

How Stress Changes The Brain

Huff Post: November 18, 2014

By: Carolyn Gregoire

We tend to think of stress as an immediate problem: The boss hovering over our desks; the mad dash to the subway at the end of a long day. And in the short-term, stress makes us feel irritable, anxious, tense, distracted and forgetful. But that's only part of the story.

Over time, elevated levels of cortisol, the stress hormone, can chip away at our physical, mental and emotional health. The link between chronic stress and the potential for mental health conditions -- such as post-traumatic stress disorder, anxiety, depression and other mood disorders -- is well-established. But what kind of changes -- both fleeting and lasting -- are actually taking place in the brain when we experience a stressful event?

Here are four ways stress changes your brain.

Stress could trigger a chemical change that makes you irritable

Many of us know that we're not pleasant to be around when we're stressed out -- we may get irritable and grumpy. Under pressure, many people get distracted and forgetful and this could be a sign of the destructive effects of stress in the brain.

French researchers discovered an enzyme, when triggered by stress, that attacks a molecule in the hippocampus which is responsible for regulating synapses. When the synapses are modified, fewer neural connections are able to be made in the area.

"These effects lead subjects to lose their sociability, avoid interactions with their peers and have impaired memory or understanding," a university press release explained.

Chronic stress can shrink your brain

Stressful life events could harm your brain's memory and learning capacity by reducing the volume of gray matter in brain regions associated with emotions, self-control and physiological functions.

Chronic stress and/or depression can contribute to lost volume in the brain's medial prefrontal cortex, which is associated with emotional and cognitive impairment. Researchers found that this is particularly true of people with a genetic marker that can disrupt the formation of synaptic connections between brain cells.

A 2008 study on mice found that even short-term stress could lead to communication problems among brain cells in regions associated with memory and learning.

One stressful event can kill brain cells

As we learn new information, we constantly generate new neurons in the hippocampus - a brain region associated with learning, memory and emotion. But ongoing stress can halt the production of new neurons in the hippocampus and may also affect the speed of connections between hippocampal cells, according to Scientific American. What's more, an animal study found that a single stressful event can destroy newly created neurons in the hippocampus.

University of California at Berkeley researchers found that the brain in a state of chronic stress generates more myelin-producing cells and fewer neurons than a typical brain would, resulting in excess myelin (an insulating layer of protective coating around neurons) in the hippocampus.

"The hippocampus is especially vulnerable to ongoing emotional distress, because of the damaging effects of cortisol," psychologist Daniel Goleman wrote in Social Intelligence.

Stress can disrupt memory by triggering the brain's threat response

While cortisol hampers the activity of the hippocampus, it increases the size and activity of the amygdala, the brain's main center for emotional responses and motivation. The amygdala is responsible for fear processing, threat perception and the fight-or-flight response. Increased activity means we're in a state of reacting to perceived threat, which can have the effect of restricting our ability to take in new information. It can also heighten emotional reactions.

"After a day when a student gets panicked by a pop quiz, he'll remember the details of that panic far more than any of the material in the quiz," Goleman wrote.

Lorie Eber is a trained Wellness Coach, NASM Certified Personal Trainer, Gerontologist and author. Lorie Eber Wellness Coaching provides one-on-one guidance and support to clients who are ready to make permanent lifestyle changes and lead a happier, healthier life.