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# Childhood abuse, neglect may significantly alter brain structure, function

Childhood abuse and neglect appear to have significant effects on brain structure and function, as well as on the epigenome, according to a presenter at the NEI Max virtual conference.

“Early life adversity can increase mortality and morbidity in adulthood,” **Deborah A. York, MSN, PMHNP-BC, APRN, CCRA**, psychiatric nurse practitioner at Mountain Mind Private Practice in Colorado, said in a presentation. “Early life adversity may include physical abuse, emotional abuse, sexual abuse, household mental illness left untreated, household substance use and abuse, incarceration of a household member, parental separation or divorce and domestic abuse in the household.”

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Almost 62% of children in the United States experience one or more adverse childhood experiences, according to York, and nearly 25% experience three or more, with the most common form being emotional abuse. Studies have shown higher rates of adverse childhood experiences among individuals who are Black, Hispanic or multiracial vs. those who are white; have less than a high school education vs. those who completed high school or more education; are unemployed or unable to work vs. employed; have an annual income less than \$15,000 vs. income greater than \$15,000; are lesbian, gay or bisexual vs. straight; and are transgender vs. lesbian, gay, bisexual or cisgender.

Results of one study showed child abuse and neglect are linked to increased risk for major psychiatric disorders and [suicide](#), and the course of psychiatric disorders among these individuals is more severe and characterized by altered brain structure, brain function and epigenetics. Another study found that childhood maltreatment increased risk for suicidal behavior, with emotional abuse linked to the greatest increased risk of 133%.

York noted that those with a history of childhood trauma have been found to have reduced gray matter volume in the hippocampus and amygdala. Moreover, meta-analysis of 21 [functional MRI](#) studies including 1,341 children and adolescents suggested early-life adversity was linked to greater activation of the amygdala, globus pallidus/parahippocampal gyrus, superior temporal gyrus, middle temporal gyrus, cerebellum and thalamus.

According to York, DNA methylation is an epigenetic mechanism related to early life abuse/neglect, and it adds methyl groups to promoter regions of genes, turning them “off” when they should be “on.”

York noted that methylation of several genes is consistently associated with childhood trauma among healthy and psychiatric populations. These genes and the potential effects of their alteration include the following:

- glucocorticoid receptor gene/nuclear receptor subfamily 3, group C (may play a role in stress-related psychopathology);
- serotonin transporter gene/solute carrier family 6 (may be involved in the development of stress-related hippocampal alterations);

- brain-derived neurotrophin factor (may lead to structural alterations of other stress-responsive brain regions, like the orbitofrontal cortex); and
- oxytocin receptor (may affect brain structure and psychiatric symptoms).

“Childhood abuse and neglect are alarmingly common and are associated with poor mental health outcomes,” York said. “Early life adversity is associated with neuronal alterations in brain regions associated with social and emotional processing, as well as with epigenetic alterations in genes implicated in impaired neurodevelopment and plasticity, neurotransmission and stress response. The association between early life adversity and poor mental health outcomes may be mediated by epigenetic and neural alterations and moderated by genome type, but more research is needed to confirm this.”