

A mother's criticism causes distinctive neural activity among formerly depressed

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While inside an fMRI scanner, participants listened to audio recordings of remarks from their mothers. Some comments were praising, some were critical, and others were neutral. Jon Chase/Harvard News Office

(PhysOrg.com) -- Formerly depressed women show patterns of brain activity when they are criticized by their mothers that are distinctly different from the patterns shown by never depressed controls, according to a new study from Harvard University. The participants reported being completely well and fully recovered, yet their neural activity resembled that which has been observed in depressed individuals in other studies.

The study, which appears in the current issue of the journal *Psychiatry Research: Neuroimaging*, was led by Jill M. Hooley, professor of psychology in the Faculty of Arts and Sciences at Harvard. Hooley's co-authors were Holly Parker, also of Harvard, and Staci Gruber, Julien Guillaumot, Jadwiga Rogowska and Deborah Yurgelun-Todd of McLean

Hospital in Belmont, Mass.

"We found that even though our formerly depressed participants were fully well, had no symptoms, and felt fine, different things were happening in their brains when they were exposed to personal criticism," says Hooley. "What's interesting to us about these findings is that although these women were fully recovered, at the level of the brain they were not back to normal."

The study included 23 female participants, 12 of whom had no history of depression or any other mental illness and 11 of whom had previously experienced one or more depressive episodes, but had reported no symptoms for an average of 20 months. To an observer, both the control group and the formerly depressed appeared completely healthy.

While inside an [fMRI](#) scanner, the participants listened to 30-second audio recordings of remarks from their mother. Some comments were praising, some were critical and others were neutral in content. The comments were previously recorded over the telephone with the permission of the mothers. The participants were also asked to rate their mood on a scale from one to five after hearing the different kinds of remarks.

Despite being healthy and reporting similar conscious reactions to the recorded comments, the formerly depressed showed different activity in their brains, compared to those who had never been depressed. "When we asked them how they felt after being criticized, they responded in the same way as the controls did," said Hooley. "But when we looked at the brain scans, the patterns of activation were quite different. So this is happening under the radar of awareness."

Individuals who had never been depressed showed increased activity in the dorsolateral prefrontal cortex and the anterior cingulate cortex,

which are brain areas involved in the cognitive control of emotion. The formerly depressed individuals did not show activity in these areas, but instead showed increased activity in the amygdala, a part of the brain that is responsive to potentially threatening stimuli. Previous research has shown similar activity in these neural systems among individuals who are currently depressed.

"When these formerly depressed participants are processing criticism, some brain areas thought to be involved in emotion regulation are less active, and the amygdala is actually more active, compared to the healthy controls," says Hooley. "We know that this is not linked to them being symptomatic now. These findings tell us that even when people are fully recovered from an episode of depression, their ability to process criticism is still different - and probably not in a good way."

What the researchers don't know is whether this type of activity within these brain systems exists prior to the development of a depressive episode, or if this activity could be a kind of scar left on the brain by a past episode of depression, says Hooley.

Previous studies have shown that living in a critical family environment increases rates of relapse in depression, and so use of criticism in this study is particularly important and applicable to real life.

Care was taken to avoid placing the formerly depressed individuals in a potentially harmful situation. The researchers ensured that the criticisms were not too extreme. Mothers provided the critical remarks in a very specific format, and the remarks were criticisms that the mothers had previously voiced. Examples of the criticisms included statements about tattoos or body piercing, failing to send thank you notes, or being inconsiderate and untidy.

To protect participants, the criticisms were required to concern topics

that the daughters had previously heard about from their mothers, although the praising remarks were in some cases new to the daughters.

"We made sure that everybody left in a good frame of mind, and still had a good relationship with their mother," says Hooley. "That was crucial."

Source: Harvard University ([news](#) : [web](#))

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