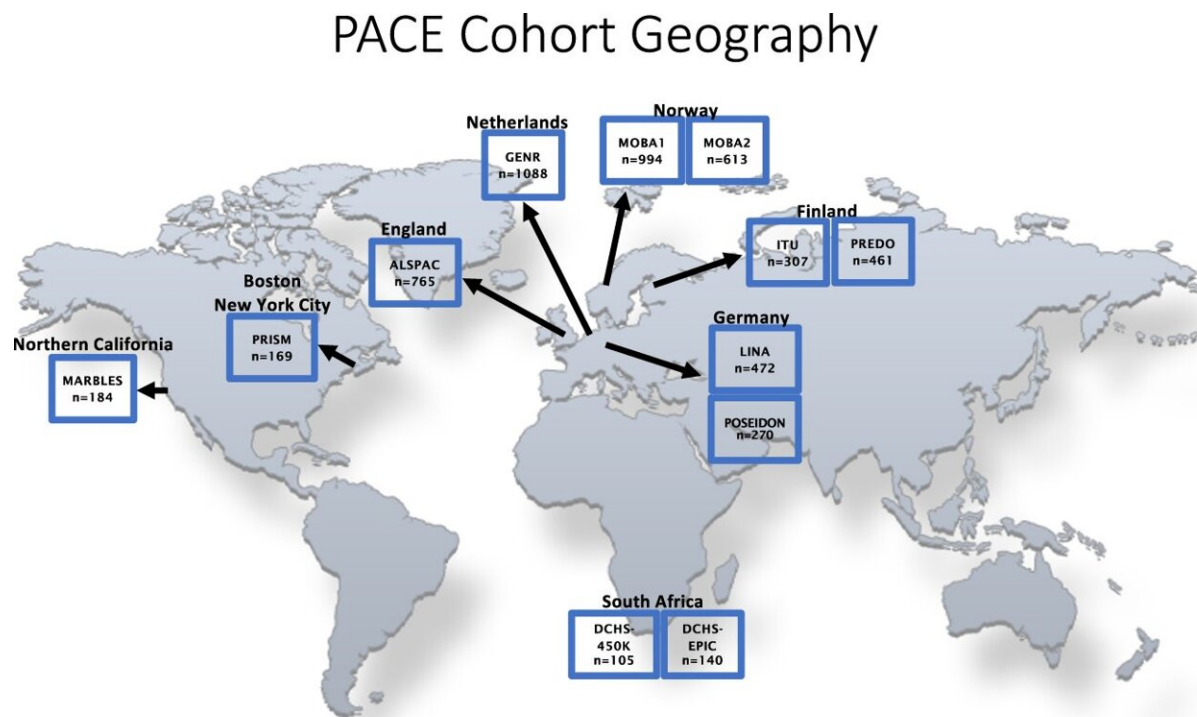


Research examines the impact of maternal stress during pregnancy on child's health

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Geography of participating cohorts. Credit: *Molecular Psychiatry* (2023). DOI: 10.1038/s41380-023-02010-5

New research out of the University of Cincinnati examines the impact that maternal stress during pregnancy has on the neurodevelopment of babies.

The study was published in the journal *Molecular Psychiatry*.

Prenatal [maternal stress](#) life events are associated with adverse neurodevelopmental outcomes in offspring. Biological mechanisms underlying these associations are largely unknown, but a chemical reaction in the body in which a small molecule known as a [methyl group](#) gets added to DNA, called DNA methylation, likely plays a role, according to researchers. These findings could provide new insights into how the fetal environment potentially influences not only neurodevelopment, but metabolism and immunologic functions as well.

More than 5,500 people took part in the study with that population broken down into 12 separate cohorts, according to Anna Ruehlmann, a postdoctoral fellow in the Department of Environmental and Public Health Sciences in the UC College of Medicine and lead author of the research.

"Our study is the first to look at such a large sample size and examine the entire epigenome, so it's not just looking at the stress control genes as in previous studies, it's looking at all the epigenomic sites available right now that you can study," she says.

The research examines five separate categories of stress that expectant moms face during pregnancy. They are financial stress, conflict with a partner, conflict with a family member or friend, abuse (including physical, emotional and mental) and death of a friend or relative, plus a cumulative score that combines all the categories.

"We found that when mom experienced a cumulative amount of stress during pregnancy, there was, in fact, an association with DNA methylation in [umbilical cord blood](#), which is a kind of epigenetic modification in the baby that's developing in the womb," Ruehlmann says.

"An epigenetic modification is something that doesn't change the sequence of the DNA, however the DNA is modified which is something that's dynamic and can change in response to environmental exposures. Therefore, it's something that can be turned on or off later in the child's life or something that can maybe not do anything, it's still unknown. It's thought to be a mechanism of gene expression control."

Ruehlmann says another unknown is how this process impacts children once they are born.

"We found five specific locations of DNA methylation with three different maternal stressors during pregnancy," she says. "One was cumulative stress and the stressor specific domains of conflict with family/friends, abuse (physical, sexual and emotional) and death of a close friend/relative that were associated with DNA methylation in the developing fetus. These were occurring in genes that have shown to be involved in neurodevelopment. The next steps are to do some functional analyses to see how these genes really work and how the DNA methylation affects their expression."

Ruehlmann describes the process as being a huge puzzle.

"Epigenetic modifications are a very dynamic process, there are a lot of changes that can happen in response to environmental factors," she says. "What you're seeing biologically at the beginning of fetal development you might not see the outcome of until later on during a child's development. It's fascinating as a biologist to begin to uncover some of the biological clues to how neurodevelopment is affected during fetal development. There are a lot of pieces to the puzzle that have yet to be connected. It's very exciting."

More information: Anna Kotsakis Ruehlmann et al, Epigenome-wide meta-analysis of prenatal maternal stressful life events and newborn

DNA methylation, *Molecular Psychiatry* (2023). [DOI: 10.1038/s41380-023-02010-5](https://doi.org/10.1038/s41380-023-02010-5)

Provided by University of Cincinnati

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