



Society for Research in Child Development

Office for Policy and Communications

750 First St., NE • Washington, DC 20002-4242

OFFICE: (202) 336-5926 • FAX: (202) 336-6184

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Contact Information:

Andrea Browning
Society for Research in Child Development
Office for Policy and Communications
(202) 336-5926
abrowning@srcd.org

Effects of Preterm Birth and Early Environmental Risks Continue Into Adolescence

In one of the first studies to use brain imaging with adolescents born prematurely, New Jersey researchers report that the effects of premature birth and environmental risks on the brain during the first three years of childhood continue through adolescence. Their findings are published in the March/April issue of the journal *Child Development*.

Numerous studies of children born prematurely find deficits in cognitive ability and school achievement through young adulthood. The studies also find that the greater the medical complications at birth, the greater the cognitive and motor deficits, the lower the school achievement and the higher the behavioral problems at school age. These studies also find, however, that the early childhood social environment plays a prominent role in subsequent development, with greater environmental risk such as life stresses and little social support related to lower cognitive abilities and delayed social development.

For the current study, researchers from the Robert Wood Johnson Medical School at the University of Medicine and Dentistry of New Jersey used functional magnetic resonance imaging (fMRI) to create images of the brains of 10 teenagers as the teens performed attention tasks. The goal was to learn if adolescents with many medical risks at birth and different amounts of environmental risk used the same or different parts of the brain when performing such tasks. Based on earlier studies, the researchers theorized that areas of the brain involved in motor function, such as the parietal lobe, would be particularly sensitive to the effects of medical complications; while areas of the brain related to language, such as the temporal lobe, would be particularly sensitive to environmental risk.

As expected, the researchers found that individual differences in medical and environmental risks were related to patterns of brain activation. Medical risk was related to activation levels of the left parietal cortex, while environmental risk was related to temporal lobe activation.

“The implications of these findings are that different risk factors associated with preterm birth have different effects on brain function in adolescence,” said lead author Michael Lewis, Ph.D., Distinguished Professor of Pediatrics and Psychiatry and Director of the Institute for the Study of Child Development at the Robert Wood Johnson Medical School. Such findings suggest that poor environments affect not only early behavior, but have an impact on adolescents’ attentional abilities. This can result in poorer school performance as well as less appropriate social adjustment.

“Although there may be no intervention to overcome the deficits associated with severe medical complications at birth, there is room for improvement in the social environment,” he said. For instance, it may be possible to reduce environmental risk factors such as life stress, little social support and poor mother-child interaction. “These types of improvements may help increase brain activation that would translate into better school achievement,” he concluded.

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Summarized from Child Development, Vol. 77, Issue 2, *Early Risk, Attention and Brain Activation in Adolescents Born Preterm*, by Lewis M, Carmody DP, Bendersky M and Hegyi T (University of Medicine and Dentistry of New Jersey), Dunn SM (Rutgers University), DeMarco JK (University Radiology Group)

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