

# Prenatal stress associated with infant gut microbes

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Mother's chronic prenatal psychological distress and elevated hair cortisol concentrations are associated with gut microbiota composition of the infant, according to a new publication from the FinnBrain research project of the University of Turku, Finland. The results help to better understand how prenatal stress can be connected to infant growth and development. The study has been published in the esteemed *Psychoneuroendocrinology* journal.

Prenatal stress can be associated with infant growth and development. However, the mechanisms underlying this association are not yet fully understood.

"We were able to show that maternal chronic psychological distress and elevated hair cortisol concentrations during pregnancy are associated with infant gut microbiota composition but not diversity," says Doctoral Candidate, Doctor Anna Aatsinki.

The study used hair cortisol analysis which enabled measuring the concentration averages of

stress hormone cortisol over several months. In addition, the symptoms of the mother were assessed three times during pregnancy. The infant gut microbiota was analyzed early at the age of 2.5 months with next generation sequencing.

Previously, similar studies have focused on animals and two have been smaller [human studies](#) making this data consisting of 399 mothers and their [infants](#) the largest in the world so far. The received results provide significant new information on the phenomenon. In addition, this study was able to confirm previously made observations.

## Studying the Role of Microbes as Mediators of Stress

Both Proteobacteria and Lactobacillus are common infant gut microbes.

"We discovered, for instance, that mother's chronic prenatal psychological distress was linked to increased abundances of Proteobacteria genera in infant microbiota. In addition, chronic psychological symptoms were connected to decreased abundances of Akkermansia genera which is considered to promote health at least in adults," says Aatsinki.

According to Aatsinki, it was also interesting that low cortisol concentrations were associated with increased abundances of Lactobacillus in infant gut microbiota. Lactobacillus bacteria are considered to promote health.

However, Proteobacteria also contain species that are able to cause inflammation in the body. Proteobacteria can also be associated with the child's disease risk later in life. Therefore, researchers consider it important to study how the observed changes are connected to later child development.

"Our study does not explain the cause-effect

relationship, or whether prenatal psychological stress is linked to differences in microbial metabolic products or e.g. in immune system function. In other words, important questions still need to be answered," says Aatsinki.

The study is part of the FinnBrain research project and its gut-brain axis sub-project. The sub-project led by Docent, Child and Adolescent Psychiatrist Linnea Karlsson studies how prenatal [stress](#) affects infant [microbiota](#) development and how infant gut microbes affect later brain development.

The FinnBrain research project of the University of Turku studies the combined influence of environmental and genetic factors on the development of children. Over 4,000 families participate in the research project and they are followed from infancy long into adulthood.

**More information:** Anna-Katariina Aatsinki et al. Maternal prenatal psychological distress and hair cortisol levels associate with infant fecal microbiota composition at 2.5 months of age, *Psychoneuroendocrinology* (2020). [DOI: 10.1016/j.psyneuen.2020.104754](#)

Provided by University of Turku

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