

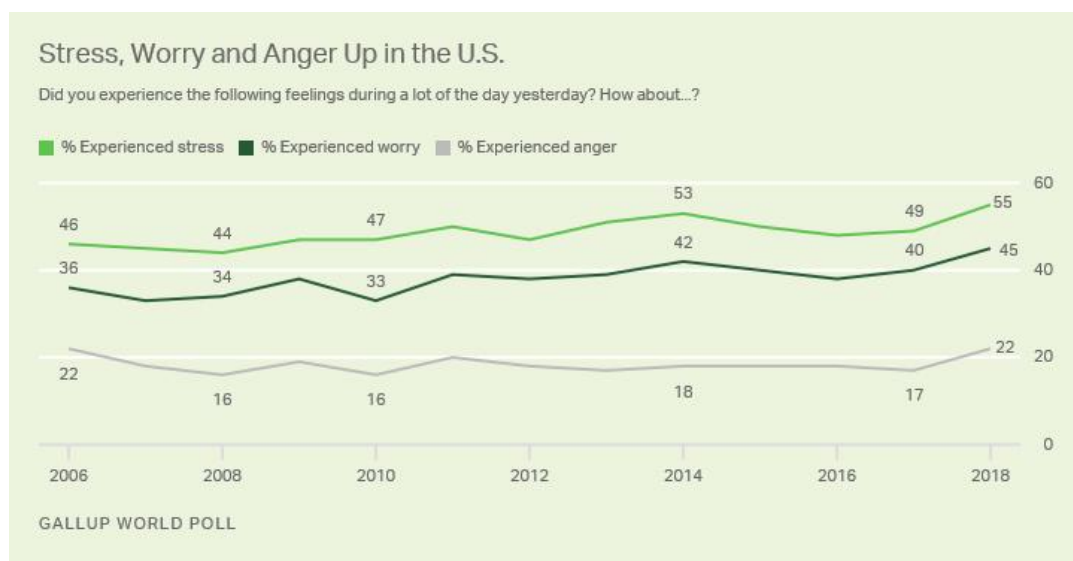
The Physical Effects of Stress and How to Prevent Damage

Tiffany Lu

Concord-Carlisle High School, Massachusetts 01742, USA.

Abstract: Chronic stress is a rising public health crisis. 84% of Americans report feeling stressed weekly (Black, 2022). Stress is the emotional or physical tension resulting from any event that makes one feel frustrated, angry, or nervous.

Keywords: Stress; Effects; Prevent Chronic Stress



The above diagram represents the slight increase in stress levels over the years. Americans were polled yearly, and a rise in mental health issues has been observed. There is an upwards trajectory in the amount of stress that Americans feel, as it is an increasing issue (Ray, 2019).

Stress can be broken down into two categories: acute stress and chronic stress. Acute stress occurs over a brief period and goes away quickly.

On the other hand, chronic stress is long-term stress. This type of stress leads to physical problems, eventually taking a toll on the body and causing various physical effects (Medline Plus, 2022). This paper will discuss the effects of stress starting from the brain, its physical symptoms by showing the chemical effects, how they affect the body and solutions.

Stress Releases a Variety of Hormones

According to researchers from the department of psychiatry at the University of California, it has been found that stress has significant effects on the autonomic nervous system, the hypothalamic-pituitary-adrenal axis, and the immune system. Exposure to stress releases the hormones of norepinephrine and epinephrine in the autonomic nervous system and increases heart rate. Effects on the hypothalamic-pituitary-adrenal axis include cortisol, saliva, and urine levels (Kemeny, 2003). High cortisol levels raise the blood sugar level, which can cause illnesses like type 2 diabetes. Lastly, the immune system undergoes several changes. Stress limits the production of some cytokines, immune cells are altered, and inflammation is enhanced.

Similarly, the Encyclopedia of Early Childhood Development reports that the stress response involves the sympathetic nervous system, various neurotransmitter systems, the immune system, and the HPA axis. The HPA axis plays a large role in stress management by maintaining the individual's ability to respond to acute stressors. With long-term stress, the system releases the hormone corticotropin (CRH). CRH is manufactured in the amygdala and is related to the fight-or-flight response. In this process, adrenocorticotrophic hormone (ACTH) is also released. ACTH signals the release of cortisol, the primary hormone linked with stress, and it is in charge of maintaining homeostasis. Cortisol directly relates to the amount of stress the body feels. The Hormones Released have a Direct Effect on the Body (Gunnar et al., 2008).

According to Medline Plus, the human body stays alert during chronic stress. In the beginning stages, individuals typically suffer from forgetfulness, aches and pains, headaches, fatigue, lack of focus, digestive problems, stiffness, weight, or sleep issues. Over time, these symptoms may lead to various health problems that are put at high risk, including high blood pressure, heart disease, diabetes, obesity, depression and anxiety, and skin problems (MedlinePlus, 2016).

After reporting on hormones linked to stress, the Encyclopedia of Early Childhood Development analyzes the effects of chronic stress. Early life stressors can lead to decreased brain volume, dysregulation of the neuroendocrine stress response system, and limbic dysfunction, including the hippocampus, the medial prefrontal cortex, and the amygdala. The authors of this study also linked other studies involving animals that faced early life stressors. As a result, there is inhibited neurogenesis, disrupted neuronal plasticity, neurotoxicity, and abnormal synaptic connectivity (Gunnar et al., 2008).

