PENNY HOLBURN COACHING

It's about You and Results

Some Effects of Stress Exposure on the Brain

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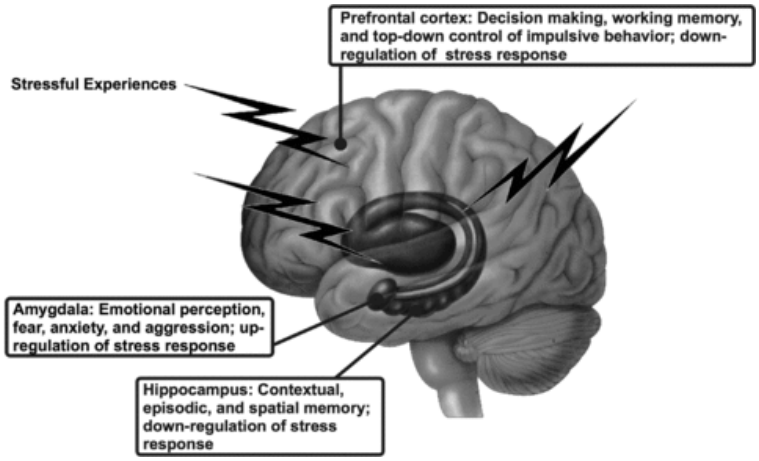
Chronic stress has many effects on the brain including changes in brain functioning, changes in brain structure, changes to hormones and neurotransmitters, disruption in synapse regulation, shortening of the chromosomes, changes in the proportion of white to grey matter in the brain, and alteration of gene expression. I want to keep this fairly simple so I am going to focus on three structures in the brain which are affected, and where the resulting behaviour changes are quite easy to see and will make sense to people who are witnessing the actions of someone highly stressed.

My reason for writing this newsletter is so you can see how important it is to manage your stress We cannot always stop stressors coming our way, but we can manage our stress. Some people wear their stress like a badge of honour to show how busy and important they are, which is ridiculous, because chronic stress is very damaging to your health, and consequently your life.

Because the brain is so well hidden, unlike the limbs or skin, we tend to not know what is happening inside it. Yet, when you are chronically stressed, there is lots going on that you don't see.

The three brain structures are the prefrontal cortex right at the front of the brain, and two structures near the middle of the brain, the amygdala and hippocampus. The research I quote from is from many places including the University of California-Berkeley, Yale University, and the National Institute for Mental Health in the USA. (This is not an academic article, so I am not going to give specific references, in addition to which the findings are very well known and have now more or less entered mainstream writing).



The Prefrontal Cortex.

Chronic stress can shrink the prefrontal cortex. The prefrontal cortex is the most advanced and evolved part of the brain and usually is only fully developed around age 26. It is the area of the brain that enables you to act "thoughtfully". It is responsible for higher thinking functions such as decision making and problem solving. It enables you to stop and think in a crisis. If it is functioning well, it enables you to access your memories, experiences, and wisdom in a fraction of a second, which means you can assess your situation, gain perspective, and respond in the best way. The prefrontal cortex is extensively connected with other areas of the brain. In a healthy brain, the prefrontal cortex regulates our thoughts, emotions, and actions. We call this "top-down control"

With chronic stress, links to, as well as the functioning of the prefrontal cortex are impacted. This leads to impaired concentration, poor impulse control, and poor working memory. Working memory is used all the time for us to make decisions and solve problems, and it does this by bringing into our mind information from long-term storage and we use this to decide on appropriate thoughts, emotions, and behaviour. As the prefrontal cortex is also important for inhibiting inappropriate actions as well as promoting task relevant actions, with chronic stress, we can find ourselves saying and doing things that we wish we had not. Impairment in the prefrontal cortex also leads to difficulty regulating emotions and difficulty in learning from experience.

The Amygdala.

The amygdala is involved with our basic survival and is concerned with processing emotions. Chronic stress causes the amygdala to increase in size, and the links between it and the prefrontal cortex to shrink. This means your emotions become stronger than your ability to think clearly. This is called "bottom-up control" because the more basic brain structures such as the amygdala, now govern your thoughts, emotions, and actions, rather than the intelligent thinking prefrontal cortex.

A bigger amygdala is correlated with aggression and is associated with more impulsive, angry, and impatient behaviour. Your emotions take over and control the way you react to life. You start to feel overwhelmed and out of control. You are much less likely to find positive and creative ways to respond.

An increase in the size of the amygdala, which is found with chronic stress, can make the brain more responsive to stress and predispose you to be in a constant state of fight-or-flight. It sets you up for increased anxiety and fears.

The Hippocampus.

The hippocampus is a structure in the middle of the brain involved with learning, memory, and emotions. It is involved in storing memories in an organised and sequential way, as well as in spatial navigation. A single stressful event can kill neurons in the hippocampus. Chronic stress causes the hippocampus to shrink. Neurons die and the connections between neurons in the hippocampus become weaker. This is particularly detrimental to your memory and it becomes harder for you to keep track of what you are doing. You may feel like you have brain fog and be unable to think creatively.

Neural pathways between the hippocampus and the amygdala can get severely damaged due to constant exposure to stress. The stress hormones can create a domino effect that hardwires pathways between the hippocampus and amygdala in a way that causes the brain to be in a constant state of fight-or-flight.

The above represents some of the more commonly understood implications of stress and the brain. There are many other ways in which the brain is affected by chronic stress. I hope though, that this has given you a better idea of why you and others may behave the way you do under chronic stress conditions. But I also want you to understand that long-term stress has major consequences for you if you don't do something to manage it. Just because you cannot see what is going on in your brain, doesn't mean that all is well.

Fortunately, it's not all bad news. The brain has the property of plasticity, so a lot of the damage caused by chronic stress can be reversed with proper interventions. Medication can bring about improvements as can many actions. Some of the activities which are believed to enable plasticity are exercising regularly, socialising, having a purpose in life, as well as practicing regular stress management techniques (including therapy), and taking time to relax.