Title
Increased Risk for Affective Disorders Programmed In Utero? High Prenatal Maternal Cortisol Concentrations and Volumes of the Amygdala and Hippocampus in the Offspring at 6-9 Years of Age

Permalink
https://escholarship.org/uc/item/4f7072gk

Journal
JOURNAL OF DEVELOPMENTAL ORIGINS OF HEALTH AND DISEASE, 2

ISSN
2040-1744

Authors
Buss, Claudia
Davis, Elysia P
Pruessner, Jens C
et al.

Publication Date
2011-09-01

License
https://creativecommons.org/licenses/by/4.0/ 4.0

Peer reviewed
Increased Risk for Affective Disorders Programmed In Utero? High Prenatal Maternal Cortisol Concentrations and Volumes of the Amygdala and Hippocampus in the Offspring at 6-9 Years of Age. Claudia Buss1, Elysia P. Davis2, Jens C. Pruessner3, Tugan L. Muftluer2, Kevin Head2, Anton Hasso2, Curt A. Sandman2. 1Pediatrics, University of California, Irvine, USA; 2Psychiatry and Human Behavior, University of California, Irvine, USA; 3Psychiatry, Psychology, Neurology and Neurosurgery, McGill University, Canada.

Because fetal brain development proceeds at an extremely rapid pace, early life experiences have the potential to alter the trajectory of neurodevelopment. Alterations especially in limbic structures have been associated with a range of neuropsychiatric disorders, including affective disorders. Studies in non-human primates and rodents have shown that such alterations can be induced in the offspring of mothers by prenatal exposure to exogenous glucocorticoids or chronic stress. To this date, the association between exposure to prenatal maternal cortisol concentrations and size of limbic structures has not been studied in human subjects. In the current prospective longitudinal study we included women for whom serial data on cortisol concentrations were available at five time points over the course of gestation. When the offspring from the target pregnancy were between six to nine years of age, volumes of the hippocampus and amygdala were assessed by manual segmentation of T1 magnetic resonance (MR) images, acquired by a Phillips 3T Tesla. After controlling for potentially confounding postnatal factors, high maternal cortisol concentrations were associated with larger amygdala volumes in the 6-9 year old offspring. Furthermore, high maternal prenatal cortisol concentrations were associated with higher anxiety levels in their offspring. Analyses stratified by sex suggested that these associations were significant in female but not in male offspring. Prenatal maternal cortisol concentrations were not associated with hippocampal volumes. These findings are in line with studies in rodents and non-human primates and suggest that higher maternal cortisol concentrations during pregnancy are associated with changes in limbic structures, which may increase the offspring’s susceptibility for neuropsychiatric disorders.