

# Child Brain Development

Aberdeenshire Council Educational Psychology Service January 2021

## Growing Brains

Our brains begin developing before we are born and continue to develop into adulthood. However, the impact of the development that takes place in the first few years of life lasts a lifetime and can determine who we become and how we behave.

There are major differences between the brain development of a child and the brain development of an adult with brains being extremely impressionable in the earlier stages of development. While this means that children's brains are able to benefit from a variety of enriching learning opportunities that can stand them in good stead for the future, it also means that they are more vulnerable to negative experiences which can have lasting adverse consequences.

The experiences and relationships that babies and children have every day are key to supporting optimal brain development. Giving children a wide variety of experiences can be very beneficial as everything experienced by young a child is new and interesting and helps to develop and strengthen their brains. The brain is also able to figure out how things in the world work, and develop working models of behavioural responses by observing how key adults behave and respond in different situations.

## Brain Facts

- The brain uses a lot of energy and needs to get the right amount of good nutritious food in order to help it work well. An adult brain is 2% of a person's overall weight but uses about 20% of their calories. A child's brain uses up to 80% of their calorie intake in the early stages of development.
- At birth, the average baby's brain is about 25% of the size of the average adult brain. The brain doubles in size in the first year of a child's life. By about three years of age, a child's brain is around 80% of the size of an adult's brain and by age five it is 90%.
- Adults and babies have around 100 billion brain cells called neurons. However, it's not the number of neurons that is important but the number and strength of connections between them. Babies have very few connections so they rely on adults to do things for them.
- When we do something for the first time new connections are made in our brains and the more we practice something, the stronger those connections become and the easier we begin to find that activity.

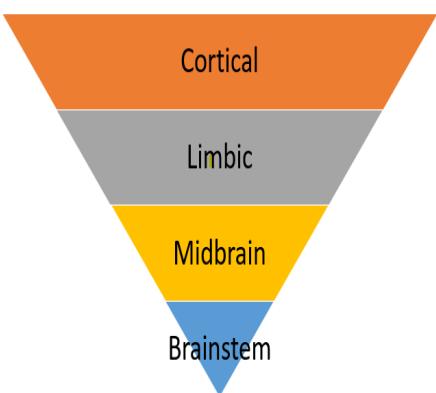


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## Hierarchical model of brain development



The brain develops in a hierarchical sequence. This means that each stage of development is crucial, as the higher-level circuits are built on the lower-level ones. Every new skill developed at the current stage of child's brain development aides the next stage.

Acquiring more complex skills becomes more difficult if they are being developed on a shaky foundation. Being exposed to positive experiences in the early years is essential for optimal brain development and ensuring that children can develop the skills and abilities necessary to be successful in later childhood and into adulthood.

**Brainstem:** This is the most primitive part of the brain and is predominantly concerned with survival. It begins to develop before a baby is born and continues to develop over the first couple of years of life.

Ways to encourage development:

- ◆ Peep-a-boo
- ◆ New tastes
- ◆ Tactile play



**Midbrain:** This area of the brain helps to regulate movement and process auditory and visual information.

Ways to encourage development:

- ◆ Gross motor activities
- ◆ Fine motor activities
- ◆ Music

**Limbic:** The limbic system is the control centre for our emotional responses and behaviour.

Ways to encourage development:

- ◆ Team activities
- ◆ Win/lose games
- ◆ Turn-taking
- ◆ Sharing

### Terrible Twos?

The brain of a two year old is anything but terrible. It is, in fact, working incredibly hard.

At certain points of a two year old's life, the brain is making up to one million connections every second.

It can take a two year old's brain between 10 – 15 times longer for information to be processed, compared to an adult's brain. This means that younger children may need more time to respond to questions. Young children also need shorter instructions as they can struggle with instructions that may seem straightforward for an adult but are too long and complex for the child's young brain to process.

**Cortical:** The largest and last part of the brain to develop. It relates to our ability to use and understand language, to reason, to plan, to problem solve and to think in both concrete and abstract terms.

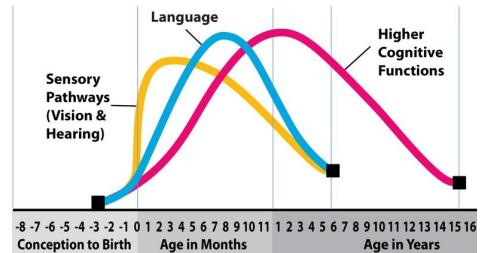
Ways to encourage development:

- ◆ Humour
- ◆ Language
- ◆ Games
- ◆ Art



## Prime Time

Over a lifetime there are 'prime times' for various aspects of brain development. During these prime times, certain events and experiences are particularly beneficial to brain development. For instance, verbal language development requires adequate hearing but if hearing loss is not identified at an early enough age then the brain cannot receive the sounds that support language development. After the prime times for specific areas of development pass, the brain circuitry for those skills stabilise and they become a lot less susceptible to change.



