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UNC study: Parenting can override effect of genes in how babies respond to stress

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Everyone gets stressed, even babies. Now, it appears how infants respond to stress is linked to if they have a particular form of a certain gene, according to a new study from the University of North Carolina at Chapel Hill.

Just as significantly, researchers say they have also found that good parenting – as early as within the first year of a child's life – can counter the effect the gene has in babies who initially do not respond well to stressful situations.

"Infancy is an important time for developing behavioral and biological processes," said the study's lead author, Cathi Propper, Ph.D., research scientist at UNC's Center for Developmental Science. "Although these processes will continue to change over time, parenting can have important positive effects even when children have inherited a genetic vulnerability to problematic behaviors."

The study findings appear in the September/October 2008 issue of the journal *Child Development*.

Researchers looked at 142 infants over the first year of their lives, when the children were 3, 6 and 12 months old. On each occasion, they were placed in a stressful situation — being separated from their mothers — and researchers measured the infants' heart rates, looking specifically at a type of cardiac response called vagal tone. Vagal tone acts like a brake on the heart when the body is in a calm state, but during challenging

situations, the brake is withdrawn and the level of vagal tone goes down, allowing heart rate to increase so the body can actively deal with the challenge.

Researchers also collected DNA from the infants to see which form of a dopamine receptor gene they carried. Previous studies have shown that adolescents and adults with specific forms of this gene are more likely to have problems such as aggression, substance abuse and other risky behaviors.

When the babies were 6 months old, researchers also videotaped the mothers and their infants playing together for 10 minutes, and assessed whether the mothers' behavior was high or low in sensitivity.

Propper said the study found both genes and parenting were important to the development of how infants' brains help regulate cardiac responses to stress.

At 3 and 6 months old, infants with the form of the dopamine gene associated with risky behaviors did not display a decrease in vagal tone when stressed, while those with the non-risk version of the gene did. At these early ages, it did not appear to matter whether mothers were sensitive or not, Propper said.

However, by the time the infants were 12 months old, the pattern changed. Infants with the risk form of the gene whose mothers were highly sensitive now showed the expected cardiac response when under stress – while those with the at-risk gene form who had insensitive mothers did not.

Propper said the findings suggest that although genes play a role in the development of physiological responses to stress, environmental experiences – such as mothers' sensitive care-giving behavior – can have

a strong influence, enough to change the effect that genes have on physiology very early in life.

"Our findings provide further support for the notion that the development of complex behavioral and physiological responses is not the result of nature or nurture, but rather a combination of the two," Propper said. "They also illustrate the importance of parenting not just for the development of children's behavior, but for the underlying physiological mechanisms that support this behavior.

"Infancy is an important time for developing behavioral and biological processes. Although these processes will continue to change over time, parenting can have important positive effects even when children have inherited a genetic vulnerability to problematic behaviors," Propper said.

Source: University of North Carolina at Chapel Hill

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