Techniques to Prevent Chronic Stress

There are a few ways to prevent chronic stress from its physical consequences. Doctors from Yale Medicine recommend treating chronic stress sooner rather than later as a preventative approach. Finding solutions to releasing stress is easier in the early stages, as there is less damage as well. Some techniques include exercising, eating healthy foods, managing a balanced schedule, getting more sleep, having free time, and practicing mindfulness (Yale Medicine, 2022).

Dieticians writing for Healthline provide and support similar methods to preventing and easing stress. Exercise, for one, releases large amounts of stress (Jennings & Kubula, 2018). A team of researchers for the National Library of Medicine conducted a six-week study with 185 university students. After two days of participating in aerobic stress, there was a drastic decline in stress and depressive levels (Herbert et al., 2020). In addition, a healthy diet can lower stress levels. Processed foods and added sugars increase stress levels in individuals. Decreasing screen time, self-care, deep breathing, and spending time outside has also proven to reduce cortisol levels (Jennings & Kubula, 2018).

In addition, educating children in school is one step to proactively preventing chronic stress. Childhood is a crucial time to address this issue as the relationship between stressors and anxiety is stronger in children than in adolescents. A study was conducted to test this relationship. A group of professors puts together a study where they gathered 208 children from ages 8-12. They assigned different classes to different groups, either the experimental group that was exposed to intervention courses, or the control group that did not receive this opportunity. Stress was measured through self-reports of coherence, rumination, and happiness. Parents also reported on these same measures. The intervention courses helped children primarily in their verbal sharing of emotions and bodily awareness of their feelings. The effect was even more prominent in the follow-up examination, proving long-term effectiveness (Van de Weijer-Bergsma et al., 2012).

Conclusion

To conclude, it is evident that stress directly affects one's physical state. With high levels of perceived stress, the body releases more hormones, the main one being cortisol, which affects physical well-being. Prolonged chronic stress causes one to experience various symptoms, including negative impacts on the autonomic nervous system, the hypothalamic-pituitary-adrenal axis, and the immune system. However, these negative effects can be prevented through youth exposure to this topic and learning ways to cope. In addition, another solution involves several exercises that can be

performed at any stage to reduce stress levels, including exercising more, going outside, practicing mindfulness, adopting a balanced diet, and seeking professional help, to prevent the beginnings of stress from the brain effects on the body.

References

- [1] Gunnar MR, Herrera A, Hostinar CE. Stress and Early Brain Development. In: Tremblay RE, Boivin M, Peters RDeV, eds. Encyclopedia on Early Childhood Development [online]. [https:// www. child-encyclopedia. com/brain/according-experts/stress-and-early-brain-development](https://www.child-encyclopedia.com/brain/according-experts/stress-and-early-brain-development). Published: June 2009. Accessed February 1, 2023.
- [2] Herbert, C., Meixner, F., Wiebking, C., & Gilg, V. (2020). Regular Physical Activity, Short-Term Exercise, Mental Health, and Well-Being Among University Students: The Results of an Online and a Laboratory Study. *Frontiers in Psychology*, 11(509).
- [3] Jennings, KA., & Kubala, J. (2018, August 28). 16 simple ways to relieve stress and anxiety. Healthline. <https://www.healthline.com/nutrition/16-ways-relieve-stress-anxiety>.
- [4] Kemeny, M. E. (2003). The psychobiology of stress. *Current directions in psychological science*, 12(4), 124-129.
- [5] Black, M. L. (2022, April 4). Americans' Stress Levels — and Financial Anxiety — on the Rise. ValuePenguin. <https://www.valuepenguin.com/stress-financial-anxiety-survey>.
- [6] MedlinePlus. (2016). Stress and your health: MedlinePlus Medical Encyclopedia. MedlinePlus. [https:// medlineplus. gov/ency/article/003211.htm](https://medlineplus.gov/ency/article/003211.htm).
- [7] Van de Weijer-Bergsma, E., Langenberg, G., Brandsma, R. et al. The Effectiveness of a School-Based Mindfulness Training as a Program to Prevent Stress in Elementary School Children. *Mindfulness* 5, 238–248 (2014).
- [8] Yale Medicine. (2022). Chronic Stress. Yale Medicine. [https://www.yalemedicine.org/ conditions/stress-disorder](https://www.yalemedicine.org/conditions/stress-disorder).
- [9] Joëls M, Karst H, Krugers HJ, Lucassen PJ. Chronic stress: implications for neuronal morphology, function and neurogenesis. *Front Neuroendocrinol*. 2007 Aug-Sep;28(2-3):72-96.
- [10] Lowrance SA, Ionadi A, McKay E, Douglas X, Johnson JD. Sympathetic nervous system contributes to enhanced corticosterone levels following chronic stress. *Psychoneuroendocrinology*. 2016 Jun;68:163-70.
- [11] Blackburn-Munro G, Blackburn-Munro RE. Chronic pain, chronic stress and depression: coincidence or consequence? *J Neuroendocrinol*. 2001 Dec;13(12):1009-23.