Even Mild Stress Can Make It Difficult to Control Your Emotions

Aug. 26, 2013 — Even mild stress can thwart therapeutic measures to control emotions, a team of neuroscientists at New York University has found. Their findings, which appear in the journal*Proceedings of the National Academy of Sciences*, point to the limits of clinical techniques while also shedding new light on the barriers that must be overcome in addressing afflictions such as fear or anxiety.

"We have long suspected that stress can impair our ability to control our emotions, but this is the first study to document how even mild stress can undercut therapies designed to keep our emotions in check," said Elizabeth Phelps, a professor in NYU's Department of Psychology and Center for Neural Science and the study's senior author. "In other words, what you learn in the clinic may not be as relevant in the real world when you're stressed."

In addressing patients' emotional maladies, therapists sometimes use cognitive restructuring techniques -- encouraging patients to alter their thoughts or approach to a situation to change their emotional response. These might include focusing on the positive or non-threatening aspects of an event or stimulus that might normally produce fear.

But do these techniques hold up in the real world when accompanied by the stress of everyday life? This is the question the researchers sought to answer.

To do so, they designed a two-day experiment in which the study's participants employed techniques like those used in clinics as a way to combat their fears.

On the first day, the researchers created a fear among the study's participants using a commonly employed "fear conditioning" technique. Specifically, the participants viewed pictures of snakes or spiders. Some of the pictures were occasionally accompanied by a mild shock to the wrist, while others were not. Participants developed fear responses to the pictures paired with shock as measured by physiological arousal and self-report.

After the fear conditioning procedure, the participants were taught cognitive strategies -- akin to those prescribed by therapists and collectively titled cognitive-behavioral therapy (CBT) -- in order to learn to diminish the fears brought on by the experiment.

On the next day, the participants were put into two groups: "the stress group" and "the control group." In the stress group, participants' hands were submerged in icy water for three minutes -- a standard method for creating a mild stress response in psychological studies. In the control group, subjects' hands were submerged in mildly warm water. To determine that the participants in the stress group were, in fact, stressed, the researchers gauged each participant's levels of salivary cortisol, which the human body is known to produce in response to stress. Those in the stress group showed a significant increase in cortisol following the stress manipulation, whereas there was no change in the control group.

After a short delay, the researchers then tested the participants' fear response to the same pictures of snakes or spiders in order to determine if stress undermined the utilization of the cognitive techniques taught the previous day.

As expected, the control group showed diminished fear response to the images, suggesting they were able to employ the cognitive training from the previous day. However, even though the stress group received identical training, they showed no reduction in fear, indicating they were unable to use these cognitive techniques to reduce fear on the second day.

"The use of cognitive techniques to control fear has previously been shown to rely on regions of the prefrontal cortex that are known to be functionally impaired by mild stress," Phelps observed. "These findings are consistent with the suggestion that the effect of mild stress on the prefrontal cortex may result in a diminished ability to use previously learned techniques to control fear."

"Our results suggest that even mild stress, such as that encountered in daily life, may impair the ability to use cognitive techniques known to control fear and anxiety," added Candace Raio, a doctoral student in NYU's Department of Psychology and the study's lead author. "However, with practice or after longer intervals of cognitive training, these strategies may become more habitual and less sensitive to the effects of stress."

The study's other co-authors included: Temidayo Orederu, an undergraduate at Hunter College; Laura Palazzolo, a medical student at SUNY Downstate College of Medicine; and Ashley Shurick, a doctoral student at Stanford University.
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Journal Reference:

1. Candace M. Raio, Temidayo A. Orederu, Laura Palazzolo, Ashley A. Shurick, and Elizabeth A. Phelps. **Cognitive emotion regulation fails the stress test**. *PNAS*, August 26, 2013 DOI: 10.1073/pnas.1305706110
