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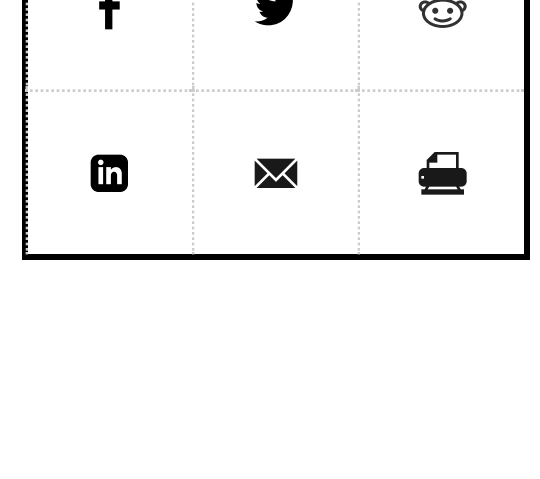
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The Stress of Poverty Changes the Brain

By Mind Matters on February 19, 2008



A NEURAL CORRELATE FOR SOCIAL CLASS

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Membership in a high social class is thought to contribute to good mental well-being and physical health. Low socioeconomic status, in contrast, increases one's vulnerability for developing psychiatric or chronic medical conditions, research suggests. Various aspects of socioeconomic status could affect personal health in different ways, but most scientific attention has focused on the role of stress. Surprisingly, the most stressful part of being of lower socioeconomic status might not be feelings of deprivation, as might be expected, but rather the subjective perception of our lower social standing. Although epidemiological associations between low socioeconomic status and stress, and their consequences on mental health have been well documented, there have been fewer attempts to understand the neural pathways through which status and stress may interact in human society. That is the goal of the intriguing study by Peter Gianaros and colleagues entitled "Perigenual anterior cingulate morphology covaries with perceived social standing." Gianaros and colleagues take advantage of the idea that the subjective perception of low socioeconomic status is a strong predictor of future health. They use a computational structural neuroimaging method to investigate if brain volume of neural substrates linked to stress varies according to perceived social standing. **Subjective social status and the anterior cingulate** The authors recruited 100 middle-aged volunteers from a Pennsylvania community registry and acquired three important measures from each. First, participants provided information that qualified as an objective indicator of personal and community socioeconomic status (for example, educational attainment and household income). Second, they received the MacArthur Scale of Subjective Social Status. In this scale, participants were presented with a 10 step "social ladder" and asked to place an "X" on the step they perceived as their social standing in comparison with the rest of the United States in terms of income, education and occupation prestige. Finally, the authors also acquired structural neuroimaging data using magnetic resonance imaging (MRI). This technique allows investigators to quantify an individual's total gray matter volume in targeted brain regions, which can highlight specific deficits in clinical cases, as well as show the presence of greater aptitude with different executive skills (associated with increased brain volume in certain regions.) To examine general changes in brain volume among the 100 volunteers, the authors selected three specific brain regions previously linked with chronic stress and social standing in non-human animal research: the anterior cingulate, the hippocampus and the amygdala. All three are thought to be critical components of a circuit that integrates autonomic and emotional responses to environmental stimuli and thereby direct the appropriate behavioral response (for instance, coping with stressful situation). The authors found that a lower subjective perception of one's own social status correlated with reduced gray matter in a specific subregion of the anterior cingulate, the perigenual area. This result was consistent even when objective indicators of social status (such as income) were controlled for during subsequent analyses. In addition, subjective social status ladder rankings did not correlate with gray matter volumes in either the hippocampus or the amygdala. This evidence suggests a role for the perigenual area of the anterior cingulate in the subjective perception of social standing, which may, in turn, contribute to health-related issues. **The Next Step** This finding builds on data showing that the perigenual area of the anterior cingulate cortex has a potential role in adaptive responses to emotional and physiological stimuli such as stressors. The region is connected with other brain structures, such as the amygdala and hippocampus, involved in learning and memory, emotional processing and the brain's response to stress. Thus, based on the role of the perigenual area and its connectivity, we can infer that decreases in brain volume in the perigenual cingulate cortex have an impact on a broad set of functions related to maintaining emotional stability and wellbeing. The fact that such decreases in brain volume are greater for individuals that perceive themselves as lower on the totem pole highlights a neural mechanism for why low socioeconomic status contributes to poor health in the long run. Although this study is an excellent step toward answering questions related to stress, mental health and social status, there is clearly more work to be done. For instance, one potential interpretation of the authors' findings is that chronic stress over many years has led to the observed decrease in brain volume. Research in non-human animals, however, predicts that chronic stress should also affect regions such as the amygdala and hippocampus—finding that was not observed. Longitudinal studies, aimed at tracking brain volume changes over an individual's lifespan, might shed light on some of these remaining issues. A larger and more diverse sample of participants encompassing all ranges of socioeconomic distribution, cultures and racial composition also would be helpful and more generalizable to the overall population. In addition, understanding the underlying genetics in future studies may provide the means to identify individuals who are more at risk at developing anxiety problems due to their subjective perception of social standing. In such cases, an individual with potentially poor coping abilities would be afforded specific treatments or training necessary to increase emotion regulation capabilities and decrease stress levels early on in life, in turn promoting better health over the long term. -- Edited by Mind Matters at 02/19/2008 7:43 AM

