

Hormones associated with body composition during pregnancy linked to infants' mental health

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Researchers at OHSU's Center for Mental Health Innovation have identified novel biomarkers related to body fat composition during pregnancy are associated with mental health outcomes in offspring. Credit: OHSU/Christine Torres Hicks

Researchers at Oregon Health & Science University's Center for Mental Health Innovation have identified why increased adiposity, or the amount of fat in the body, during pregnancy is associated with a higher risk for mental health disorders in offspring.

The study, [published](#) recently in the journal *Brain, Behavior, and Immunity*, examined whether pregnancy or umbilical cord blood concentrations of two key hormones associated with fat mass—adiponectin and leptin—could be predictive of infant mental health disorders. Leptin, a hormone that helps regulate appetite, and adiponectin, a hormone that supports glucose level regulation and fat breakdown, are both critical in fetal development.

While an association between obesity during pregnancy and offspring mental health is becoming [increasingly clear](#), the mechanisms underlying this relationship are not yet understood. This is the first study to demonstrate the link between the two hormones and offspring behavioral outcomes.

"The link between the metabolic state of the birthing parenting during pregnancy and offspring mental health is relatively novel, and there is very little research to explain the connection," said Elinor Sullivan, Ph.D., professor of psychiatry in the OHSU School of Medicine and lead author of the study. "The thought is that metabolic state can influence the in-utero environment, which can shape the fetal brain and its development.

"Identifying novel biomarkers allow us the opportunity to predict very early on which children are at risk of common mental health disorders, including ADHD and anxiety, so we can provide targeted early interventions."

Biomarkers, or measurable traits in the body, can serve as an early

warning system for underlying diseases or conditions, and are a valuable tool to better understand an individual's health.

Led by Sullivan and Hanna Gustafsson, Ph.D., researchers gathered data from a cohort of more than 300 pregnant people and their children, collecting [blood samples](#) from the parent in the [second trimester](#) and an umbilical cord blood sample at birth. The offspring were brought in for evaluation at 6 months old, at which point researchers performed standard behavioral tests to examine behaviors used to regulate emotions, which are strong indicators of risk for mental health disorders in early life.

The findings show that that lower levels of the hormone adiponectin in the parent's circulation and higher concentrations of the hormone leptin in cord blood may be novel biomarkers of their offspring's risk for mental health disorders.

Researchers say identifying these biomarkers could have significant potential for early intervention for children at risk for a range of [mental health disorders](#), and suggest that identification of at-risk children may be possible earlier than commonly thought—at or even before birth. Additionally, these biomarkers can be measured in a [clinical setting](#) using standard, low-cost tools, and can be assessed using a single test that is easily interpretable.

The next step for the research team will be testing interventions aimed at reducing child mental health risk and supporting parents during the perinatal period. There is promising evidence that teaching parents practical skills during pregnancy can help to support the health of both the parent and child—for example, teaching how to swaddle and soothe a crying baby, providing information about typical infant crying patterns, and offering mindfulness techniques to manage their own emotions when caring for an infant.

"Weight can be a complex and sensitive topic for pregnant individuals, and our goal as clinicians is to help patients take the best care of themselves and their developing baby," said Jamie Lo, M.D., MCR, associate professor of obstetrics and gynecology in the OHSU School of Medicine, who specializes in maternal-fetal medicine. "These findings present an opportunity to intervene early in pregnancy to potentially improve health outcomes in children."

Lo also emphasizes the importance of access to quality prenatal care that includes counseling on nutrition and a healthy lifestyle during pregnancy and prior to conception, which is critical to optimize the health of pregnant individuals and their infants.

Looking forward, Sullivan says additional research is needed to better understand the nature of these associations and whether behavioral health outcomes persist throughout childhood. The research team plans to follow the study subjects through 5 years old to determine how these factors can predict long-term risk and clinical diagnosis.

"While this is an exciting first step, we have so much more to learn, including what role social determinants of health might play," Sullivan said. "We look forward to furthering our research and supporting improved care for birthing parents and their children."

More information: Elinor L. Sullivan et al, Adipokines measured during pregnancy and at birth are associated with infant negative affect, *Brain, Behavior, and Immunity* (2024). [DOI: 10.1016/j.bbi.2024.05.018](https://doi.org/10.1016/j.bbi.2024.05.018)

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