and reliability of relationships that children and young people have within and outside the family.

Warm, responsive and trusting relationships provide optimal conditions for children and young people to learn and make sense of the world around them.

As an educator, you have an important role in supporting children and young people to develop in ways that ensure good health, wellbeing and success throughout their childhood, adolescence and into the future.

About brain architecture

Foundation for learning

The brain's structure (or architecture), provides the foundation for children and young people's learning. Brain development occurs sequentially, with lower and more primitive areas developing first (that is, those parts of the brain that regulate body functions such as breathing, heart rate and temperature). The prefrontal cortex is the last area of the brain to mature, in adulthood. This controls higher-order or 'executive' functioning.

A baby is born with billions of brain cells called neurons. The first 18-24 months of life see a tremendous growth in neural connections. These connections form pathways of communication between neurons which direct all our functions and behaviours.

Brain development is influenced by genes and the environment

While our genes determine the formation of neural connections, the connections are reinforced by experiences in the child or young person's environment. Connections that are stimulated through experiences are strengthened, while those that aren't are lost. Only connections needed for the person's environment are retained on the principle of 'use it or lose it.'

This process of forming and pruning connections continues into adulthood. The billions of connections that result from this process influence children and young people's future health, wellbeing, learning and behaviour.

How a child's brain develops

The early years are critical for brain development because of the rapid growth of neural connections at this stage. It's estimated that during the first few

years of life, more than one million neural connections form every second.

These connections correspond with various skills

For example, when a child is learning to ride a bike, the skills required to ride, such as balancing, pushing pedals and watching ahead need to be stored in memory. This happens with repeated opportunities to practice these skills, so that when they ride on another day, they can do so without much thought thanks to the existing connections. If the child doesn't ride again for an extended period, they may need to make these connections all over again.

Experiences during the early years have the greatest impact on brain development – more than any other stage of life. The brain is most sensitive to stimulation during this period, so early experiences shape children's brain development and have a lasting effect on their mental health and wellbeing. Positive relationships and rich learning environments promote children's development while early adverse experiences may alter a child's progress.

Relationships and interactions

Most experiences occur through a child's relationship with their family and other significant adults, including early childhood educators. Positive interactions are described as 'serve and return': when adults respond appropriately to an infant or young child's needs (communicated through cries, smiles, babbling). In this way, the neural pathways responsible for communication and social skills are formed.

If an adult is consistently warm and responsive to the child, the brain architecture develops in an optimal way. However, if they're inconsistent, absent, unreliable or inappropriate in their responses, this can have a negative impact on the child's brain architecture, affecting future learning and behaviour.

Experiences in the early years affect the way children respond and react to the world they live in for the rest of their lives.

Positive brain development in early childhood

In your daily interactions with children, you help them develop their brain architecture.

There are several ways in which early childhood educators can positively influence brain development in babies and children:

Create safe and supportive environments for optimal wellbeing and development.

- Provide a safe and secure environment, where people are treated with care and respect.
- Provide warm and responsive care to children's physical and emotional needs.
- Build strong, positive relationships by showing an interest in a child's thoughts, feelings and experiences.
- Be inclusive of diverse cultures, personalities and interests.

Develop broader organisational and community strategies that support wellbeing.

- Regularly reflect on how the service supports children's wellbeing and how this could be improved.
- Undertake professional development on a range of topics related to children's mental health, wellbeing and development.
- Raise awareness of the importance of the early years for positive lifelong outcomes among colleagues, families and the community.

Help children learn social and emotional skills and manage their own behaviour.

- Provide opportunities for children to learn about their emotions and the emotions of others.
- Help them manage their behaviour by being clear about rules or expectations and guiding them to manage strong emotions like anger or frustration.
- Model positive communication skills with the children at the service, as well as with other educators.
- Acknowledge children's strengths and plan activities that cater to their development, interests, culture and preferences.

Identify children and families who may need additional support

- Observe and document the development and wellbeing of each child at the service.

- Become familiar with the potential signs of mental health difficulties, mental illness (for example, anxiety or depression) or neurodevelopmental disorders (for example, attention deficit hyperactivity disorder).
- Maintain close relationships with families at the service so they feel comfortable discussing any concerns they have regarding their child's development or behaviour.

Link families with support and information services for mental health and wellbeing

- Be familiar with local health and education professionals who can support vulnerable children and families.
- Respectfully communicate with families about their child's development.
- Raise concerns about children with their families and, if appropriate, provide them with information about relevant support networks.
- Recommend reliable and trustworthy resources (such as websites) for families to access more information about their child's health and development.

Be You Professional Learning

Learn more about positive and supportive environments in the [Mentally Healthy Communities](#) domain.

Learn more about social and emotional learning (SEL) in the [Learning Resilience](#) domain.

Learn more about observing behavioural and emotional changes, having conversations with families and colleagues regarding any concerns, and providing access to information and additional support, in the [Early Support](#) domain.

Learn more about forming and maintaining collaborative relationships with families in the [Family Partnerships](#) domain.