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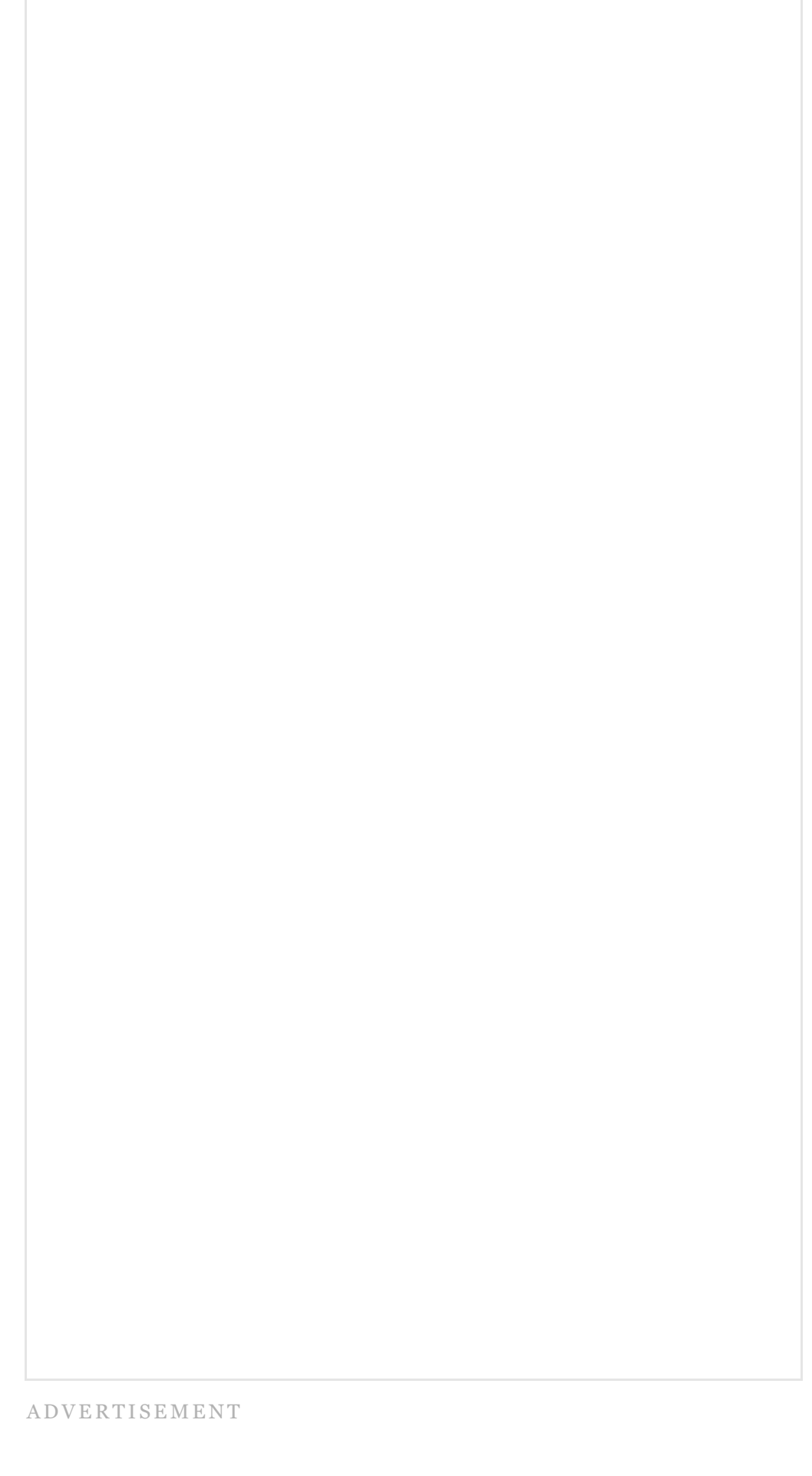
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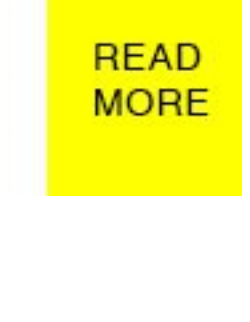
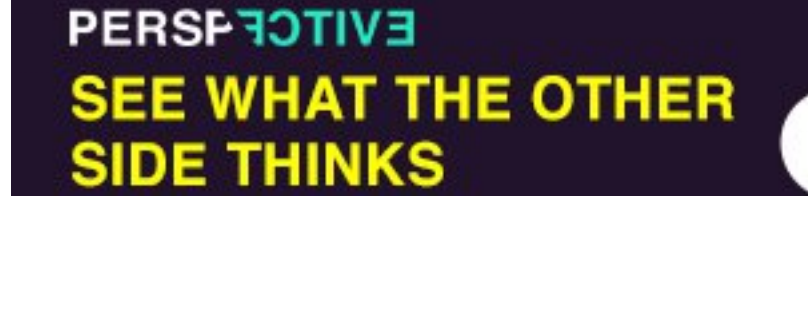
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