

Early childhood fish consumption may protect against neurodevelopmental delays

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Adding fish to a toddler's repertoire of finger foods may help protect them from neurodevelopmental delays, according to researchers at the Penn State College of Medicine. The team studied 142 children from

birth to age 18 months and found that consuming fish at least once a week was associated with a reduced risk of neurodevelopmental delays. Intriguingly, the positive influence of fish consumption on neurodevelopment was amplified by a child's microbiome.

The research, which indicated the association persists across social and environmental considerations, was published in the journal [Microorganisms](#).

"While some neurodevelopmental conditions are linked to genetics, emerging evidence suggests that [environmental factors](#) and social determinants of health may interact with genes to influence neurodevelopment," said first author Terrah Keck-Kester, assistant professor of pediatrics at Penn State. "Our findings suggest that diet, particularly [fish](#) consumption, may be one factor that could affect neurodevelopmental outcomes."

The team assessed the nutrition of 142 infants at 6 and 12 months of age using the Infant Feeding Practices II Survey, a standardized questionnaire developed by the Food and Drug Administration and the Centers for Disease Control and Prevention. The researchers also collected saliva samples from the infants at 6 months and measured the activity levels of different bacteria within the samples.

"We chose saliva because of its ease of access at well-child visits, its proximity to the [developing brain](#), and because the mouth represents one of the first sites of microbial contact for infants exploring their physical world," said corresponding author Steven Hicks, associate professor of pediatrics at Penn State.

Finally, using parental responses to a Survey of Wellbeing in Young Children, a screening instrument that is recognized by the American Academy of Pediatrics, the team determined the presence or absence of

neurodevelopmental delays—defined as delays in [skills development](#) such as running, speaking, and [social interaction](#)—in the children at age 18 months.

The team found that neurodevelopmental delays were associated with no infant fish consumption at 12 months. Neurodevelopmental delays were also associated with increased activity of two salivary microbes—*Candidatus gracilibacteria* and *Chlorobi*.

"There's always the question, "Are the findings more related to variables other than the ones being studied?" Keck-Kester said. "For example, consider factors that determine whether a person is able to eat more fish in their diet. With our [statistical analysis](#), we were able to control for many of these factors."

Keck-Kester explained that the team also studied social determinants of health—such as maternal stress, [family income](#), and access to [health care](#), as well as demographic contributions, such as race and ethnicity and age of their home—that could influence neurodevelopmental outcomes. The researchers found that Hispanic children were more likely to face neurodevelopmental challenges.

Indeed, the researchers found that beyond these social and environmental factors, children who ate fish at least once per week were less likely to display neurodevelopmental delays at 18 months old, and this protective effect was enhanced by microbial diversity.

"Our results suggest that microbial diversity may be important for the metabolism and utilization of essential nutrients, such as long-chain polyunsaturated fatty acids, that are associated with fish consumption," Hicks said.

More information: Terrah Keck-Kester et al, Infant Saliva

Microbiome Activity Modulates Nutritional Impacts on Neurodevelopment, *Microorganisms* (2023). DOI: [10.3390/microorganisms11082111](https://doi.org/10.3390/microorganisms11082111)

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