HPA Activation Leads to Sex Differences in Spatial Attention

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In case you missed it, the cameras were rolling at the APS 23rd Annual Convention in Washington, DC. Watch Melissa VanderKaay Tomasulo from St. Michael's College present her poster session research.

Stressors in your life, such as navigating traffic or doing a public presentation, activate two main biological stress systems: The HPA axis (hypothalamic-pituitary-adrenal axis) and the SAM axis (sympatho-adrenomedullary axis). Stress research in humans has generally focused on verbal learning and memory. But Melissa M. VanderKaay Tomasulo of Saint Michael's College, along withAnthony E. Richardson, Eric Hanko, Rachael Sparks and Amanda Willette, wanted to see how acute stress affects these two systems as well as spatial attention and spatial learning.

The researchers exposed student volunteers to an acute stressor (for this study, they use the cold pressor test in which volunteers immersed their hands in ice water for approximately one minute) or a non-stress condition (e.g., watching a nature video) before the students were asked to complete two spatial tasks: the useful field of view task (which measures spatial attention), and a virtual reality (VR) navigation task. Cortisol measurements were taken from the volunteers before they were exposed to the stress or non-stress conditions, before they performed the tasks, and after performing the tasks. Changes in blood pressure and heart rate were also recorded during the tasks.

Overall, the stress condition didn't affect performance of the tasks. But when the volunteers were divided into low- and high-cortisol responders (i.e., volunteers who had small changes in their cortisol level compared volunteers who had big changes), there were some performance differences. Males who were high-cortisol responders performed the spatial attention stress task more accurately than females who were high responders. For the virtual navigation task, there was no difference between males and females, but individuals who were high-cortisol responders performed the task faster and more accurately. Additional research of how HPA activation relates to spatial performance might explain how these sex differences arose.