

Study looks at why people may feel more helpless in stressful situations than others

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Why do some people handle stress better than others? Credit: Frontiersin.org

Stress - we're all too familiar with it. More of us than ever are feeling the relentless pressure of busy lives and it is taking its toll. In the US, stress related ailments cost the nation \$300 billion every year in medical bills and lost productivity.

But it seems some people are able to cope with this problem much better than others. Some individuals are resilient, while others succumb to despair. The reason, scientists have discovered, is all in the brain.

Mapping the brain activity in mice when placed under stress, scientists have found that mice showing helpless behavior had vastly different brain activity from those displaying resilient behavior.

Certain patterns were revealed in the stressed brain and the scientists identified a list of brain areas that might have a critical role to play in stress-induced depression. Looking at these brain activities the study, published in *Frontiers in Neural Circuits*, opens up possibilities for identifying new targets for the treatment of depression.

They explain that with the exception of a few brain areas, "mice showing 'helpless' behavior had an overall brain-wide reduction in the level of neuronal activation compared with mice showing 'resilient' behavior."

"In addition, the helpless mice showed a strong trend of having higher similarity in whole-brain activity profile among individuals, suggesting that helplessness is represented by a more stereotypic brain-wide activation pattern," explained the authors of the study.

Helpless behavior in the face of stress is distinctly recognizable in the brain and common to those animals displaying helplessness. The scientists said that, "we uncovered abnormally stereotypic brain activity in helpless animals." Helpless mice had more brain activity in common than the resilient mice.

Moreover, those mice that showed helpless behavior had significantly lower levels of overall [brain activity](#). The scientists found that this included the prefrontal cortex, a brain region associated with organizing our thoughts and actions, and which has been implicated in mood or anxiety disorders. The helpless group also showed lower brain activation in areas vital for processing emotion and motivation, areas important for defensive behavior, those key for stress coping and those associated with learning and memory.

However, there was one area of the brain that lit up more in helpless mice and that was the locus coeruleus. According to the study, this strongly suggests that the area has a significant role to play in stress-induced depression. It provides an opportunity for further study and could be significant for future treatments of depression.

More research is required to determine whether these neural changes are causally related to the expression of helplessness or resilience.

"Our findings provide novel insights into brain circuits underlying a model of depression," they explained. "It has the potential to guide future studies aimed at understanding the different roles specific [brain](#) regions play, as well as provide new targets for the development of new therapies."

More information: Yongsoo Kim et al. Whole-Brain Mapping of Neuronal Activity in the Learned Helplessness Model of Depression, *Frontiers in Neural Circuits* (2016). [DOI: 10.3389/fncir.2016.00003](https://doi.org/10.3389/fncir.2016.00003)

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