

Chapter 1 : The Mind and Mental Health: How Stress Affects the Brain

While stress can negatively affect the brain, the brain and body can recover. Young adults, especially, are able to recover from the effects of stress, according to Proceedings of the National Academy of Sciences (PNAS).

More than one-third of adults report that their stress increased over the past year. Twenty-four percent of adults report experiencing extreme stress, up from 18 percent the year before. It is simply a response. How harmful it is ultimately depends on its intensity, duration and treatment. Stress takes a variety of forms. Some stress happens as the result of a single, short-term event – having an argument with a loved one, for example. Other stress happens due to recurring conditions, such as managing a long-term illness or a demanding job. While all stress triggers physiological reactions, chronic stress is specifically problematic because of the significant harm it can do to the functioning of the body and the brain.

Leading Causes of Stress

Stress occurs for a number of reasons. The Stress in America survey reported that money and work were the top two sources of stress for adults in the United States for the eighth year in a row. Other common contributors included family responsibilities, personal health concerns, health problems affecting the family and the economy. The study found that women consistently struggle with more stress than men. Millennials and Generation Xers deal with more stress than baby boomers. And those who face discrimination based on characteristics such as race, disability status or LGBT identification struggle with more stress than their counterparts who do not regularly encounter such societal biases.

Physiological Effects of Stress on the Brain

Stress is a chain reaction. Finally, a hormone called cortisol is released, which helps to restore the energy lost in the response. When the stressful event is over, cortisol levels fall and the body returns to stasis.

Effects of Chronic Stress on the Brain

While stress itself is not necessarily problematic, the buildup of cortisol in the brain can have long-term effects. Thus, chronic stress can lead to health problems. In moderation, the hormone is perfectly normal and healthy. Its functions are multiple, explains the Dartmouth Undergraduate Journal of Science. In addition to restoring balance to the body after a stress event, cortisol helps regulate blood sugar levels in cells and has utilitarian value in the hippocampus, where memories are stored and processed. But when chronic stress is experienced, the body makes more cortisol than it has a chance to release. This is when cortisol and stress can lead to trouble. According to several studies, chronic stress impairs brain function in multiple ways. It can disrupt synapse regulation, resulting in the loss of sociability and the avoidance of interactions with others. Stress can kill brain cells and even reduce the size of the brain. Chronic stress has a shrinking effect on the prefrontal cortex, the area of the brain responsible for memory and learning. While stress can shrink the prefrontal cortex, it can increase the size of the amygdala, which can make the brain more receptive to stress. It can also lead to other significant problems, such as increased risk of heart disease, high blood pressure and diabetes. Other systems of the body stop working properly too, including the digestive, excretory and reproductive structures.

Plasticity and the Brain:

While stress can negatively affect the brain, the brain and body can recover. Age has a direct correlation with the reversibility of stress-related damage. Interventions including activities like exercising regularly, socializing and finding purpose in life enable plasticity. It can seem like stress is an inevitable part of life, but chronic stress can have real and significant consequences on the brain. Understanding these effects and how to combat them can help promote overall health.

Chapter 2 : What Stress Does to Your Brain - Mindful

Madhumita Murgia shows how chronic stress can affect brain size, its structure, and how it functions, right down to the level of your genes. Lesson by Madhumita Murgia, animation by Andrew.

