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The Teenage Brain

The teenage years are an essential part of preparing for the transition from the dependent child, where our needs are met by the primary caregiver, to the responsible adult. This period of change, which we call adolescence, can begin, for some, as young as eight, although it more commonly begins around the age of 13; while we associate this period of brain development with being a teenager, it goes on beyond 19 years of age, for some until their mid-twenties. Physically and operationally, the brain that emerges from adolescence is very different from the one at the start of the process.

Teenagers often suffer from a collective bad reputation; they're moody, lazy, cheeky, reckless, borderline criminal and weird – or at least that's what parents unable to understand the radical changes in their young people's personalities. These changes in personality can, however, often be related to changes in the teenage brain caused by adolescence.

Pruning

If you're familiar with Cyrenians Scottish Centre for Conflict Resolution's **The Three Brains** digital development, you'll already be familiar with 'neurons'. Neurons are nerve cells that play a role in breathing, talking, eating, walking, and thinking. They do this by sending messages around the body. In The Three Brains, we learn how neurons play a vital part in our mind-body connection, in which our thoughts and feelings can positively or negatively affect our physical health. To learn more about The Three Brains, click here.

The brain is made up of neurons and synapses (connections between the neurons), as well as other material. While in the womb through until late childhood, the brain creates a huge number of synapses. During adolescence, the synapses that are not being used are pruned away, while those that are being used are strengthened, in order to optimise brain function.

Pruning occurs in the prefrontal cortex, an area of the brain proportionally larger in humans than in any other species. It means that a teenager can essentially grow the brain he or she needs to survive and flourish within the specific environment in which they're growing up.

A prolonged period of development of the prefrontal cortex might mean that adolescents' abilities to make judgments and decisions aren't yet fully mature. Other brain regions may be more functionally developed in adolescence, meaning that teenagers may be particularly sensitive to the environment they are in but less able to make adult-like decisions within it.

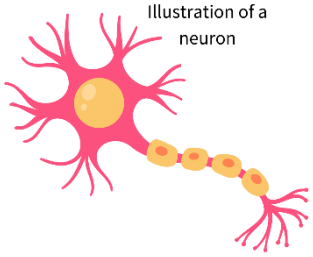
Illustration of a neuron

Despite the changes occurring within teenage bodies and minds, adult caregivers don't always take into account what their young people are experiencing. Teenagers often find adolescence – from acne to breaking voices – strange and

upsetting. Little wonder they sometimes act out. **Understanding can go some way to reducing tensions within a house caused by a teenager reacting to physical changes.**

Feeling Emotional

The limbic system is a series of brain structures involved with emotion. As a child approaches adolescence, the limbic area of our nervous system works closely with the brainstem and the body to create and heighten emotion.

As a result, teens are likelier to see emotion in other people, even when there is none. When you show a photo of a neutral face to an adolescent in a brain scanner, the scanner shows that they think that the person is having a negative emotional response rather than a neutral one.

The downside of this increased emotionality is that teens can become more easily irritated, upset, and moody – and they can have a relationship with themselves that confuses them.

It's not a good idea for an adult to criticise a young person for being 'emotional'. At that stage in a Young Person's life, their brain is designed to be just that, 'emotional'.

Peers

It can be difficult for caregivers to hear this but once their young person has left childhood, their focus shifts from them to their peers. Teenagers take an interest in the opinions and actions of their contemporaries that children and adults don't share to the same level.

In the wild, an adolescent animal without a peer group is at greater risk than an animal who acts as part of a group. Humans have evolved in a similar fashion, and we haven't outgrown our own adolescent need to be part of a peer group. If a Young Person insists they'll 'just die' if they don't get to go to a party all their friends are going to, it may be a figure of speech, but it also speaks to an important evolutionary truth that explains this intensity of feeling.

Privileging peers over parents and other adults can explain why otherwise smart young people can become involved in damaging behaviour. When they are with friends, a group dynamic comes into play; young people within that dynamic can become fearful of bucking it, which is often the reason why young people find themselves in trouble with the law or consuming drugs and alcohol.

While young people often take risks with their own safety, when it comes to social risk, to going against the grain of their friends, young people often become risk-averse if it means their behaviour could lead to them being marked out from their peer group.

Caregivers should be aware that there is a biological influence upon why young people sometimes break the law or harm themselves or others. Given that the vast majority of young people stop such harmful behaviour once they've left adolescence, caregivers could be more patient with and understanding of young people.

Equally, while caregivers can find it alienating when their young people begin listening to music and dressing in a way that they disapprove of, but which is common amongst their peers, they should be conscious that adolescence is the period when an individual starts to ask, who am I, and what should I be? **Clothes, hairstyles, musical taste, can all form part of an exploration of identity familiar to anyone who has been through adolescence, although parents and carers too often forget this part of their own development or believe it was different in their day.**

It's worth parents accepting some risk themselves and allowing their Young People to cultivate links with their peers. Research shows that teenagers who spend their adolescence developing social skills enjoy a greater quality of life and better physical and mental health.

