

How the dark shadow of the COVID-19 pandemic is changing our brains

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Credit: Hannah Moore/Northeastern University

The threat of COVID-19 has been looming over our lives for a year and a half. We've had to question whether seemingly mundane behaviors might lead to someone's death. Or if we or someone we love might get

severely sick. Our financial forecast and job stability have been at risk. Uncertainty about the future has reigned—and was renewed with the emergence of variants of the coronavirus that causes COVID-19.

For many people, a year and a half feeling stressed out has worn on us. And, say Northeastern psychologists, the emotional long-haul of the pandemic and the continual stress it induces could have lingering effects within your mind and [body](#).

"Before COVID, you were used to a certain level of comfort or stability in your day-to-day life, and that was completely disrupted when COVID hit for basically everybody," says Rebecca Shansky, associate professor of psychology at Northeastern. "When you're living with that kind of uncertainty, that is going to change the way your [brain](#) is going to work."

Typically, when your brain perceives a threat, it triggers two main hormonal responses in your body, explains Heather Brenhouse, associate professor of psychology at Northeastern. One system releases epinephrine (which is commonly known as adrenaline) and the other releases cortisol. Together, those hormones make your body poised and ready to react to a threat.

To set off a sort of "fight or flight" response, the adrenaline in your body spikes quickly in the face of a perceived threat or acute stressor. That hormone gives you a lot of energy to react, and it also activates your [immune system](#). That way, Brenhouse says, "it can fight pathogens, fight bacteria, because you can imagine if you're under an [acute stress](#) and some predator is chasing you, you better be ready to heal wounds and things like that."

The cortisol can also give you a surge of energy, but may leave you feeling lethargic afterwards. It might also trigger feelings of anxiety, as it sends signals to your brain that something is wrong and it has to be dealt

with.

While the adrenaline rushes throughout your body and then peters out quickly, [cortisol levels](#) rise slowly in your body and then remain high in your bloodstream for longer. The two are supposed to balance one another out.

"Cortisol is actually meant to replenish some of the stuff that your adrenaline did. It's kind of there to bring us back to baseline from that adrenaline rush," Brenhouse says. Cortisol can make us hungry, and also suppresses the immune system so that it doesn't stay at the adrenaline-triggered, overly active state for too long.

That system has a mechanism to turn off the flow of cortisol when you're healthy and no longer facing a stressor, Brenhouse says. "But, if you've experienced stress for a long period of time, one thing that could happen is a resistance to that shut-off mechanism. So you wind up having this kind of prolonged cortisol response even when there might not be an actual stressor."

That protracted feeling of heightened stress, she says, can lead to depression. And if your immune system is suppressed for too long, you can become more susceptible to getting sick, too.

Not everybody experiencing long-term stress will be unable to turn off the cortisol response, Brenhouse says, but it is a possibility. And that possibility, she says, makes it even more crucial to figure out ways to cope and ease the feelings of stress.

"None of this is permanent," Brenhouse says. "You're not getting broken right now. None of us are breaking. Our brain and our bodies are really adaptable. So I'm pretty optimistic that we're not all doomed because we're going through this."

However, she says, the [long-term stress](#) of the pandemic is likely changing us. And, says Shansky, it might also be changing the physical structure of our brains.

"When you experience a stressful event, your brain and body work together to try and deal with that. Normally, that's a good thing. That's what your body and your brain are supposed to do: deal with something that is immediately life-threatening," she says. "But we haven't quite evolved to have a lot of nuance in that process. And so if you're living under long-term stressful times—before COVID-19, this is the case for people in low socioeconomic status or caregivers—exposure to those factors can actually start to change your brain at the molecular level."

Shansky's own research has focused on just how a brain can change under stressful conditions. She exposed rats to repeated stress and observed how branches and connections in their brains changed over time.

In the male rats, neurons in some brain regions actually shrank, whereas neurons in those same brain regions grew in female rats. "We don't know yet exactly what purpose those structural changes have," Shansky says, "But that is something to keep in mind."

Those shrunken neurons in the rats' brains do grow back during a recovery period, Shansky found. But they don't grow back in exactly the same way as before.

The same may happen in our brains after the pandemic is over (whenever that may be).

"I don't know that we'll ever reform the way we would've been, because this is definitely changing us," says Brenhouse. "But it could be better. We could be adapting to things that we otherwise wouldn't have adapted

to. We might be becoming a little more resilient to some kinds of stress. We might be learning new coping mechanisms. This is a lot of learning we're doing. And that does change the brain."

It might not be a time of growth for everybody, she says. We're all experiencing the stress of COVID-19 differently, and some of our lives might be more disrupted than others or we may be exposed to more traumatic aspects of the deadly pandemic. And "sometimes that load can lead to injury," Brenhouse says. Too much stress or trauma could be detrimental and wind up being an ongoing challenge for someone later on.

Both Brenhouse and Shansky suggest that you don't mentally beat yourself up if you're not feeling the same or being as productive as you were before the pandemic.

"We have to be really kind to ourselves and forgive ourselves for any of this frustration that we're dealing with," Brenhouse says. She also suggests coping mechanisms such as mindfulness training, physical exercise, and spending time with loved ones. But, she says, "We all have our own ways of dealing with stress. Whatever works, there's no wrong answer. Cope with your [stress](#) as much as you can. Do what you know makes you calm."

Provided by Northeastern University

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