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Poster Presentation

Changes in Thickness and Intelligence

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Abstract

Neuroimaging research indicates that human intellectual ability is associated to brain structure including the thickness of the cerebral cortex. Most studies show that general intelligence is positively associated with cortical thickness in areas of association cortex allocated throughout both brain hemispheres. Changes in cortical thickness over time have been related to intelligence, but whether changes in cortical surface area are related to general cognitive functioning is unknown. At 10 years of age, more intelligent children have a slightly thinner cortex than children with a lower Intelligence quotient (IQ). This relationship becomes more pronounced with increasing age: with higher IQ, a faster thinning of the cortex is found over time. In the more intelligent young adults, this relationship reverses so that by the age of 42 a thicker cortex is associated with higher intelligence. In contrast, cortical surface is larger in more intelligent children at the age of 10. The cortical surface is still expanding, reaching its maximum area during adolescence. With higher IQ, cortical expansion is completed at a younger age; and once completed, surface area decreases at a higher rate. These findings suggest that intelligence may be more related to the magnitude and timing of changes in brain structure during development than to brain structure per se, and that the cortex is never completed but shows continuing intelligence-dependent development.

Key words: Cortical Thickness, Intelligence, Neuroimaging

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