Have your choice of college? Try Lumosity Brain Training for Students! Think about it in your daily life. Does added stress help you think through problems? Or when under stress do you need a little quiet time to reflect? Those under a great deal of emotional strain often have trouble thinking clearly and making good decisions. These affects also translate into problems for the body when the brain cannot properly rest because of anxiety and stress. Hormonal Responses to Stress When you feel stress, adrenal and pituitary glands release chemicals like adrenaline, cortisol and dopamine designed to increase your heart rate and help you to run from danger. Stress responses in a flee to survive situation are released and dispersed when you run from the danger. If there is nothing to run from, the stress response simply remains in your system, fueling more feelings of unease. The Danger of Cortisol Cortisol can be particular harmful when released too frequently in the brain. This hormone can actually damage our brain cells from prolonged exposure. In studies, cortisol was shown to break down hippocampus cells. The hippocampus is responsible for a great deal of your memory, including episodic memory. This is a helpful feature for those who have suffered severe trauma and would benefit from forgetting the episode of danger. However, when cortisol is ever-present, the damage can bring on early age-related memory loss. Too much cortisol can also place you at risk for depression. Excess cortisol has a tendency to overwhelm the healthy good-feeling hormones in your brain like serotonin. Long-term stress can permanently reduce the levels of serotonin in your brain, making the ever presence of cortisol even more dangerous. After an episode of danger, the brain returns itself to normal and banishes the cortisol to the kidneys were it can exit the body. If the perceived threat does not pass, cortisol remains in the brain, causing damage. For this reason, it is important to learn how to relax and return your body to homeostasis, in which normal, healthy chemicals will return to dominance in your brain. Regaining Balance Regaining balance and banishing cortisol after an episode of stress is not difficult and gets easier with practice for those who never learned how to relax. Relaxing is a learned skill that you can practice very easily. When stress comes knocking on your door, immediately recognize the threat to your health. Acknowledge that you have a choice to let stress damage you or not. You can achieve this by breathing deeply while counting mentally to four. Then slowly let out the breath, counting back down to zero in reverse. When breathing, be sure to breathe through your lower abdomen, rather than your chest. This type of breathing is more effective at helping you to relax. When you practice this deep breathing, you will notice an immediate calming sensation in your mind. You will feel a pleasurable, warm sensation on the skin all over your body. Concentrate on that vibratory feeling while you breathe deeply and slowly. This state of relaxation allows your mind to regain equilibrium and banish damaging cortisol from your system.

Chapter 3 : Stress and the Brain | HuffPost

Long-term stress can permanently reduce the levels of serotonin in your brain, making the ever presence of cortisol even more dangerous. After an episode of danger, the brain returns itself to normal and banishes the cortisol to the kidneys were it can exit the body.

Chronic activation of this survival mechanism impairs health Updated: May 1, Published: March, A stressful situation – whether something environmental, such as a looming work deadline, or psychological, such as persistent worry about losing a job – can trigger a cascade of stress hormones that produce well-orchestrated physiological changes. A stressful incident can make the heart pound and breathing quicken. Muscles tense and beads of sweat appear. This combination of reactions to stress is also known as the "fight-or-flight" response because it evolved as a survival mechanism, enabling people and other mammals to react quickly to life-threatening situations. The carefully orchestrated yet near-instantaneous sequence of hormonal changes and physiological responses helps someone to fight the threat off or flee to safety. Unfortunately, the body can also overreact to stressors that are not life-threatening, such as traffic jams, work pressure, and family difficulties. Over the years, researchers have learned not only how and why these reactions occur, but have also gained insight into the long-term effects chronic stress has on physical and psychological health. Over time, repeated activation of the stress response takes a toll on the body. Research suggests that chronic stress contributes to high blood pressure, promotes the formation of artery-clogging deposits, and causes brain changes that may contribute to anxiety, depression, and addiction. More preliminary research suggests that chronic stress may also contribute to obesity, both through direct mechanisms causing people to eat more or indirectly decreasing sleep and exercise. Sounding the alarm The stress response begins in the brain see illustration. When someone confronts an oncoming car or other danger, the eyes or ears or both send the information to the amygdala, an area of the brain that contributes to emotional processing. The amygdala interprets the images and sounds. When it perceives danger, it instantly sends a distress signal to the hypothalamus. Command center When someone experiences a stressful event, the amygdala, an area of the brain that contributes to emotional processing, sends a distress signal to the hypothalamus. This area of the brain functions like a command center, communicating with the rest of the body through the nervous system so that the person has the energy to fight or flee. The hypothalamus is a bit like a command center. This area of the brain communicates with the rest of the body through the autonomic nervous system, which controls such involuntary body functions as breathing, blood pressure, heartbeat, and the dilation or constriction of key blood vessels and small airways in the lungs called bronchioles. The autonomic nervous system has two components, the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system functions like a gas pedal in a car. It triggers the fight-or-flight response, providing the body with a burst of energy so that it can respond to perceived dangers. The parasympathetic nervous system acts like a brake. It promotes the "rest and digest" response that calms the body down after the danger has passed. After the amygdala sends a distress signal, the hypothalamus activates the sympathetic nervous system by sending signals through the autonomic nerves to the adrenal glands. These glands respond by pumping the hormone epinephrine also known as adrenaline into the bloodstream. As epinephrine circulates through the body, it brings on a number of physiological changes. The heart beats faster than normal, pushing blood to the muscles, heart, and other vital organs. Pulse rate and blood pressure go up. The person undergoing these changes also starts to breathe more rapidly. Small airways in the lungs open wide. This way, the lungs can take in as much oxygen as possible with each breath. Extra oxygen is sent to the brain, increasing alertness. Sight, hearing, and other senses become sharper. Meanwhile, epinephrine triggers the release of blood sugar glucose and fats from temporary storage sites in the body. These nutrients flood into the bloodstream, supplying energy to all parts of the body. As the initial surge of epinephrine subsides, the hypothalamus activates the second component of the stress response system – known as the HPA axis. This network consists of the hypothalamus, the pituitary gland, and the adrenal glands. The HPA axis relies on a series of hormonal signals to keep the sympathetic nervous system – the "gas pedal" – pressed down. If the brain

