

Graphic Evidence

ADOLESCENT DECISIONMAKING: STILL A MYSTERY

Scientists have proposed various theories to explain why adolescents are more likely than children or adults to make decisions that result in accidents, suicide, homicide, addiction, and other negative outcomes. According to one theory, the part of the brain that says, “That’ll feel good—go for it” matures before the part that says, “Hold on, there could be a downside here.” Another theory holds that these adolescents are trying to do what adults do, but before society is ready for them to be adults and before they have the experience and skills that enable adults to hedge the attendant dangers.

A recent NIDA-funded study lent support to the latter theory. Dr. C. Monica Capra and colleagues at the Emory School of Medicine in Atlanta found that, in brain development, adolescents who made risky decisions—about sex, glue sniffing, drinking and driving, and other activities—were more like adults than those who played it safer.

The researchers assessed risk-taking behaviors of 91 boys and girls, 12 to 18 years old, using questions from the standardized Adolescent Risk Questionnaire (ARQ). The results indicated that children younger than 14 uniformly took few risks (Figure 1). Both the overall level of risk taking and the amount of divergence between individual risk levels increased steadily from age 14 to 18.

The researchers adjusted the ARQ responses statistically to eliminate the effects of age and sex (males had scores that were 10 percent higher on the risk-taking scale), then compared the adjusted responses with diffusion tensor brain images of the 60 youths who were aged 14 to 18. The youths who made riskier decisions had greater nerve fiber density and more myelination in tracts connecting the two sides of the prefrontal cortex (red areas, Figure 2A) and emanating from the prefrontal cortex to brain motor areas via the corona radiata (yellow and red areas, Figure 2B–2D). Increases in fiber density and myelination in cortical tracts are features of brain maturation that enhance the volume and rapidity of nerve transmission.

The prefrontal cortex is a center of judgment. The study findings suggest that the right and left prefrontal cortex may be better coordinated and exert stronger influence on risk-taking teens than their more conservative peers.

The Emory team says that its findings counter the idea that adolescent risk taking reflects immature cortical tracts but raise another question: Does precocious brain development predispose adolescents to take risks, or does engaging in risky activities at a young age affect brain development?

FIGURE 1.

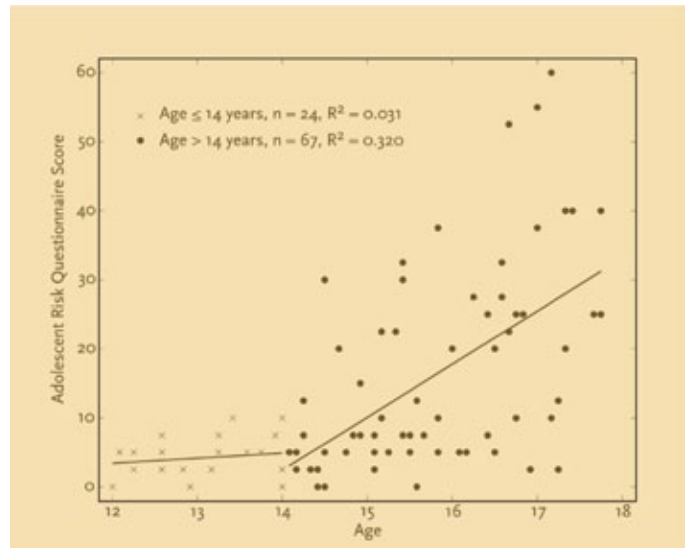
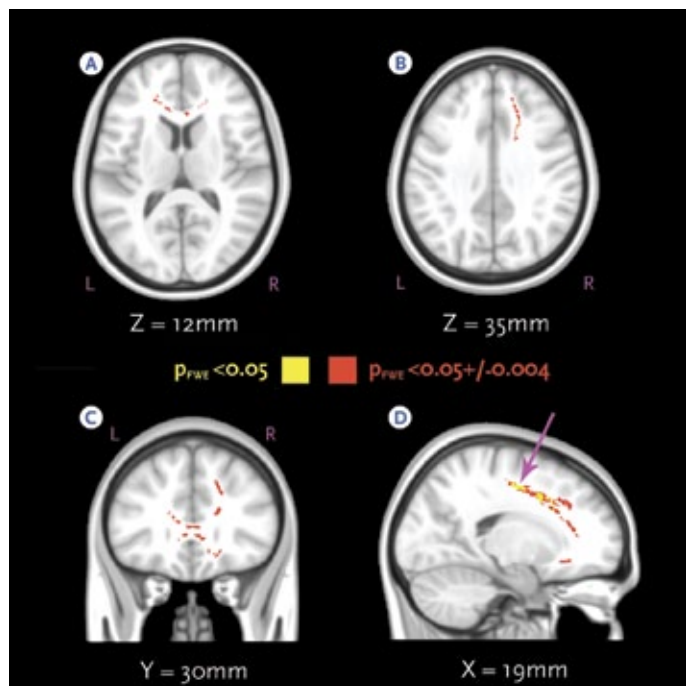


FIGURE 2.



Source: Berns, G.S.; Moore, S.; and Capra, C.M., 2009. Adolescent engagement in dangerous behaviors is associated with increased white matter maturity of frontal cortex. *PLoS ONE* 4(8): e6773; doi:10.1371/journal.pone.0006773.