

Young Risk-Takers May Be More Susceptible to Substance Abuse

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January 11, 2012 — Adolescents who engage in extremely risky behaviors may show decreased activation of the reward processing areas of the brain, suggesting an increased possibility of later substance abuse, according to new research.

In a magnetic functioning imaging (MRI) study of almost 300 young teens, the participants who were found to engage in substantial risk-taking behaviors, but who had no apparent substance use problems, showed decreased bilateral activation of the ventral striatum during a reward anticipation task.

In addition, those reporting potentially problematic substance use had both significantly higher risk scores and significantly less activation in the left ventral striatum than did those reporting nonuse.

"Both a tendency toward risk-taking behavior and problematic drug use are linked to lower activation of the adolescent neural reward system, a connection partly mediated by structural differences," lead author Sophia Schneider, psychologist and PhD student in the Department of Systems Neuroscience at the University Medical Center Hamburg-Eppendorf in Germany, told *Medscape Medical News*.

"Thus, more risk-taking teenagers may seek stronger stimulation to activate their reward system, making them potentially susceptible for strong short-term pleasures, such as the use and abuse of psychotropic substances," added Ms. Schneider.

The study is published in the January issue of the *American Journal of Psychiatry*.

European Multicenter Project

Previous research has shown a link between increased risk taking and addiction, which in turn has been associated with a lower response in reward-related areas of the brain, such as the ventral striatum.

The investigators write that an unanswered question has been whether increased risk taking behaviors are linked to striatal reward processing "in the absence of substance abuse."

"This area was particularly fascinating because I am very interested in the factors contributing to the development of mental disorders," said Ms. Schneider. "I think it is extremely important to identify these factors because such knowledge can be effectively used for the optimization of prevention programs."

The IMAGEN project is an ongoing European multicenter genetic neuroimaging study that includes more than 2,000 teenagers.

In an analysis published last year using this patient population and reported by *Medscape Medical News* at the time, the investigators found that the reward processing areas of the brain may be altered in frequent video-game players compared with moderate players.

For the current study, the researchers examined data from IMAGEN for 266 "healthy" adolescents (all aged 14 years, 55% girls) without reported substance use behaviors.

In additional analysis, data for 31 of these participants were compared with data for 31 teens (also all aged 14 years, 48% girls) with reported "potentially problematic" substance use.

Potentially problematic use included nicotine dependence, likelihood of alcohol abuse, or having ever tried hashish, marijuana, amphetamines, cocaine, crack, "ecstasy," heroin, ketamine, or psychoactive mushrooms.

The Cambridge Gamble Task was administered to all participants to assess risk-taking bias, after which both functional and structural MRIs were administered.