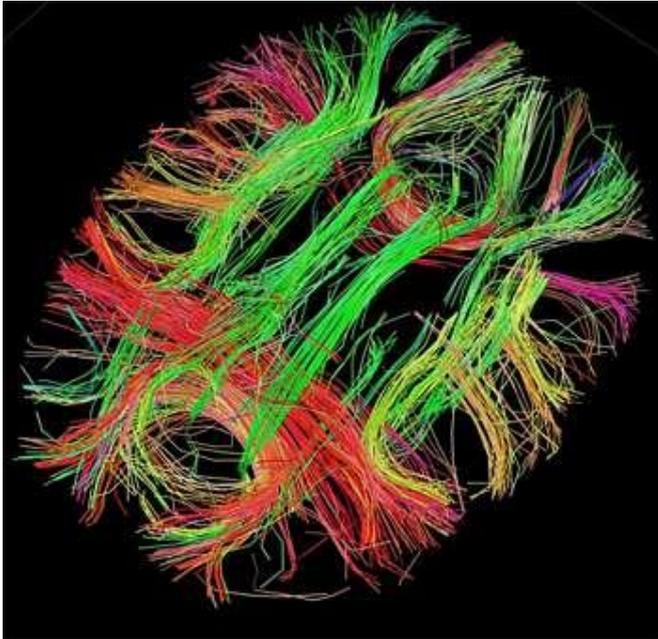


How stress can tweak the brain to sabotage self-control

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White matter fiber architecture of the brain. Credit: Human Connectome Project.

A challenging morning meeting or an interaction with an upset client at work may affect whether we go for that extra chocolate bar at lunch. In a study appearing August 5 in *Neuron*, researchers placed human volunteers in a similar food choice scenario to explore how stress can alter the brain to impair self-control when we're confronted with a choice.

"Our findings provide an important step towards understanding the interactions between stress and self-control in the [human brain](#), with the [effects of stress](#) operating through multiple neural pathways," says lead author Silvia Maier, of the University of Zurich's Laboratory for Social and Neural Systems Research. "Self-control abilities are sensitive to perturbations at several points within this network, and optimal self-control requires a precise balance of input from multiple

brain regions rather than a simple on/off switch." She emphasized that much work still remains, however, to fully understand the mechanisms involved.

In the study, 29 participants underwent a treatment known to induce moderate stress in the laboratory before they were asked to choose between two food options. An additional 22 participants did not undergo the treatment, which involved being observed and evaluated by the experimenter while immersing a hand in an ice water bath for 3 minutes, before choosing between the food options.

All of the participants who were selected for the study were making an effort to maintain a healthy lifestyle, so the study presented them with a conflict between eating a very tasty but unhealthy item and one that is healthy but less tasty.

The scientists found that when individuals chose between different [food options](#) after having experienced the stressful ice bath treatment, they overweighted food taste attributes and were more likely to choose an [unhealthy food](#) compared with people who were not stressed.

The effects of stress were also visible in the brain. Stressed participants' brains exhibited altered patterns of connectivity between regions including the amygdala, striatum, and the dorsolateral and [ventromedial prefrontal cortex](#), essentially reducing individuals' ability to exercise self-control over [food](#) choices. Only some of these changes were associated with cortisol, a hormone commonly linked to stress.

The investigators say that their study indicates that even moderate levels of stress can impair self-control. "This is important because moderate stressors are more common than extreme events and will thus influence self-control choices more frequently and for a larger portion of the population," says senior author Todd Hare. "One

interesting avenue for future research will be to determine whether some of the factors shown to protect against structural brain changes following severe stress—such as exercise and social support—can also buffer the effects of moderate stress on decision making," he adds.

There was also a good deal of variation in the degree to which [stress](#) affected individuals in the study, so it will be important to investigate why some people are more resilient than others.

More information: *Neuron*, Maier et al.: "Acute Stress Impairs Self-Control in Goal-Directed Choice by Altering Multiple Functional Connections within the Brain's Decision Circuits"

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