Brain development in adolescence

Adolescence is also a time of significant brain development.

As a child grows to adolescence, unused connections in the thinking and processing part of their brain are 'pruned', while consistently used connections are strengthened.

By adolescence, the amygdala – the part of the brain associated with emotions, impulses, aggression and instinctive behaviour – is well developed. However, the pre-frontal cortex – responsible for one's ability to plan and think about the consequences of actions, solve problems and control impulses – doesn't fully develop until a person is in their mid-20s. As a result, young people at times rely on the amygdala to make decisions and solve problems, particularly in emotionally charged situations.

This is why adolescents are more likely to:

- act on impulse (this may be positive as they stretch their boundaries and try new things, or negative as they may take more risks or respond aggressively)
- try new adventurous activities
- explore new relationships
- misread or misinterpret social cues and emotions
- engage in dangerous or risky behaviour.

These brain differences don't mean that young people can't make rational decisions or tell the difference between right and wrong; nor does it mean they shouldn't be held responsible for their actions.

Adolescent development is often described through the metaphor of an incomplete car – 'all gas, no brakes'. While this metaphor can be somewhat useful in explaining how adolescents might be driven to seek sensations and emotions, and avoid others, it can also undermine the great capacity of adolescents. High-quality educational curriculum aims to challenge and grow adolescent brains and cognitive and emotional skills. Secondary school teachers play an important role in achieving this.

Positive brain development in adolescence

How young people spend their time is crucial to their brain development

It's worth thinking about the activities and experiences a young person is exposed to (such as music, sports, study, languages and video games) and how these shape the emerging adult brain.

While families are central to this process, schools and the broader community are also critical in

providing learning experiences and activities. Schools and educators can help adolescents develop their higher-order planning, thinking and problem-solving skills through both planned activities and everyday interactions.

Tips for strengthening positive brain connections:

- Help students to find new creative and expressive outlets for their feelings, as a way to learn how to manage emotions (for instance, sport, music or writing).
- Help students explore immediate and long-term consequences of their actions.
- Support the development of empathy by talking about emotions and how people will have different reactions to events depending on their circumstances; encourage perspective-taking.
- Help students develop problem-solving and decision-making skills by supporting them to develop a process (define the problem, work through options, consider outcomes).
- Be a positive role model by talking to students about how you process information and deal with emotions and challenges.
- Deliver social and emotional or resilience skills programs to students.

Often adolescents require more time to process information and need instructions repeated calmly and succinctly, as well as benefiting from explanations or alternatives. It's often better to identify and suggest preferred behaviours rather than tell adolescents what not to do.

Better outcomes happen when you approach adolescents in an emotionally neutral manner and focus on your own behaviours, language and timing as well as theirs.

Toxic stress and brain development

Stress can significantly impact the developing brain

Stress is a fact of life. Often, it has a positive influence as it pushes children and young people to adapt to their environment and use new skills. When children and young people are faced with distressing situations that are minor and temporary (such as saying goodbye to a family member in the morning or preparing for an exam), they may have a short

period of elevated stress. But this stress response doesn't last long and is not harmful to the developing brain.

More serious situations may activate a severe stress response

Toxic stress occurs when a child or young person experiences strong, frequent or prolonged adversity without the support of a caring adult. This is one of the most damaging influences on the developing brain. Toxic stress can arise in situations of chronic violence; physical, emotional or sexual abuse; neglect; mental illness or drug addiction of a family member; or the accumulated effects of living in extreme financial hardship.

Toxic stress can negatively impact developing brain circuits, leading to a poorly controlled stress response system – one that's overly reactive or slow to shut down when faced with challenges throughout life. This influences every aspect of health and wellbeing in childhood and beyond.

Regardless of the type of stress, it's important to remember that if a child or young person has a strong, supportive relationship with at least one adult in their life, the damaging effects of these situations on brain development can be minimised or prevented altogether.

References

Albert, D., Chein, J., & Steinberg, L. (2013). The teenage brain. *Current Directions in Psychological Science*, 22(2), 114-120.

Blakemore, S. J., & Choudhury, S. (2006). Development of the adolescent brain: implications for executive function and social cognition. *Journal of Child Psychology and Psychiatry*, 47(3-4), 296-312.

National Scientific Council on the Developing Child. (2004). *Children's Emotional Development Is Built into the Architecture of Their Brains*. Boston: Harvard University. Retrieved from <https://developingchild.harvard.edu/resources/childrens-emotional-development-is-built-into-the-architecture-of-their-brains/>.

National Scientific Council on the Developing Child (2014). *Excessive Stress Disrupts the Architecture of the Developing Brain*. Boston: Harvard University. Retrieved from

<https://developingchild.harvard.edu/resources/wp3/>

Sawyer, S. M., Afifi, R. A., Bearinger, L. H., Blakemore, S. J., Dick, B., Ezeh, A. C., & Patton, G. C. (2012). Adolescence: a foundation for future health. *The Lancet*, 379(9826), 1630-1640.