

How parents see themselves may affect their child's brain and stress level

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A mother's perceived social status predicts her child's brain development and stress indicators, finds a study at Boston Children's Hospital. While previous studies going back to the 1950s have linked objective socioeconomic factors—such as parental income or education—to child health, achievement and brain function, the new study is the first to link brain function to maternal self-perception.

In the study, children whose mothers saw themselves as having a low social status were more likely to have increased cortisol levels, an indicator of stress, and less activation of their hippocampus, a structure in the brain responsible for long-term [memory formation](#) (required for learning) and reducing stress responses.

Findings were published online August 6th by the journal *Developmental Science*, and will be part of a special issue devoted to the effects of socioeconomic status on [brain development](#).

"We know that there are big disparities among people in income and education," says Margaret Sheridan, PhD, of the Labs of Cognitive Neuroscience at Boston Children's Hospital, the study's first author.

"Our results indicate that a mother's perception of her social status 'lives' biologically in her children."

Sheridan, senior investigator Charles Nelson, PhD, of Boston Children's Hospital and colleagues studied 38 children aged 8.3 to 11.8 years. The children gave [saliva samples](#) to measure levels of cortisol, and 19 also

underwent functional MRI of the brain, focusing on the hippocampus.

Mothers, meanwhile, rated their social standing on a ladder on a scale of 1 to 10, comparing themselves with others in the United States. Findings were as follows:

- After controlling for gender and age, the mother's self-perceived social status was a significant predictor of cortisol levels in the child. This finding is consistent with studies in animals. "In animal research, your [stress response](#) is related to your relative standing in the hierarchy," Sheridan says.
- Similarly, the mother's perceived social status significantly predicted the degree of hippocampal activation in their children during a learning task.
- In contrast, actual maternal education or income-to-needs ratio (income relative to family size) did not significantly predict cortisol levels or hippocampal activation.

The findings suggest that while actual socioeconomic status varies, how people perceive and adapt to their situation is an important factor in child development. Some of this may be culturally determined, Sheridan notes. She is currently participating in a much larger international study of childhood poverty, the Young Lives Project, that is looking at objective and subjective measures of social status along with health measures and cognitive function. The study will capture much wider extremes of socioeconomic status than would a U.S.-based study.

What the current study didn't find was evidence that stress itself alters hippocampal function; no relationship was found between cortisol and hippocampal function, as has been seen in animals, perhaps because of the small number children having brain fMRIs. "This needs further exploration," says Sheridan. "There may be more than one pathway leading to differences in long-term memory, or there may be an effect of

stress on the hippocampus that comes out only in adulthood."

Provided by Children's Hospital Boston

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