Typical Human Brain Development  
(dependant on early experiences)

## Play is the way

Developing prosocial behaviours (such as helping, sharing and cooperating) begin with children observing the behaviour of key adults. Children continue this development through their play, and understanding takes place through play with others. As children begin to play and interact with others, they learn via trial and error to cooperate and negotiate.



We often try to teach and encourage our young children to share. However, children are only able to manage this once they are about three or four years of age. It is around this age that children develop theory of mind. Theory of mind means that they understand that not everyone sees things the same way they do and that people can actually have a different point of view. For example, it is by around four years of age that children become aware that another child might also want to play with the same toy that they want.

## Supporting Your Child

There are lots of ways you can support your child's development:

- It takes children longer to process information and complete tasks so give them enough time before intervening.
- Talk to your child lots. Build on what your child says to extend the words they use or ask open ended questions to expand their thinking.
- Offer choices where possible in order to meet their ever increasing desire to be independent with an element of control
- Tell your child what you want them to do instead of what you want them not to do.
- Provide opportunities for free play. This allows your child to experiment, to learn how things work, to communicate, to remember, to create, to think and to plan. You can support their critical thinking by wondering aloud "what would happen if we...?" or "what other ways could we do that?"
- If your child engages in risk taking behaviour assess the risk versus benefits before intervening. Your child needs opportunities to try risky things out, to make mistakes, to problem solve and to understand when to seek guidance.

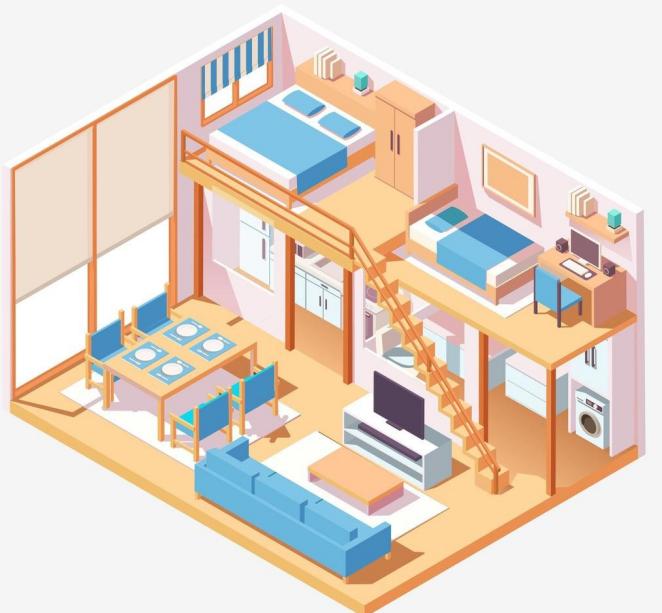
### Did you know?

Young children develop connections in the brain capable of producing the sounds used in every language around the world. When we don't use those sounds, the brain loses those connections and then, if we learn a new language as an adolescent or an adult, we find it harder to make some of the specific sounds used in other languages.



## Upstairs and Downstairs Brain

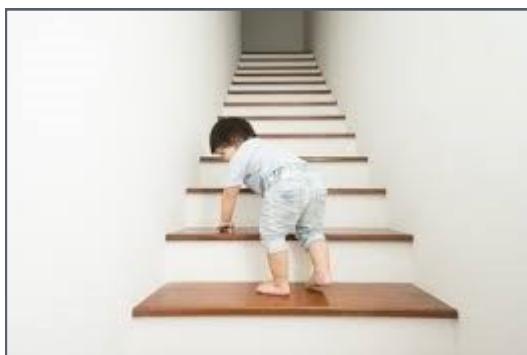
Thinking of the brain as a house with an upstairs and downstairs can help us understand the brain in a simple way. The downstairs is where important things stay: basic functions like breathing, strong emotions, and innate reactions to danger, like fight, flight or freeze; much like the downstairs of a house where we usually find the basics like the kitchen, living room, bathroom. The upstairs brain is more complex: thinking, imagining, planning. We use the upstairs brain to think critically, problem solve, and make good decisions. The upstairs brain is not fully mature until our mid-20s.



