Childhood Trauma and the Brain
— Deep Dives
Pathways to vulnerability

by Prof. Eamon McCrory, Co-director, UK Trauma Council
and Dr. Mattia Indi Gerin, Developmental Neuroscientist
Key messages

- In order to help children more effectively, we need to understand how mental health problems are at greater risk of developing over time.

- There are three important ways that childhood trauma in the form of maltreatment can lead to brain changes which increase a child’s risk of later mental health problems:

  **Stress susceptibility:** Brain changes can alter how a child processes the world, so that everyday experiences become more stressful.

  **Stress generation:** Brain changes can influence a child’s behaviour leading to interactions with peers and adults that ultimately generate new experiences of stress.

  **Social thinning:** Brain changes may make it harder to cultivate and maintain relationships, so that children over time can lose important sources of social support.

Introduction

A child does not suddenly wake up one day with a mental health problem. Such problems unfold over time and can eventually become severe enough to reach a level where they become a diagnosable disorder. If we can understand how problems unfold well before they reach a diagnostic threshold, we can begin to prevent mental health problems from emerging in the first place.

We know that the brain adapts to threatening and unpredictable environments in childhood. For example, there can be changes to how the brain processes threat, reward and everyday memories. These changes in response to trauma may be helpful for the child in the short-term but may increase vulnerability to psychological and behavioural difficulties later on. But HOW does this happen?

Here are three important ways that brain changes can increase vulnerability to mental health problems. This does not happen in a vacuum. As we will see, it crucially depends on how the child interacts with their social world – and how we as carers and professionals respond.
Stress susceptibility: Life takes a greater toll

Everyday challenges – such as taking an exam, moving to a new school, or even making new friends – can be stressful. However, a child who experienced abuse and neglect while growing up may find these situations even more difficult to manage than most children – we call this stress susceptibility. This means that everyday life can take a greater toll.

Why do children who have experienced maltreatment show increased susceptibility to stress?

Let’s take the example of threat. Children who have experienced maltreatment can show greater brain reactivity to threat cues – like facial expressions of anger. This can lead to heightened stress responses in the body that over time take up a child’s energy and attention. Such hypervigilance may help stay safe in a threatening home environment, but may not be so helpful at school or a safe foster placement. Adults and peers – even those who are friendly – may be perceived as untrustworthy. Looking out for danger can be tiring. If a child expects rejection and harm from others, even ordinary everyday tasks such as spending time with a group of friends or joining a new sport club can create real anxiety.

It can also put children off approaching a sympathetic teacher for help or asking a loving foster carer for support. If children have learned that adults are not trustworthy and can hurt them, it is not easy to alter this perception. The brain will take time to adapt, and this requires patience on our part.

We can also think about changes to how a child processes reward. Children who have experienced maltreatment show reduced brain reactivity to reward cues. This may influence how they respond to positive social cues, like praise or even a friendly smile. Reduced response to reward may have made sense in a home environment characterised by neglect, where positive responses from adults were rare or inconsistent. Later, when a child is at school, a child may become less receptive to encouragement and praise from adults and peers. It is also possible that reduced response to reward may reduce a child’s motivation to expend effort. We all need positive reinforcement from others to help us stay motivated and engaged. For children who have experienced maltreatment, these positive ‘hits’ may be less effective – making ordinary tasks like homework and household chores more of an effort.

Finally, studies of autobiographical memory – our memory of everyday past experiences – suggests that children who have experienced maltreatment may prioritise negative memories over positive ones. Over time, this may lead to a negative bias which can increase the risk of depression.

If a child is tending to focus on threat in their environment and is less responsive to reward, it is not hard to imagine how everyday life can take a greater toll.
Stress generation

Children who have experienced abuse and neglect have already experienced significant stress in childhood. This has been called by some ‘toxic stress’. We are learning that these children continue to experience more stressful events than their peers, even into adulthood. This has been called ‘stress generation’. For example, we know that children who have experienced maltreatment are more likely to experience bullying and are more likely to be excluded from school.

Why does this stress generation happen?
It seems very unfair that early experiences of adversity are associated with a greater likelihood of new stressful events later on. Why this happens is not straightforward. The answer is likely to be a complex one and involve the interplay between a child’s genetic make-up, the nature of their past experiences, and their current environment – including how people around them respond to their behaviour.

