TEENS

Why the Teen Brain Is Drawn to Risk

By MAIA SZALAVITZ | @maiasz | October 2, 2012 | 2

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If you're the parent of a tween, be warned: your cautious 10-year-old is bound to turn into a wild child in a few short years, with seemingly no regard whatsoever for safety. Indeed, teenagers have the double the risk of dying compared to their preteen selves.

Adults have long reckoned with ways to protect adolescents from their own misjudgments. Only recently, however, have researchers really begun to understand how the teen brain is wired and that some of what appear to be teens' senseless choices may result from biological tendencies that also prime their brains to learn and be flexible.

Take teens' perception of risk. It's certainly different from that of adults, but not in the ways you'd expect. Research shows, for instance, that teens tend to wildly *overestimate* certain risks — of things like unprotected sex and drug use — not to lowball them as one would predict. So, it may be that teens' notorious risk-taking behavior stems not from some immunity to known risks, but rather, as a new study now suggests, from their greater tolerance to uncertainty and ambiguity — that is, *un*known risks.

"Relative to adults, adolescents engage more in unknown risks than they do in known risks," says Agnieszka Tymula, a postdoctoral student at New York University and the lead author of the study, which was published in the *Proceedings of the National Academy of Sciences*. Teens, it seems, love the unknown.

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To examine the differences in risk-taking between teens and adults, researchers studied 33 healthy adolescents aged 12 to 17, along with 30 normal adults aged 30 to 50. They all engaged in a gambling game, in which they could take a definite $5 reward or choose between the possibility of getting a much larger payout or nothing at all. The payout was based on whether there was a greater number of red or blue poker chips in a stack of 100; to vary the ambiguity, larger or smaller portions of the stacks were hidden from view.

In this way, the trials provided different amounts of information about the risks involved: for example, in some trials, participants could choose between the $5 and a clear 50% chance of winning $50. In others, however, they had a choice between $5 and varying amounts of money, up to $125, but the probability of winning appeared to vary from 25% to 75%. In reality, they always had a 50% chance of winning, but were led to believe their odds varied, which allowed researchers to look at how participants thought about ambiguity.

"If the risks are known, adolescents engage [in risk-taking] less than adults do, but if they are unknown, this is reversed," Tymula says. In fact, when the payout was known to be $125, adults always gambled — but this was not so for teens.

"I think [the finding] adds very nicely to the literature," says Valerie Reyna, professor of human development and

psychology at Cornell University, who was not associated with the research. "The new breakthrough here is that it extends our knowledge about adolescent risk-taking into the realm of ambiguity aversion."

Reyna's own research has shown how excessively teens tend to overestimate risk: for example, when asked about the risk of AIDS in one study, adolescents estimated that a teenage girl who is sexually active has a 60% chance of contracting HIV. (The actual odds are miniscule for most Americans.)

This perception, however, doesn't prevent teens from engaging in risky behavior. Why? Because teens have a different style of information processing, Reyna argues. They may get lost in the details about specific risks and overly focused on possible rewards, while ignoring the overall "gist" of the problem — i.e., the ultimate consequences. In the case of unprotected sex, for example, even if the odds of contracting HIV are low, a bad outcome would be irreversible. Unlike teens, adults tend to focus on the end result and the consequences.

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Oddly, teens' information-processing style seems to rely on the uniquely human "rational" parts of the brain. Reyna's work has shown that adolescents carefully think about risks most adults wouldn't even consider taking — like, say, playing Russian roulette — using their prefrontal cortex. They use quantitative reasoning and take about twice as long as adults do before responding, while adults immediately have a negative reaction to such risks, stemming intuitively from the insula, and almost automatically say no.

So why might the teenage brain be wired this way? Their greater tolerance for uncertainty and the unknown — and an increased desire for and focus on rewards — probably helps them leave the nest. Such explanations are speculative, Reyna cautions, but notes that "in rats, for example, adolescent rats are more likely to explore a new environment. You don't know what you're going to find: that's sort of the definition of a novel environment. If you are more ambiguity tolerant, that would enable that sort of exploration."

In other words, it takes some acceptance of uncertainty and comfort with not knowing in order to learn and to be open to new knowledge. "We come into the world with limited knowledge about what kind of consequences we will experience after making decisions and also about how likely these different outcomes are," says Tymula. "But, of course, we want to learn, so this tolerance for unknown risks might stem from an underlying biological feature that makes learning about the unknown less unpleasant for adolescents than it is for adults."

An early part of learning any type of new skill — from typing to teaching — is accepting instruction and consciously thinking about all of the tactics and techniques involved in performing the skill. While novices need to think step-by-step, however, experts will have incorporated the best routines into their brains to the point that they become automatic. This may be why the teen brain uses the higher-order cortex for risk decisions: it hasn't yet made enough of them to develop an intuitive reaction that it can "offload" to other brain regions.

Such new information about how the teen brain works — and why its characteristics shouldn't simply be seen as negative or dysfunctional — is only just beginning to inform teen health programs. Reyna, for example, has studied how teaching "gist"-based reasoning can help teens avoid dangerous sexual choices, finding that teens who are taught to focus on potential, catastrophic negative outcomes, rather than the odds, make fewer risky sexual decisions and have fewer partners.

Tymula suggests that allowing teens opportunities to safely experiment — for example, a simulator that shows sober teens what drunk driving is like — could also help, by making an unknown risk seem more real and known. Allowing teens the opportunity to take risks in a safe context could also help them develop expertise that underlies gist-based thinking.

Meanwhile, it's interesting to note that while adults tend to prefer the certainty of misery to the misery of uncertainty, as family therapist Virginia Satir once put it, the same may not be true for teens.

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Maia Szalavitz is a health writer at TIME.com. Find her on Twitter at @maiasz. You can also continue the discussion on TIME Healthland's Facebook page and on Twitter at @TIMEHealthland.