continues to perceive something as dangerous, the hypothalamus releases corticotropin-releasing hormone CRH, which travels to the pituitary gland, triggering the release of adrenocorticotropic hormone ACTH. This hormone travels to the adrenal glands, prompting them to release cortisol. The body thus stays revved up and on high alert. When the threat passes, cortisol levels fall. The parasympathetic nervous system—the "brake"—then dampens the stress response. Techniques to counter chronic stress Many people are unable to find a way to put the brakes on stress. Chronic low-level stress keeps the HPA axis activated, much like a motor that is idling too high for too long. After a while, this has an effect on the body that contributes to the health problems associated with chronic stress. Persistent epinephrine surges can damage blood vessels and arteries, increasing blood pressure and raising risk of heart attacks or strokes. But they inadvertently contribute to the buildup of fat tissue and to weight gain. For example, cortisol increases appetite, so that people will want to eat more to obtain extra energy. It also increases storage of unused nutrients as fat. Fortunately, people can learn techniques to counter the stress response. Herbert Benson, director emeritus of the Benson-Henry Institute for Mind Body Medicine at Massachusetts General Hospital, has devoted much of his career to learning how people can counter the stress response by using a combination of approaches that elicit the relaxation response. These include deep abdominal breathing, focus on a soothing word such as peace or calm, visualization of tranquil scenes, repetitive prayer, yoga, and tai chi. Most of the research using objective measures to evaluate how effective the relaxation response is at countering chronic stress have been conducted in people with hypertension and other forms of heart disease. Those results suggest the technique may be worth trying—although for most people it is not a cure-all. For example, researchers at Massachusetts General Hospital conducted a double-blind, randomized controlled trial of patients with hypertension, ages 55 and older, in which half were assigned to relaxation response training and the other half to a control group that received information about blood pressure control. After eight weeks, 34 of the people who practiced the relaxation response—a little more than half—had achieved a systolic blood pressure reduction of more than 5 mm Hg, and were therefore eligible for the next phase of the study, in which they could reduce levels of blood pressure medication they were taking. People can use exercise to stifle the buildup of stress in several ways. Exercise, such as taking a brisk walk shortly after feeling stressed, not only deepens breathing but also helps relieve muscle tension. Movement therapies such as yoga, tai chi, and qi gong combine fluid movements with deep breathing and mental focus, all of which can induce calm. Confidants, friends, acquaintances, co-workers, relatives, spouses, and companions all provide a life-enhancing social net—and may increase longevity.

