

Severe Stress May Damage Children's Brains

PTSD could shrink a key center for emotion and memory, study suggests

By Steven Reinberg

Children who experience traumatic stress can suffer brain damage that results in a decrease in the size of the hippocampus, a part of the brain involved in memory and emotion, research suggests.

The researchers found that children with post-traumatic stress disorder (PTSD) and **high levels of the stress hormone cortisol** were likely to have this type of damage, which could make them prone to depression and anxiety later in life. "In this study, we analyzed children who had a history of interpersonal trauma, physical abuse, sexual abuse or witnessing violence and developed PTSD," said lead researcher Dr. Victor G. Carrion, the director of the Stanford Early Life Stress Research Program at Stanford University.



Symptoms of PTSD include "re-experience," involving flashbacks, intrusive thoughts or nightmares, avoidance and emotional numbing; and physical symptoms such as an elevated heart rate. These symptoms make PTSD difficult to differentiate from other conditions, such as attention deficit/hyperactivity disorder, according to the report. In their study, Carrion's team measured the volume of the hippocampus in 15 children ages 7 to 13, all of who suffered from PTSD. Measurements were taken 12 to 18 months after the start of the study. Reporting in the March issue of *Pediatrics*, the researchers found that children with the most severe PTSD symptoms had higher levels of cortisol at the start of the study. "Cortisol is important because animal studies have shown that it can be toxic to the brain and kill brain cells," Carrion said. Carrion's group also found the children with the highest levels of cortisol were more likely to have reductions in their hippocampal volumes at the end of the study, compared with their less-affected, but still traumatized counterparts.

The reduction in the size of the hippocampus may have serious consequences in adulthood, Carrion said. "When you finish having chronic PTSD, you might not have the resources in your hippocampus to really fight stress adequately as an adult," he said. "That puts you at risk for anxiety and depression." Whether the reduced size of the hippocampus is directly caused by PTSD or whether a smaller hippocampus makes one more vulnerable to PTSD isn't clear, Carrion noted. But this study suggests that high cortisol levels are involved in shrinking the hippocampus, he said. This finding adds to the understanding of PTSD, Carrion said. "This knowledge may lead us to develop more focused and more targeted treatments," he said. "Treatment of kids with PTSD needs to start as soon as possible," he said. "As soon as we recognize trauma, kids should be investigated for PTSD" But one expert said the study's implications remain unclear. "We don't know what a shrunken hippocampus means," said Dr. Glen R. Elliott, the chief psychiatrist at the Children's Health Council, Palo Alto, Calif. "Whether that means that it works less well or that the individual is prone to anxiety or depression -- we are nowhere near knowing that," he said. "Over the last 20 years, there has been increasing recognition that early trauma can have significant consequences," Elliott said. The mental health care field has moved from believing that unless you are physically damaged there are no lasting psychological consequences, to appreciating that major overwhelming stress from a variety of causes can produce sustained changes later on, he said. **However, Elliott doesn't think these findings will change treatment. "It doesn't mean that we need to slam these kids with drugs," he said. "The kinds of treatments that could be effective might be behavioral,"** he said.