

Research links greater gestational vitamin D in blood with reduced childhood behavioral issues

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Credit: Jeffrey C. Chase/University of Delaware

If you work indoors, live in the north, avoid the sun, are lactose intolerant, vegan, elderly or darker skinned, chances are you may be deficient in vitamin D. It's a common problem affecting as many as 25% of Americans, according to [a recent study](#). Deficiency rates are even higher among Black Americans, reaching 60%.

Vitamin D is listed as a nutrient of concern in the U.S. Dietary Guidelines. Low levels of this key nutrient during pregnancy could have negative child health outcomes, according to research by Melissa Melough, assistant professor of behavioral health and nutrition at the University of Delaware.

In research published in *The Journal of Nutrition*, Melough has discovered a link between gestational vitamin D and behavioral outcomes in children. Using data from the Environmental influences on Child Health Outcomes (ECHO) consortium, Melough examined nearly 3,200 mother and child pairs from across the country. As many as 50% of the mothers were found to be deficient in vitamin D, and deficiency was linked with long-term effects on their child's social development.

Her research found that pregnant mothers who had lower levels of vitamin D in their blood gave birth to children with more behavioral issues. These problems included a variety of behaviors from extreme shyness, detachment, or depression to acting out, disrespecting authority, violating social norms, and even aggression and violence.

"We have a sizable number of children who have these behavioral outcome measures from the early childhood period of 1 ½ to 5 years and to middle childhood, ages 5 to 12," she said.

Melough wanted to study behavior in both age groups to determine if the possible effects of gestational vitamin D are still seen in older children whose social behavior has been shaped by many other factors over time.

"The data revealed similar results between the two childhood periods," she said. "We saw a small but significant effect that we can appreciate in both early and middle childhood."

The College of Health Sciences professor has been working with ECHO

data since 2020 and has previously published research linking second trimester vitamin D blood levels to fetal brain development and the IQ of children aged four to six years.

"If you boosted vitamin D status by 10 ng/mL, our study suggested you may see an increase in a child's IQ of at least one point," she said. "An IQ change of just that much could relate to long-term success, academic performance, and income earnings."

Her latest findings on behavioral outcomes further expose the magnitude of the problem of vitamin D deficiency, particularly in pregnancy. Especially when caring for vulnerable groups like Black women, healthcare providers, and particularly obstetricians, should be aware of these potential problems.

"We are spreading the word that vitamin D deficiency is very common, and pregnant women are no exception," Melough said. "Black women are a key population of concern because the melanin in their skin protects them from UV damage, but also blocks out UV light that's needed for vitamin D synthesis."

Melough also points out that prenatal supplements alone won't fix the problem.

"If a person was deficient in vitamin D before pregnancy, [prenatal supplements](#) often won't have enough vitamin D to raise levels to the adequate established level," she said. "Prenatal vitamins aren't designed to correct vitamin D deficiency."

Annual routine lab tests don't often measure vitamin D levels, so most Americans have no idea they're potentially deficient. The average American diet, on its own, also won't likely raise vitamin D to acceptable levels. High-dose supplements are usually needed to raise levels.

"You can get vitamin D in some fortified dairy products, and you can get it in small amounts from eggs and certain fish, but even the U.S. Dietary Guidelines acknowledge that many people will need supplements of vitamin D in order to meet their needs, especially depending on skin pigmentation and sun exposure habits," Melough said.

Many factors can affect a person's vitamin D status.

"The diets we consume, and even the amount of fat we store in our bodies can influence vitamin D levels in the blood. Our exposure to the sun also matters a lot. If you wear sunscreen and I don't, and we both go out for a walk in the sun, I might produce more vitamin D," she said. "If one person takes a different form of supplemental vitamin D, its effect on vitamin D blood levels could be different than in someone who takes a different supplement."

Melough noted that in most cases, supplements of vitamin D3 are preferred over D2 because they have greater and longer-lasting effects on blood levels.

The Institute of Medicine suggests a target vitamin D blood level of 20 ng/mL to promote bone health. But other organizations differ in their recommendations.

"Because vitamin D acts in our body as a hormone and is important for a wide range of processes, the Endocrine Society looked at the totality of the evidence and recommended a target of 30 ng/mL," Melough said.

Her current research suggests that vitamin D levels over 20 ng/mL could be beneficial in [pregnant women](#).

Pregnant mothers can take several steps to improve the health of their baby; they're urged to take prenatal vitamins with folic acid, avoid

alcohol and smoking, and stay physically active. What they're not often told is to take a vitamin D supplement.

"While many factors affecting pregnancy and its impacts on children's health are out of our control, this is one aspect we can control that proves to be a very simple fix to guide at-risk future moms to take a [vitamin D](#) supplement to replete their levels and combat deficiency," Melough said.

More information: Melissa M. Melough et al, Greater Gestational Vitamin D Status is Associated with Reduced Childhood Behavioral Problems in the Environmental Influences on Child Health Outcomes Program, *The Journal of Nutrition* (2023). [DOI: 10.1016/j.tjnut.2023.03.005](#)

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