We need both the upstairs and the downstairs brain. We need the downstairs brain to save us from urgent situations and keep us alive but we don't want it fully in control. We really need the upstairs and the downstairs brain to work together so the staircase is one of the most important parts to allow us to use both the upstairs and downstairs. A good staircase in the brain allows the upstairs brain to monitor the strong emotions and impulses from the downstairs and make sense of them.

### Using the Staircase

To help a child to build and strengthen their staircase, we first need to pay attention and recognise what part of their brain is controlling their actions: upstairs or downstairs.



A child who is struggling to calm down is in their downstairs brain. They are so upset and angry that they can't make rational or logical decisions. Connecting with the child as early as possible by recognising their emotion will begin to help the child feel understood and comforted. An adult can guide the child to calm down through the use of a breathing exercise. Once the child is able to access their upstairs brain, the issue that caused them to get upset or angry can be addressed using logic and reason. We can't expect the child to use reason or logic until they are able to access their upstairs brain. Refer to

 [Emotion Coaching leaflet](#) for more information and tips on how to help children with their emotional development.



Watch [Upstairs Brain Downstairs Brain : SEL Sketches](#) to learn more about how the upstairs and downstairs parts of the brain work together.



## How to Talk So Kids Will Listen and Listen So Kids Will Talk

A QUICK GUIDE FOR BUSY PARENTS

### Chapter 1: HELP YOUR CHILD DEAL WITH THEIR FEELINGS

1. Listen with full attention
2. Acknowledge with a word
3. Give the feeling a name
4. Give a child his wishes in fantasy

### Chapter 3: ALTERNATIVES TO PUNISHMENT

1. Point out a way to be helpful
2. Express your feelings strongly
3. State your expectations
4. Show the child how to make amends
5. Give the child a choice
6. Take action
7. Allow the child to experience the consequences of the misbehaviour
8. Problem-solve

### Chapter 5: PRAISE AND SELF-ESTEEM

1. Describe what you see. e.g. "I see a clean floor, a smooth bed, and books neatly lined up on the shelf."
2. Describe what you feel. e.g. "It's a pleasure to walk into this room!"
3. Sum up the child's praiseworthy behaviour with a word. e.g. "You sorted out your pencils, crayons and pens, and put them in separate boxes. That's what I call organisation!"

© Jacaranda Tree Montessori

### Chapter 2: ENGAGING COOPERATION

1. Describe, eg, "The milk is on the table"
2. Give information. eg, "Milk goes bad when it is out of the fridge"
3. Say it with a word, eg, "Shoes."
4. Talk about your feelings. "I don't like having my hair pulled. It hurts. We could have a cuddle instead?"
5. Write a note. e.g., Put a post-it note on the oven saying "Hot!" when it is on. You can point to the sign and say, "It says hot."

### Chapter 4: ENCOURAGING AUTONOMY

1. Let children make choices
2. Show respect for a child's struggle
3. Don't ask too many questions
4. Don't rush to answer questions
5. Encourage children to use sources outside the home
6. Don't take away hope

### Chapter 6: FREEING CHILDREN FROM PLAYING ROLES

1. Look for opportunities to show them a new picture of him/herself
2. Put children in situations where they can see themselves differently
3. Let children overhear you say something positive about them
4. Model the behaviour you'd like to see
5. Be a storehouse for your child's special moments
6. State your feelings and/or your expectations.

# The Whole-Brain Child

► A QUICK GUIDE FOR BUSY PARENTS ◀

LEFT BRAIN = LOGICAL PART  
RIGHT BRAIN = EMOTIONAL PART

UPSTAIRS BRAIN = SOPHISTICATED, ANALYTICAL  
DOWNSTAIRS BRAIN = PRIMITIVE, REACTIVE

### CONNECT AND RE-DIRECT

When your child is upset:

1. CONNECT FIRST  
RIGHT BRAIN TO  
RIGHT BRAIN  
eg, loving touch,  
empathy, validate their  
feelings, listen, reflect
2. REDIRECT WITH  
LEFT BRAIN  
When they are more  
receptive, involve child in  
making amends

### NAME IT TO TAME IT

USE LEFT-BRAIN  
STORY TELLING  
to help them understand  
what is upsetting them +  
feel more in control

### USE IT OR LOSE IT

EXERCISE THE  
UPSTAIRS BRAIN  
eg, give choices, practice  
solving problems with  
them, practice controlling  
emotions, build self-  
understanding, consider  
other's feelings

### ENGAGE, DON'T ENRAGE

In high stress situations:  
APPEAL TO THE  
UPSTAIRS BRAIN  
Keep them thinking and  
listening rather than just  
reacting