Neuroscience is providing some clues to understanding stress generation. If we think again about changes in the threat system for example, it is not difficult to imagine how a child may misinterpret a situation or over-react in a way that can lead to conflict or sometimes violence. This can lead to consequences for the child – for instance, being excluded from a sports team or even being excluded from a school. Such reactions can arise given that abuse and neglect can affect a child’s ability to regulate their emotions.

We can also think about changes in the autobiographical memory system. If a child finds it more difficult to access memories from the past, they may be less able to negotiate new social situations. This may make them less able to deal with problems in their relationships – with peers and adults – making it more likely that relationships break down in ways that cause stress.

In other words, a child who has experienced abuse and neglect may find it harder to successfully negotiate social situations, meaning that NEW stressful events occur. Being excluded, breaking up with a boyfriend, getting into a fight, avoiding an exam, and failing – these can all occur as a child either over-reacts to situations or shows a pattern of avoidance.

Even for skilled carers and professionals such behaviour may seem willful, erratic or even confusing. Over time, it is easy to become frustrated and simply respond in a punitive way. While boundaries and consequences are important for all children – including those who have experienced abuse and neglect – adults need to step back and reflect. They need to be curious and interested in the mind of the child – not simply respond to often very natural feelings of anger or even hurt. We need to try to respond in a way that inadvertently increases the risk of a new stressful event occurring. Can a child be given a sanction, for example, that helps them
learn and try again – rather than be excluded? Can we as adults show curiosity and better understand what underlies their behaviour? Can children be helped to reflect and think about their behaviour and find new ways of coping?

Reducing the risk of stress generation is very important, because the more that stressful events occur, the greater the risk of mental health problems - including anxiety and depression.\(^6\)

### Social thinning

We know that supportive relationships are key to our wellbeing. They help us regulate our emotions and think through our everyday worries and problems. Adults also have a key role to play in creating opportunities for learning and growth for children.

However, building and maintaining relationships can be a challenging task – for all of us at times! As well as the positive things relationships can bring, they can also give rise to conflict, disappointment and rejection. These are difficult emotions to manage. We need to be able to accurately understand others’ emotions and perspectives (called ‘mentalization’), plan and problem-solve, and try to make balanced decisions. None of this is easy.

For children who have experienced abuse and neglect, these challenges can be even harder. They may not have had adults in their life who were interested and supportive to help them build understanding of their own feelings and sense of self. Indeed, such children have often been let down, and have learnt to mistrust others.

Scientists think that adaptations in different systems in the brain may make it more challenging for children to build and maintain relationships. A child may focus on danger and threat while missing out on other more positive social communications, such as a friendly nudge or a positive remark. They may also be less able to draw on past experiences to solve current social problems, or may fail to act in ways that prevent problems from arising in the first place.

The stressful events that can arise as a result of stress generation can also lead to outcomes that fracture relationships – being excluded from a friendship group after an argument, being removed from a sports team after a fight, being moved from a foster placement after sustained behavioural challenges.

Over time, these difficulties in social interactions can increase the likelihood that a child loses friends and relationships with supportive adults.\(^{10}\) We call this ‘social thinning’.\(^{11}\) This is the gradual erosion of social networks, friendship groups and bonds with family members. As the network of people who can provide support becomes weaker, a child has less support when they experience future stressful events – making them more vulnerable to mental health problems. They can also lose out on new experiences that can help them grow and develop. In some ways, all of us have had an experience of social thinning during the coronavirus pandemic – and got a sense of how hard this can be.
Conclusion

Changes in the brain following maltreatment do not mean that vulnerability is located solely within the child. Instead, vulnerability plays out in a relational context – that is, through the child’s relationships. Stress susceptibility, stress generation and social thinning are not inevitable processes. We need to remain curious and open about the reasons behind the child’s behaviour and their inner world. This can help a child to process and regulate their emotions by promoting understanding and trust. We also need to respond in ways that do not inadvertently increase the likelihood of future stressors. Instead, we should facilitate and create opportunities for learning and exploration as well as building a child’s social connections.
References


