

Traumatic stress changes brains of boys, girls differently, study finds

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Traumatic stress affects the brains of adolescent boys and girls

differently, according to a new brain-scanning study from the Stanford University School of Medicine.

Among youth with [post-traumatic stress disorder](#), the study found structural differences between the sexes in one part of the insula, a brain region that detects cues from the body and processes emotions and empathy. The insula helps to integrate one's feelings, actions and several other brain functions.

The findings will be published online Nov. 11 in *Depression and Anxiety*. The study is the first to show differences between male and female PTSD patients in a part of the insula involved in emotion and empathy.

"The insula appears to play a key role in the development of PTSD," said the study's senior author, Victor Carrion, MD, professor of psychiatry and behavioral sciences at Stanford. "The difference we saw between the brains of boys and [girls](#) who have experienced psychological trauma is important because it may help explain differences in trauma symptoms between sexes."

Smaller insula in traumatized girls

Among young people who are exposed to [traumatic stress](#), some develop PTSD while others do not. People with PTSD may experience flashbacks of traumatic events; may avoid places, people and things that remind them of the trauma; and may suffer a variety of other problems, including social withdrawal and difficulty sleeping or concentrating. Prior research has shown that girls who experienced trauma are more likely to develop PTSD than boys who experience trauma, but scientists have been unable to determine why.

The research team conducted MRI scans of the brains of 59 study participants ages 9-17. Thirty of them—14 girls and 16 boys—had

trauma symptoms, and 29 others—the control group of 15 girls and 14 boys—did not. The traumatized and nontraumatized participants had similar ages and IQs. Of the traumatized participants, five had experienced one episode of trauma, while the remaining 25 had experienced two or more episodes or had been exposed to chronic trauma.

The researchers saw no differences in brain structure between boys and girls in the control group. However, among the traumatized boys and girls, they saw differences in a portion of the insula called the anterior circular sulcus. This brain region had larger volume and surface area in traumatized boys than in boys in the control group. In addition, the region's volume and surface area were smaller in girls with trauma than among girls in the [control group](#).

Findings could help clinicians

"It is important that people who work with traumatized youth consider the [sex differences](#)," said Megan Klabunde, PhD, the study's lead author and an instructor of psychiatry and [behavioral sciences](#). "Our findings suggest it is possible that boys and girls could exhibit different [trauma symptoms](#) and that they might benefit from different approaches to treatment."

The insula normally changes during childhood and adolescence, with smaller insula volume typically seen as children and teenagers grow older. Thus, the findings imply that traumatic stress could contribute to accelerated cortical aging of the insula in girls who develop PTSD, Klabunde said.

"There are some studies suggesting that high levels of stress could contribute to early puberty in girls," she said.

The researchers also noted that their work may help scientists understand how experiencing trauma could play into differences between the sexes in regulating emotions. "By better understanding sex [differences](#) in a region of the brain involved in emotion processing, clinicians and scientists may be able to develop sex-specific [trauma](#) and emotion dysregulation treatments," the authors write in the study.

To better understand the findings, the researchers say what's needed next are longitudinal studies following traumatized young people of both sexes over time. They also say studies that further explore how PTSD might manifest itself differently in [boys](#) and girls, as well as tests of whether sex-specific treatments are beneficial, are needed.

The work is an example of Stanford Medicine's focus on precision health, the goal of which is to anticipate and prevent disease in the healthy and precisely diagnose and treat disease in the ill.

Provided by Stanford University Medical Center

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