### MOVE IT OR LOSE IT

When kids are reactive  
ENCOURAGE  
PHYSICAL ACTIVITIES  
to shift their emotional  
state and reconnect with  
their upstairs brain

### REMEMBER TO REMEMBER

After a difficult event  
USE THE REMOTE OF  
THE MIND TO PAUSE,  
REWIND AND FAST-  
FORWARD  
to help them process  
what happened

GIVE KIDS PRACTICE  
AT REMEMBERING  
to help integrate implicit  
and explicit memories  
e.g. important and  
valuable moments of  
their lives

### FEELINGS COME AND GO

LET THE CLOUDS OF  
EMOTION ROLL BY  
Help children  
understand that  
negative feelings are  
temporary

### SIFT

Teach kids to explore  
SENSATIONS  
IMAGES  
FEELINGS  
THOUGHTS  
inside them to help  
them understand and  
change their experience

### EXERCISE MINDSIGHT

GIVE TOOLS +  
STRATEGIES TO  
CALM THEMSELVES  
eg, taking calm breaths,  
visualising a calm place

### ENJOY EACH OTHER

FAMILY FUN +  
ENJOYABLE RITUALS  
creates positive  
memories

CONNECT  
THROUGH CONFLICT  
USE CONFLICT AS AN  
OPPORTUNITY TO  
TEACH KIDS



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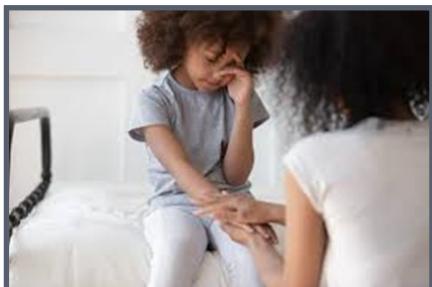
Website:

<https://blogs.glowscotland.org.uk/as/aberdeenshireeps/>



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We value your feedback, please complete our short survey by scanning the QR code.



## Further information and resources



[Harvard University: Center on the Developing Child](#)



[Experiences Build Brain Architecture: Centre on the Developing Child at Harvard University](#)



[The importance of letting young children play: Scottish Book Trust](#)



Adele Faber and Elaine Mazlish (2004). How to talk so kids will listen and listen so kids will talk



Dan Siegel, and Tanya Payne Bryson (2011). The whole-brain child: 12 revolutionary strategies to nurture your child's developing mind.

### Good Stress v Bad Stress

Excessive and long-lasting stress can be caused by adversity that a child experiences such as abuse, neglect, domestic violence and poverty. When this stress is not buffered by positive caregivers, it can be particularly toxic to healthy brain development. In situations where children face a high level of stress it is important to intervene as early as possible in order to improve the outcome for the individual.

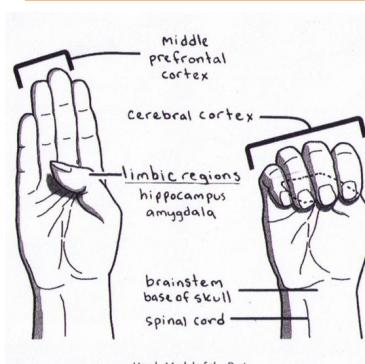
However, it is important that children are not shielded from everyday stressors. Everyday stress responses of a moderate and brief nature can result in mild increases of hormone levels and short-lived increases in heart rate. Experiencing this kind of tolerable stress while being supported by key adults is an important part of healthy development as it helps the child to develop adaptive coping strategies.



[Watch The Impact of Traumatic Experiences in Early Childhood on Brain Development: Anna Freud National Centre](#)



### Pause for thought: supporting emotional outbursts



Handy Model of the Brain

Meltdowns, tantrums, emotional outbursts, whatever you call them and whether they appear mild or severe are a sign that a child is struggling to regulate their emotions. Big emotions that children often struggle to regulate include anger, anxiety and frustration.

The ability to regulate our emotions does not develop by itself. In order for a child to be able to manage their emotions they first need consistent support from adults to regulate their emotions for them which through time allows the child to develop an ability to regulate their emotions.

You can help your child to calm down and develop more effective regulation skills by using a four step emotion coaching response:

1. Acknowledge and empathise (put yourself in their shoes to identify how they are feeling)
2. Validate and label (name the feeling for the child)
3. Set limits (while you acknowledge that their emotion is perfectly valid, the accompanying behaviour may not be appropriate)
4. Problem solve (help the child to identify more appropriate responses)

 Refer to the leaflets on [Developing Self-regulation](#) and [Emotion Coaching](#) for more information and tips on how to help children with their emotional development.

 [Watch Children Explain Why We Flip Our Lid: Springwell School](#)