Parenting stress associated with epigenetic differences in African American mothers

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Parenting can be stressful - and this stress may be influencing the DNA methylation of African American mothers, finds a new study led by NYU Rory Meyers College of Nursing published in the *Journal of Clinical and Translational Science*.

Stress can contribute to a range of health problems, including high blood pressure and heart disease - health issues that are particularly pervasive among African American women. The stress that parents feel in their roles adds to overall maternal stress levels, which can influence health outcomes for mothers and their children.

In seeking to understand the biological consequences of stress, researchers have learned that stress is associated with altered DNA methylation, a mechanism that is used to control gene expression (often "turning on" or "off" a gene). Epigenetic changes like DNA methylation do not change the sequence of DNA, but by altering gene expression can contribute to a variety of disease outcomes.

"Raising children is inevitably stressful. We wanted to see if parenting stress influences DNA methylation," said Jacquelyn Taylor, PhD, PNP-BC, RN, FAHA, FAAN, the Vernice D. Ferguson Professor in Health Equity at NYU Rory Meyers College of Nursing and the study's senior author.

The current study examined the relationship between parenting stress and DNA methylation among African American mothers and their

children using data from the Intergenerational Impact of Genetic and Psychological Factors on Blood Pressure, an ongoing study funded by the National Institute of Nursing Research.

Seventy-four pairs of African American mothers and their children took part in the study for a total of 148 participants. Parenting stress among mothers was measured using the 36-question Parenting Stress Index, and DNA methylation was measured using saliva samples from both mothers and children.

The researchers found that more than 95 CpG sites - or regions on the genome where DNA methylation occurs - were associated with the level of parenting stress among mothers. Of the 95 sites, 83 had decreased DNA methylation with higher levels of parenting stress. Importantly, the researchers identified a change in DNA methylation associated with PARP-1, a gene that plays a key role in stress signaling, when higher levels of parenting stress were observed.

"We show that parenting stress as reported by mothers influences DNA methylation, particularly in a gene that plays a huge role in stress signaling," said Taylor. "Altered expression levels of PARP-1 due to DNA methylation may be a precursor to gene expression that could have an impact on future health outcomes."

The researchers observed that DNA methylation patterns in children mirrored patterns in their mothers. However, none of the variations in DNA methylation related to maternal parenting stress were significant in the children. Taylor noted that parenting stress is experienced differently for parents and children, and it is possible that children experience other stressors that may influence their epigenome.

The researchers' next steps are to look at how social determinants of health, including parenting stress, and changes in DNA methylation

influence blood pressure in this population.

"Our study shows that psychosocial factors like parenting stress influence DNA methylation. If this ultimately translates to changes in blood pressure, what can we do as clinicians to intervene early? If a parent comes to a clinic with both high levels of stress and blood pressure, we could provide them with nonpharmacological resources or interventions to alleviate that stress before we move to antihypertensive medication," said Taylor. "Clinicians need to consider social determinants of health like stress as both root causes of illness and symptoms that can be treated."

More information: Michelle L. Wright et al, Parenting stress and DNA methylation among African Americans in the InterGEN Study, *Journal of Clinical and Translational Science* (2018). DOI: 10.1017/cts.2018.3

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