

## FOR BETTER OR WORSE, STRESS HELPS MOULD THE BRAIN

The brain is a dynamic organ that is sensitive to its environment. Individual regions undergo rapid development at different stages in life, during which time they are particularly vulnerable to environmental stress. Dr. Sonia Lupien, scientific director at the Fernand-Seguin Research Centre and director of the Centre for Studies on Human Stress in Montreal, explains the implications of these findings in a seminal review paper published in 2009 in *Nature Reviews Neuroscience*.

**T**he three brain regions that are the most important for stress are the hippocampus, the amygdala, and the prefrontal cortex," says Lupien. "The hippocampus starts developing at birth and finishes up around two years of age. ... The amygdala starts developing at birth and goes on until the late 20s, and the frontal lobe starts at around age eight and continues until late puberty. If you have a stressor or an adverse experience at one year of age, the major impact should be on the hippocampus. If you have a major stress at age 11, it may have a significant impact on your amygdala and your frontal lobe. And since these three regions do not process the same type of information, you will not develop the same type of stress-related disorder."

The prenatal period is an even more crucial time for brain development, and a stressed mother will have a stressed fetus. "The fetus is in what we call an organizational mode, so its brain is being programmed," says Lupien. "... The effects of prenatal stress on development are quite nonspecific, and they are very large. Animal studies have shown that if you have prenatal stress, you will be more reactive to stress for the rest of your life."

### WHEN STRESS IS GOOD

But not all stress is damaging. Dr. Laura Ghali, an expert in child development at the University of Calgary, says it is helpful to think of stress as coming in one of three types: positive, tolerable and toxic. Positive stress is necessary for normal functioning. For example, when



a young child is separated from his mother to go to a nurturing daycare, he has the opportunity learn to soothe himself in a supportive environment and develop independence.

Too little positive stress can even be detrimental. "Overprotecting our children, as we do now, may be decreasing their capacity to develop their resistance to stress," says Lupien.

Tolerable stress refers to life's unavoidable difficulties. "Parents need to know that kids can get over things like a divorce, a death in the family, or a bullying incident, if adults intervene," says Ghali.

### CALL TO ACTION

Toxic stress is long-term, chronic stress, such as ongoing poverty, social isolation, or abuse, that occurs in the absence of a support system. "This is the sort of stress that damages fragile, developing brains, requiring a call to action," says Lupien. Social policy must address the needs of stressed-out caregivers, children and adolescents. "We have to do something when it happens, not 25 years later, because once it has

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been programmed in the brain, it may be too late," says Lupien.

Ghali agrees. Important questions for social policy makers, she says, are: "Can you help alleviate the causes of stress? And if you can't, can you at least put the support in place to help people deal with it as best they can?" 🐾

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