Summary

A recently released paper in the Proceedings of the National Academy of Sciences (PNAS), "The Role of Mother's Genes and Environment in Postpartum Depression," concludes that 1) the gene-environment interplay is critical in determining whether a mother is at high or low risk for post-partum depression, with a mother’s genetic makeup determining whether or not her environment matters; 2) markers that scientists thought were risk factors for depression turn out to really be markers for sensitivity to one’s environment; and 3) while mothers with a genetic makeup that make them more sensitive to their environments than others have a higher risk for depression when exposed to harsh environments, they actually have a lower risk than all other mothers when exposed to positive environments, even compared to those who are not genetically sensitive. The upshot: women with the supposed “depression gene” are actually less likely to be depressed if in a positive environment than someone without it.

Background

The Fragile Families and Child Wellbeing Study was launched in 1997 in an effort to learn more about American families, particularly families formed outside of marriage. Between 1998 and 2000, the parents of approximately 5,000 children born in large U.S. cities were interviewed by researchers about their marital status and living arrangements, relationship with the other parent, hopes for the future with that parent, and other important factors that would shed light on these families. Because the study included a large oversample of unmarried parents, much was learned about “fragile families” – families formed when a child is born to unmarried couples. Follow up interviews were conducted with parents when the children were ages 1, 3, 5, and 9; with each additional survey, questions about were added about factors such as physical and mental health, parenting philosophies, and employment -- to name just a few -- and in-home interviews were added.

As part of the interviews conducted when the children were age 9, researchers added a DNA component. Mothers were asked to provide a saliva sample of themselves and of their children. Armed with this information, researchers are able to now examine the interplay between genetics and environment.

The first paper to be published using the DNA samples looks at genetic markers traditionally associated with depression and examines how socioeconomic status, as measured by the mother’s education, affects the risk of post partum depression. The findings are in some ways predictable and in other ways very surprising.
The Study

Using the Fragile Families data, researchers examined the DNA of 1,206 mothers along with information on mothers’ socioeconomic status and experience of depression during the first year after the birth of their child. Two specific genetic markers traditionally associated with depression were examined: 5-HTTLPR and Stin2.

The researchers then placed each mother on a continuum from a “negative” environment to a “positive” environment, based on the mother’s socioeconomic status, measured by her level of education and family income.

Next, the researchers looked at whether the mother was depressed or not during the first year of her child’s life, and matched that information with the genetic and environmental measures. Depression was determined by mothers’ reports about certain symptoms that have been well-documented as being indicative of clinical depression.

With these three components, the researchers were able to see if any distinct patterns emerged. In particular, they wanted to know if the effects of specific genetic markers differed depending on mothers’ environment.

The Findings

- Not surprisingly, mothers with genetic markers that made them sensitive to their environment were more likely than other new mothers to become depressed if they were in a negative environment as a result of their low level of education.

- Mothers without these markers looked the same across the education spectrum, with rates of depression the same regardless of environment. For these mothers, environment did not seem to have much of an impact.

- However, when a mother with the ‘sensitive’ genetic markers was in a positive environment (i.e. she had a higher level of education) she was actually less likely to be depressed than all other mothers, including those without the environmentally sensitive genetic markers. This is perhaps surprising for some who—given the misinformation in the popular press about the “depression gene”—might conclude that one would be better off without this genetic makeup, regardless of environment.

- Thus, the concept of a “depression gene” is not quite right. In fact, the genetic markers linked with depression are actually signaling a more sensitive genetic makeup that responds to environmental surroundings more acutely. This results in mothers with the sensitive genetic makeup actually being better off than other mothers if they have a positive environment, but worse off than other mothers in harsher environments.
A nice analogy is one utilized by the authors: the world is made up of orchids and dandelions. The dandelions pretty much grow anywhere, no matter the environment – these are the women with the genetic markers that are less sensitive to environmental influence. Orchids on the other hand need a lot of care and attention to grow – these are the women with the environmentally sensitive genetic markers. If orchids are put in a hostile environment without proper attention, they wither. But orchids with lots of care and attention blossom into flowers unmatched by any others.

**Take Home Message**

Researchers confirmed what many know instinctively and what other studies have shown: genes are not destiny, but neither is environment. Both matter – and not just in that they each contribute to various outcomes. Rather, in the nature vs. nurture debate, it is the interplay of genes and environments (both positive and negative) that matters.

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