CEDAR Clinical Brief

Center for Early Detection
Assessment and Response to Risk
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Brain Changes in Early Psychosis, Neuroplasticity, and Rationale for Early Intervention

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Childhood and Adolescence are Critical Periods for Brain Development

Although it was long thought that our brains do not change once developed, scientists have discovered in recent years that our experiences have a remarkable ability to change our brains. This ability of the brain to be sculpted by experience is known as *neuroplasticity*. The brain shows plasticity throughout an individual's lifetime, but its capacity for change may be higher at certain times, known as critical periods. Childhood and adolescence are critical periods when the brain is particularly malleable and responsive to learning.

Alterations in Brain Plasticity

Changes in neuroplasticity appear to underlie some cognitive, emotional, and behavioral difficulties. Scientists believe that alterations in brain plasticity may cause certain difficulties experienced by individuals with psychosis. For example, impaired development or excessive loss of connections between neurons during adolescence may lead to reduced neuroplasticity, which may cause cognitive impairments (trouble with learning, attention, processing speed, and memory) and negative symptoms (lack of motivation, social withdrawal, and diminished ability to experience and express emotions). On the other hand, excessive neuroplasticity in some brain circuits (such as the amygdala, which governs emotions) can lead to hallucinations, delusions, and emotional instability that many people with psychotic symptoms experience.

What can you do to improve brain functioning?

Some factors that have an important influence on brain plasticity, such as genetics and age, are fixed. Others though, such as certain behaviors, can be changed to improve brain functioning. Some examples include:

- Exercising regularly (especially aerobic exercise)
- Eating healthy foods (green leafy vegetables, foods high in antioxidants, fish)
- Following a regular, healthy sleep schedule
- Engaging in meaningful social relationships
- Managing stress
- Practicing mindful meditation
- Learning new things
- Using the brain actively in different ways (puzzles, games that involve using memory, attention, etc.)

Researchers at CEDAR have been investigating a treatment designed to enhance cognition in young people showing signs of clinical high risk (CHR) for psychosis. This program, called "CLUES" (Cognition for Learning and for Understanding Social Situations), includes cognitive training, individualized coaching, and a group focused on enhancing cognition and social functioning. Other researchers at our center are testing whether nutritional supplements (such as fish oil and N-acetyl cysteine) and physical exercise can improve cognition. New and safe brain stimulation techniques, such as transcranial magnetic stimulation, may also help improve brain plasticity. Early interventions show significant promise because young people, who have recently started experiencing symptoms, have more resilient brains compared to older individuals who have experienced symptoms for longer periods of time.

Do *you* have questions that you would like us to address in future clinical briefs? **Contact:** Emma Parrish at eparrish@bidmc.harvard.edu

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