Chapter 4 : Our Brain on Stress: Forgetful and Emotional

Chronic stress and high levels of cortisol create long-lasting brain changes. A new study confirms the importance of maintaining healthy brain structure and connectivity by finding ways to reduce.

For much of human history, this emergency response system was useful: It enabled people to survive immediate physical threats, like an attack from a wild animal. Instead of helping you survive, this kind of stress response can actually make you sick. Chronic stress can harm the body in several ways. How Stress Affects the Brain Recent research suggests that chronic stress takes a toll on the brain, too. Some of these changes involve dendrites -- tiny branch-like structures on nerve cells that send and receive signals. They think that as the amygdala grows in size, you may experience more anxiety and fear. Tips On Coping With Stress If this news about stress and the brain is giving you a headache -- or stressing you out in other ways -- relax. Not everyone is equally vulnerable to stress. Your past experiences can affect your response, too. If you lived through a lot of stressful situations growing up, you may be more sensitive to stress as an adult. Try to notice your own reactions to stress. Resolve the stressful situation if you can. You may not have much control over many of the sources of stress in your life, but if there is a something you can do to resolve a stressful situation, do it! Talk to friends about what you can do to change a bad situation, and consider getting help from a conflict resolution expert if necessary. Spend time with loved ones and cultivate healthy friendships. It can keep you from feeling lonely, isolated or inadequate and if you feel good about yourself, you can deal with stress better. Friends and loved ones can be a good source of advice and suggest new ways of handling problems. If your network of friends is small, think about volunteering, joining an outdoor activities group or trying an online meet-up group to make new friends. Do an activity you like. Part of being stressed out is feeling that you never have enough time, so adding more activities to your schedule might seem like the last thing you need. But if you make even a little bit of time for an activity you really enjoy, the payoff can be huge: You feel calmer and happier and can deal with work and other demands better. Eat a healthy diet. It sounds corny, but focusing your thoughts on positive parts of your life instead of the stress-ridden areas can be good for your physical health. Your own research has probably convinced you that laughing makes you feel better. Seek professional counseling if necessary. Extreme chronic stress is no laughing matter. Enlist the help of a professional if you think you are at risk for serious health effects.

Chapter 5 : Mechanisms of stress in the brain

How to calm down: Know the effects of stress are reversible Emma Kapotes/calendrierdelascience.com, Valero Doval (illustration) The good news: Research indicates the brain has a natural ability to recover from stress.

Chapter 6 : Effects of Stress on the Developing Brain

Stress is how the brain and body respond to any demand. Every type of demand or stressorâ€”such as exercise, work, school, major life changes, or traumatic eventsâ€”can be stressful. Stress can affect your health.

Chapter 7 : Stress symptoms: Effects on your body and behavior - Mayo Clinic

Prolonged stress changes the brain. The part of our brain that helps process threatening situations, the amygdala, can appear larger in people who are chronically stressed. Researchers have also seen that areas of the brain involved in rational thought and planning, the hippocampus and prefrontal.

Chapter 8 : How Stress Affects The Brain

This is why lifestyle factors, such as exercise, eating the right food to support brain health, reducing stress, sleep,

DOWNLOAD PDF STRESS AND THE BRAIN

sunlight, social connection, meditation etc are all important for mental health and keeping the vital neurochemicals at healthy levels.

Chapter 9 : Effect of Stress on the Brain | HowStuffWorks

The brain is not designed for long term stress when you feel like you have no control. The saber-toothed tiger ate you or you ran away but it was all over in less than a minute. If you have a bad boss, the saber-toothed tiger can be at your door for years, and you begin to deregulate.