Changes in brain structure found after childhood abuse

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(Medical Xpress)—Different forms of childhood abuse increase the risk for mental illness as well as sexual dysfunction in adulthood, but little has been known about how that happens. An international team of researchers, including the Miller School's Charles B. Nemeroff, M.D., Ph.D., Leonard M. Miller Professor and Chair of Psychiatry and Behavioral Sciences, has discovered a neural basis for this association. The study, published in the June 1 issue of the *American Journal of Psychiatry*, shows that sexually abused and emotionally mistreated children exhibit specific and differential changes in the architecture of their brain that reflect the nature of the mistreatment.

Researchers have known that victims of childhood abuse often suffer from psychiatric disorders later in life, including sexual dysfunction following sexual abuse. The underlying mechanisms mediating this association have been poorly understood. Nemeroff and a group of scientists led by Christine Heim, Ph.D., Director of the Institute of Medical Psychology at Charité University of Medicine Berlin, and Jens Pruessner, Ph.D., Director of the McGill Center for Studies in Aging at McGill University in Montreal, hypothesized that cortical changes during segments of mistreatment played a role. To study these potential changes, the researchers used magnetic resonance imaging (MRI) to examine the brains of 51 adult women who were exposed to various forms of childhood abuse.

The results showed a correlation between specific forms of maltreatment and thinning of the cortex in precisely the regions of the brain that are

involved in the perception or processing of the type of abuse. Specifically, the somatosensory cortex in the area in which the female genitals are represented was significantly thinner in women who were victims of sexual abuse in their childhood. Similarly, victims of emotional mistreatment were found to have a reduction of the thickness of the cerebral cortex in specific areas associated with self-awareness, self-evaluation and emotional regulation.

"This is one of the first studies documenting long-term alterations in specific brain areas as a consequence of child abuse and neglect," said Nemeroff, who is also Director of the Center on Aging. "The finding that specific types of early life trauma have discrete, long lasting effects on the brain that underlie symptoms in adults is an important step in developing novel therapies to intervene to reduce the often lifelong psychiatric/psychological burden of such trauma."

"Our data point to a precise association between experience-dependent neural plasticity and later health problems," said Heim. Pruessner agreed that the "large effect and the regional specificity in the brain that corresponds to the type of abuse is remarkable."

The scientists speculate that a regional thinning of the cortex may serve as a protective mechanism, immediately shielding the child from the experience of the abuse by gating or blocking the sensory experience. However, that thinning of the cortical sections may lay the groundwork for the development of behavioral problems in adulthood. The results of this study extend the literature on neural plasticity and show that cortical representation fields can be smaller when certain sensory experiences are damaging or developmentally inappropriate.

The study, "Decreased Cortical Representation of Genital Somatosensory Field After Childhood Sexual Abuse," was conducted in collaboration with scientists at Emory University in Atlanta.

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