

Gastrointestinal complaints in children could signal future mental health problems

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A Columbia University study has found that adversity early in life is associated with increased gastrointestinal symptoms in children that may have an impact on the brain and behavior as they grow to maturity.

The study was published online March 28 in the journal *Development and Psychopathology*.

"One common reason children show up at doctors' offices is intestinal complaints," said Nim Tottenham, a professor of psychology at Columbia and senior author on the study. "Our findings indicate that [gastrointestinal symptoms](#) in [young children](#) could be a red flag to [primary care physicians](#) for future emotional health problems."

Scientists have long noted the strong connection between the gut and brain. Previous research has demonstrated that a history of trauma or abuse has been reported in up to half of adults with irritable bowel syndrome (IBS), at a prevalence twice that of patients without IBS.

"The role of trauma in increasing vulnerability to both gastrointestinal and mental health symptoms is well established in adults but rarely studied in childhood," said study lead author Bridget Callaghan, a post-doctoral research fellow in Columbia's psychology department. In addition, she said, animal studies have demonstrated that adversity-induced changes in the gut microbiome—the community of bacteria in the body that regulates everything from digestion to immune system function—influence neurological development, but no [human studies](#) have

done so.

"Our study is among the first to link disruption of a child's gastrointestinal microbiome triggered by early-life adversity with [brain activity](#) in regions associated with emotional health," Callaghan said.

The researchers focused on development in children who experienced extreme psychosocial deprivation due to institutional care before international adoption. Separation of a child from a parent is known to be a powerful predictor of mental health issues in humans. That experience, when modeled in rodents, induces fear and anxiety, hinders neurodevelopment and alters microbial communities across the lifespan.

The researchers drew upon data from 115 children adopted from orphanages or foster care on or before approximately they were 2 years old, and from 229 children raised by a biological caregiver. The children with past caregiving disruptions showed higher levels of symptoms that included stomach aches, constipation, vomiting and nausea.

From that sample of adoptees, the researchers then selected eight participants, ages 7 to 13, from the adversity exposed group and another eight who'd been in the group raised by their biological parents. Tottenham and Callaghan collected behavioral information, stool samples and brain images from all the children. They used gene sequencing to identify the microbes present in the stool samples and examined the abundance and diversity of bacteria in each participant's fecal matter.

The children with a history of early caregiving disruptions had distinctly different gut microbiomes from those raised with biological caregivers from birth. Brain scans of all the children also showed that brain activity patterns were correlated with certain bacteria. For example, the children raised by parents had increased gut microbiome diversity, which is

linked to the prefrontal cortex, a region of the brain known to help regulate emotions.

"It is too early to say anything conclusive, but our study indicates that adversity-associated changes in the gut microbiome are related to brain function, including differences in the regions of the brain associated with emotional processing," says Tottenham, an expert in emotional development.

More research is needed, but Tottenham and Callaghan believe their study helps to fill in an important gap in the literature.

"Animal studies tell us that dietary interventions and probiotics can manipulate the [gut microbiome](#) and ameliorate the effects of adversity on the central nervous system, especially during the first years of life when the developing [brain](#) and microbiome are more plastic," Callaghan says. "It is possible that this type of research will help us to know if and how to best intervene in humans, and when."

Callaghan and Tottenham are currently working on a larger-scale study with 60 [children](#) in New York City to see if their findings can be replicated. They expect the results later this year.

More information: Bridget L. Callaghan et al, Mind and gut: Associations between mood and gastrointestinal distress in children exposed to adversity, *Development and Psychopathology* (2019). [DOI: 10.1017/S0954579419000087](https://doi.org/10.1017/S0954579419000087)

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