Why do teens make such bad decisions?

By Martha Nolan McKenzie

Brain researchers are confirming what parents and auto-insurance adjusters have long known—**teenagers tend to make really bad decisions.** Whether they are experimenting with methamphetamine, engaging in unprotected sex, slipping behind the wheel while drunk, or picking up a knife to join in a fight, teens often seem bound and determined to test their own mortality.

Many fail the test. About 30,000 kids between ages 10 and 24 die each year from accidents, homicide, or suicide. The vast majority of these deaths are believed to be preventable. "The biggest killer of kids is bad decision-making," says Gregory Berns, a psychiatrist and biomedical engineer in the School of Medicine. "The next biggest killer of kids—cancer—is way down on the list. It's not even close."

Why are teens often so lousy at making decisions? Parents blame teens' lack of life experience. Scientists point the finger at an immature prefrontal cortex, the area of the brain involved in executive decision-making, judgment, organization, and planning. The prefrontal cortex does not fully mature until the mid-20s.

Berns believes a third culprit may share blame. He contends that teens suffer from a hyperactive reward system fueled by a deluge of dopamine. To test the theory, he is leading a study using functional magnetic resonance imaging (fMRI) to measure brain activity in the reward system of adolescents ages 12 to 17. Funded by the NIH, the four-year study will involve up to 200 participants. More than 50 teens have enrolled thus far.

"Greg is absolutely right about the hyperactive reward system in adolescence," says child psychology researcher Jay Giedd of the National Institute of Mental Health. "The implications of understanding adolescent decision-making are far-reaching, from driving safety to substance abuse to unplanned pregnancy."

Dopamine, the leading role in Berns' drama, is the pleasure chemical of the brain. Scans have shown that dopamine floods the brain during pleasurable activities, such as eating, having sex, or taking recreational drugs. More recently, scientists have learned dopamine is also released when we encounter something new, programming us to crave novelty and new experiences.

At no time in our lives do we have more dopamine in our brains than during our teens. "It's no coincidence that dopamine levels peak at a time in human development that coincides with a peak in novelty-seeking, risk-taking, and the drive to leave home," says Berns.

Dopamine primarily acts on the two areas of the brain that are responsible for decision-making—the prefrontal cortex and the striatum. The prefrontal cortex is the part of the brain that mulls over what a person is going to do, weighing benefits and consequences. The striatum—the pair of arches that straddles the brain stem in the geographic center of our skull—is the part of the brain that is all about instant gratification and short-term rewards. "Decision-making is a balance between the two—short-term rewards and long-term consequences," says Berns.

Since the prefrontal cortex in teens has not yet matured, the striatum exerts more than its fair share of influence, he believes. That means instant gratification tends to win out over thoughtful deliberation.

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"Our interest is in seeing how they respond to the odds of winning or losing," says Berns. "Some people respond very strongly to risk itself—they get a rush off the risk. Others don't like the risk and focus on the outcome. By looking at how the teens respond to all of these tasks, we can calculate their risk attitude."

In another part of the study, Berns is looking at how peer pressure can change behavior. "We know a lot of bad decisions teens make are the result of peer pressure," says Berns. "One of the things we want to know is, How does that happen in the brain? To find out, we make them do the tasks again but show them what the most popular choices are and then observe how they change their behavior. The key question is, Do people change the way they behave because what other people say makes them see outcomes differently, or does it somehow change the way they perceive the risks? Those are two very different mechanisms."

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A sure thing versus taking a gamble

To test this theory, Berns' research is examining how teenagers weigh risk and reward for different types of things that motivate behavior: money, music, and food.

While their brain activity is monitored using fMRI, participants complete different decision-making tasks, all of which involve weighing risks and rewards. The fMRI measures blood flow in the brain—a step beyond regular MRI, which captures the structure of the brain.

In one task, participants are given a series of choices to make involving money. They may have to decide, for example, between taking a sure win of $10 or a 50:50 chance of winning $20. In another task, participants are asked to guess the outcome on a roulette wheel. If they guess correctly, they get a squirt of a juice that they like. Incorrectly, a squirt of a juice they don't like. Sometimes the roulette wheel is half black and half red, so chances of a correct guess are even. Other times the wheel is almost all red with very little black.

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In the end, Berns hopes to identify which types of interventions are most likely to influence teen decision-making. "I'm interested in understanding how social messages, whether from peers, mass media, or authority figures, can mitigate teens' propensity to take on sometimes insane risks," he says. "We might find that certain types of messages are more effective than others in tamping down this activity."

If so, parents of teens everywhere would be able to rest a little easier.

To learn more about Berns' study, visit www.whsc.emory.edu/newsitem_teenbrain.cfm.