

# Stress in pregnancy linked to changes in infant's nervous system, less smiling, less resilience

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Credit: University of California, San Francisco

Maternal stress during the second trimester of pregnancy may influence the nervous system of the developing child, both before and after birth, and may have subtle effects on temperament, resulting in less smiling and engagement, as well as diminished ability to regulate emotions.

In a study led by UC San Francisco, researchers looked at the [stress](#)

levels of 151 low-to-middle-income women who were between 12 and 24 weeks pregnant. The study was published in the journal *Development and Psychopathology* on Nov. 22, 2017.

The researchers followed the women throughout [pregnancy](#) and after delivery, and conducted a test to compare their reported [stress levels](#) during pregnancy with objective levels of stress in their 6-month-old offspring. In the test, the infants' cardiac function was monitored while the mothers were instructed to look at the infant's face but not interact with or touch them for two minutes following a brief play session.

The mothers reported the number of stressful life events they had experienced during pregnancy, which included illness, relationship problems, housing difficulties and legal issues. The babies of mothers with the highest number of these stressful life events – 22 of the 67 who completed the testing – were 22 percent more "reactive" than the 22 infants of mothers reporting the lowest number of [stressful life events](#). They also recovered less quickly from the stressor, demonstrating lower resilience.

## **'Reactivity' Places Children at Risk**

High reactivity, which is assessed by measuring the variability in the heart rate in conjunction with breathing, is indicative of a stronger decrease in parasympathetic nervous system activity in response to challenge, said first author Nicole Bush, PhD, of the UCSF departments of Psychiatry and Pediatrics, and UCSF Weill Institute for Neurosciences. The parasympathetic nervous system enables the body to rest and digest food, by slowing the [heart rate](#) and increasing intestinal and glandular activity.

"This isn't automatically good or bad, but we know that being highly reactive places children at risk for a range of psychopathological

problems, particularly anxiety and depression, as well as externalizing problems, such as disruptive behavior, especially if they experience adverse family and school environments."

However, in an optimal environment with few adversities, children with higher stress reactivity "don't have their stress response triggered too often and may exhibit better-than-average social skills and emotional and behavioral well-being, because greater reactivity can make them more sensitive to the benefits of positive relationships and experiences in their environments," said Bush, who is also associate director of research at the UCSF Division of Developmental Medicine.

Additionally, questionnaires from the 151 mothers revealed that those in the top third, who had higher levels of perceived stress in pregnancy and post-delivery, had babies with temperamental "surgency" levels that were 8 percent lower than those babies of mothers in the lower third, who reported less perceived stress in pregnancy and post-delivery.

Surgency includes traits such as willingness to approach and engage with the outside world, as well as laughter and smiles. These same babies born to the highly-stressed mothers were also found to have 8 percent lower levels of self-regulation, the ability to manage emotions – such as soothing themselves in periods of high stress – compared with the babies of [mothers](#) with less perceived stress during pregnancy and post-delivery.

## **Healthy Families, Communities May Offset High Reactivity Impact**

This combination of lower surgency and lower self-regulation can place individuals at added risk for depression, anxiety and difficulties with their social relationships, said Bush.

"At this point, we don't know the lifelong impact of higher reactivity and lower surgency and self-regulation for these babies," she said. "A lot will depend on other factors, such as families and communities. Providing healthy environments postnatally could buffer the negative impact of high reactivity and lower surgency and self-regulation."

**More information:** Nicole R. Bush et al. Effects of pre- and postnatal maternal stress on infant temperament and autonomic nervous system reactivity and regulation in a diverse, low-income population, *Development and Psychopathology* (2017). DOI: [10.1017/S0954579417001237](https://doi.org/10.1017/S0954579417001237)

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