

Network on Early Experience and Brain Development

Objectives

Despite tremendous progress in developmental neurobiology over the past two decades, we know less than the public believes we do about human brain development and even less about the role of experience in sculpting the developing brain.

While we recognize that the first two to three years of life are critical in fostering healthy neural and psychological development, we have strikingly little data on exactly *which* aspects of experience are essential to development or *how* experience works itself into the structure of the developing brain. The goal of the Network on Early Experience and Brain Development is to study the relationship between brain and behavioral development, to clarify the role of experience in brain development, and to enhance the understanding of how neurobiological development and behavioral development are linked.

Approach

The network bridges three related disciplines: developmental psychology, developmental neurobiology, and various pediatric subdisciplines. Its members are drawn from these fields and include experts in behavior and biology, cognitive neuroscience, neuroimaging, molecular biology, fetal brain development, developmental disabilities, perinatal complications and biobehavioral development, and the effects of psychological trauma on infants and children.

These researchers have identified several key questions awaiting answers:

- What do we know about brain development, from fetal stages through adulthood?
- What is the role of experience in sculpting the brain, and what critical experiences facilitate normal behavioral development?
- Are there critical periods of development in which certain experiences are necessary for normal development? If these periods are missed, is remediation possible?
- How do life circumstances influence the effects of key experiences on brain development?
- How can we use information about experience and brain development to improve the lot of children in our society?

To examine these questions, the network has organized its work into four major areas:

The effects of early experience on brain-behavioral development: The investigators will examine the developmental course of early relationships between infants and their caregivers and the effects of these relationships on brain structure and function; how responses to key early experiences serve as scaffolding for future learning; and what kinds of stimulation and support are needed for brain-behavioral development.

Methods for studying brain-behavior relationships: To understand how experiences affect brain-behavioral development, researchers will need new assessment tools. The investigators will develop and adapt a broad range of tools, from the latest techniques of molecular biology, to advanced non-invasive tools for assessing brain activity, to behavioral tools of neuropsychology and neuroscience.

Comparative studies of early brain-behavior relations: Members of the group are conducting selective rearing studies in rodents and monkeys that parallel the conditions under which young children are raised — for example, the effects of being separated from caretakers at different ages. With the assessment tools the group plans to develop, they hope to conduct in-depth studies of these animals' behavior and brains.

Impact on public policy — educating educators and the media: The group recognizes a need to moderate the excessive enthusiasm of those who argue that exposing infants to Mozart and Shakespeare will create brilliant musicians and writers, and to ease parental anxiety about the need to bring even more resources to children who already live in a very stimulating environment. To this end, they will disseminate information on early brain-behavior development to educators, the media, and society at large.

Progress and Plans

Since its inception, the network has implemented a number of pilot projects, including:

- A groundbreaking intervention study examining the effects of institutionalization on Romanian children, and the extent to which those effects can be remediated by placing institutionalized children in a family setting (foster care). Related to this study, the network has been instrumental in launching an Institute of Child Development in Bucharest that aims to develop research and clinical expertise in addressing the special needs of post-institutionalized children in Romania.
- A working group on dissemination of science on early childhood development. This working group eventually evolved into a freestanding organization, the National Scientific Council on the Developing Child, which combines developmental research and communications research to communicate science effectively to policymakers and practitioners.
- Studies of behavior disturbances in young monkeys separated from their mothers at various ages and related research exploring the neural substrates underlying these behaviors.
- A study demonstrating that enriched experience increases neuroplasticity in adult barn owls.
- New methods for examining the development of circuitry in the rat brain.
- A study of brain areas thought to be central to social behavior in primates.
- Development of a battery of gender-sensitive cognitive tests related to brain-behavior relationships in young children.