

Effects of Socioeconomic Status on Hippocampal Volume during Development

Abstract

Individuals raised in low socioeconomic status (SES) environments are more likely to suffer from health problems such as diabetes, heart disease, and mental illness, and there is a notable achievement gap between low SES individuals and their high SES peers. The effect of childhood SES on achievement and health is significant even after controlling for adult SES. Individuals raised in low SES families are exposed to more stressful environments and show greater stress reactivity as adults. This change in stress reactivity is thought to result from chronic stress exposure. We hypothesized, based on the animal literature, that if chronic stress exposure was one mechanism by which early SES affected health and achievement, we would observe damage to the hippocampus during childhood. The hippocampus is involved both in mediating the stress response by providing negative feedback to the hypothalamus-pituitary-adrenal (HPA) axis and in memory encoding. Long-term exposure to glucocorticoids, which are released by an active HPA axis, has been shown to reduce dendritic growth in the hippocampus and increase apoptosis. Damage to the hippocampus could lead to longer stress responses, producing the adverse health conditions associated with high levels of stress, and to poor memory formation, producing difficulties in achievement. We acquired MRI scans of 286 children and adolescents aged 6-77 to determine whether SES during development predicts variance in hippocampal volume. We found that SES, measured either via neighborhood poverty or years of parent education, does not predict hippocampal volume in developing individuals.