Risky Business

The motivation, entertainment and reward system is heightened in teenagers, and with it, teenagers come to seek and enjoy novelty more than they had as children. Teenagers experience 'hyper-rational thinking', which means they over-emphasise the pros of a situation and minimise the cons. This means that they have a greater drive to seek reward regardless of the risks.

'Dopamine' is key to understanding a teenager's changing attitude to risk. Dopamine is a 'neurotransmitter', a chemical released in the brain that helps nerve cells to send messages to each other, but it's also a 'reward chemical' that makes you feel good.

New experiences cause larger releases of dopamine. Experiencing new things, then, feels good to a teenager. This is why teenager may seek to try unfamiliar activities and push boundaries. It serves the evolutionary purpose of persuading Young People to leave the safety of the parental home and strike out on their own. Although necessary, there is a price.

Combined with the hyper-rational thinking, the search for this dopamine boost leads to more risk-taking behaviours common in adolescence like drinking, smoking, sex and driving too fast. **While this is completely understandable and normal for this period in a young person's life, it is important that supportive adults keep an eye out for danger, especially when the teenager is unable to rationally weigh up the pros and cons of a risky situation.**

At the opposite end of the scale, doing the same things over and over is very boring for teenagers when their dopamine levels are lower; they will feel more irritable, restless, even depressed.

The upside of dopamine-seeking is that teenagers can find their passion; they have a greater sense of anticipation, satisfaction and euphoria compared to children and adults. This desire to try new things is in fact essential in learning new skills and building resilience. It is also nature's way of encouraging us to leave the comfort of our caregiver and find out more about the world. **So, while we're obviously aware of the downside of risk-taking, parents and carers should be helped towards learning there is a positive too.**

Sleep

Another aspect of adolescence that parents might find it useful to know more about has to do with sleep. The brain produces a substance called 'melatonin' that, in children and adults, prompts the individual to start to feel sleepy at the end of the day (changes in daylight influences melatonin production). However, melatonin production occurs a few hours later in adolescents. As a result of having different body clocks, teens often stay up as well as sleeping longer. Because they are going to sleep later, but usually still need to get up for school, teenagers often don't get the 8-10 hours' sleep that they need, which can explain irritability.

While young people sleep their bodies secrete growth hormone, another reason to be more understanding when young people have lie-ins that seem to adults to be self-indulgent. **They're not being lazy; their minds and bodies need a greater amount of sleep to grow and prosper.**

Melatonin and dopamine are two chemicals that form part of 'the brain's amazing drugs cabinet'. We explore the effects various brain chemicals, and the 'cranial cocktails' they create when combined, have on behaviour in our **Emotional Homunculus** digital development. We have free resources that can be used with families to unpack how mood is created in the mind – and what we can do to reduce conflict caused when we feel out of sorts. Click here to learn more, and here to access the resources.

Summary

1. Many of the behaviours associated with teenagers that parents cite as examples of bad behaviour – moodiness, risk-taking, sleeping in – are in fact the result of changes taking place in their brains that are a normal part of adolescence.
2. Teenagers often find the physical changes they undergo – from spots to hair growth – disturbing, and as a result, they can act out. Helping a caregiver to better understand the physical and mental changes their young person is going through can reduce tension.
3. Teenagers experience greater emotionality due to changes in their limbic system. Dealing with an irritated, upset, and moody teenager can be challenging. Parents and carers should be advised to remain calm, even in the face of provocation, modelling, instead, the steadiness they wish their young person to learn.
4. Parents and carers should be warned that their young person's focus will at some point swap from them to their peer group, and not to take it personally. The switch is a normal part of development that underpins the young person's journey from a dependent child to responsible adult.
5. Clothes, hairstyles, musical taste, can all form part of an exploration of identity familiar to anyone who has been through adolescence, although parents and carers too often forget this part of their own development. Caregivers can earn a degree of credit if they show an interest in their young people's passions.
6. The motivation, entertainment and reward system is heightened in teenagers, and with it, teenagers come to seek novelty. This can lead to exploratory and risk-taking behaviour. While this is completely understandable and normal for this period in a young person's life, it is important that supportive adults keep an eye out for danger, especially when the teenager is unable to rationally weigh up the pros and cons of a risky situation.
7. An adolescent's body clock is set differently to adults: they stay up later and sleep longer. They are not being lazy, but instead responding to bodily changes. Given that it is while sleeping that certain physical processes take place (such as the secretion of growth hormone), sleeping in should not only be tolerated but to a certain degree encouraged.