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Are adolescents really risk-takers? Most adults say yes, but the science is starting to say no

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Reviewed by:

Abby
15 years old

Young Minds of the USA Science and Engineering Festival

Most adults firmly believe that as kids reach their teens, they start to take crazy risks that get them in trouble. Motivated to protect teenagers, adults impose age limits on what they consider to be really dangerous activities. But do teenagers simply love taking all risks much more than adults? Our research suggests otherwise. When the risks are vague, adolescents indeed are very optimistic about their odds and much more likely to take risks than adults. However, teenagers who understand the risks associated with a decision are way more conservative in their behavior than people of their parent's or even grandparent's age. Our research suggests that adults should probably focus more energy on trying to educate adolescents about risks than on limiting them.

Most adults firmly believe that as kids reach their teens, as they become adolescents, they start to take crazy risks that get them in trouble. And there may be good reason for adults to believe this: although 16 year olds are bigger, stronger, and better educated than 12 year olds (or at least they have gone to 4 more years of school), they get hurt and killed almost twice as often [1]. So why is that? Do they make risky choices that get them in trouble? Consider a few other facts: adolescents get more sexually transmitted diseases than any other age group [2]; they get in trouble with the law more than any other age group; and when they drive cars, they drive faster than any other age group [3].

All of these facts make adults see adolescents as "risk-takers" who need to be protected from their own decisions. Adults and society typically do this in one of two ways:

(1) by imposing age limits on what they consider to be really dangerous activities, like gambling, driving, drinking alcohol, and smoking.
(2) by trying to educate adolescents about the risks of things like smoking tobacco or driving too fast.

Both of these approaches can help them to reduce the number of teenagers who get hurt by their own decisions, but why do adolescents make these kinds of decisions in the first place?

In an effort to better understand why adolescents seem different in their decision-making from adults, we designed a simple experiment and conducted it on 33 kids ranging in age from 12 to 17. We then compared their decisions to those of college students, people the ages of their parents, and people the ages of their grandparents.

In our experiment, we tried to distinguish between two very different kinds of "risk-taking." The first we called *a willingness to take known risks* and the second we called *a willingness to take a chance when risks were unclear*. This is an essential distinction for economists [4], who need to differentiate between deciding to do something for which the likelihood of it going badly is known and deciding to take a chance when you simply do not know the odds in advance.

To make this distinction clear, imagine playing a video game, you have played before in which you get to choose between a safe path and risky path. On the safe path, you know your character will get 50 points for sure. On the risky path, you know that you have a 50% chance of earning more than 50 points and a 50% chance of getting your character killed.

Because you know the odds, economists refer to this as *willingness to take known risks*. And importantly, everyone is different in the way that they evaluate the risky path. If the positive outcome yields 1000 points, nearly everyone is willing to take the risk it presents. But if it yields only 60 points, most people choose the safe path. Just how many extra points the game has to offer before you "take the risk" defines what an economist would call your "risk tolerance." The more risk averse you are, the more extra points the game has to offer for the risky path to be worth taking.

Next consider a situation in which you have to choose between a known safe path and an *uncertain* path, a path you have never taken before. You do not know the odds that you will get killed, even if you know how many points you might win. Deciding whether or not to take that path is harder because you simply do not know what is going to happen. In this case, everyone is also different. Some will try out the uncertain path for a gain of 100; others may require a payoff of 2000 points before they give that unknown path a try. This is an example of *a willingness to take a chance when risks were unclear* and as you can see it is different from the willingness to take known risks.

We wondered whether the observation that teenagers tend to get hurt in risky situations was because they were more willing to take known risks than adults or whether it was because they were more willing to take the uncertain path than adults.

So what we did was offer teenagers, college students, parent-aged adults, and grandparent-aged adults the opportunity to play two kinds of casino games. They had the chance to win real money, with one game offering a known risk and one offering an unknown risk. On each round of our casino-like game the people in our experiment had to choose between taking a sure $5 and known or unknown risk of winning a lot more. How much more ranged from a little bit more ($8) to 25 times as much ($125).

In our known-risk condition, people always knew the exact chance of winning more money, from as low as 13% to as high as 75%. In our unknown risk condition, we did not reveal the exact chances of winning, but we did reveal that the unknown risk fell within a fixed range. Those ranges varied, with some examples being 38–62, 25–75, and 13–87%. In Figures 1 and 2, you can see examples of the choices that our study participants faced.

Each of the people in our study made about 160 of these kinds of choices and we randomly selected one of their choices to pay for real. If on that particular round they had picked the $5 for sure option, then we just gave them $5. But if on that round they had chosen to take a chance, we used a casino game to

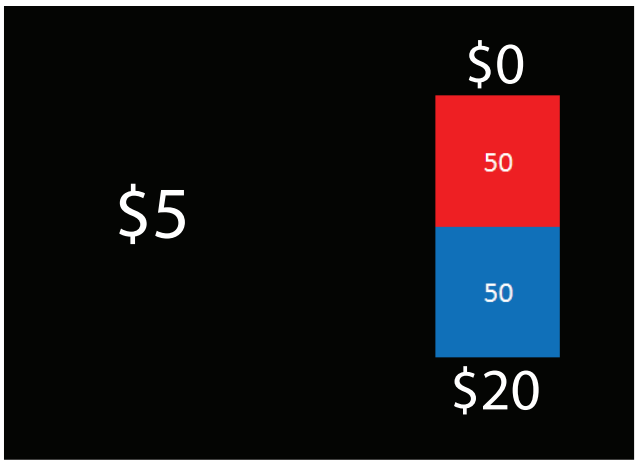

FIGURE 1 - An example of decision problem with known risks.
Study participant can either choose to receive $5 for sure (option on the left) or take a risky lottery where (s)he can win $20 or nothing. The probability of winning $20 is described by the relative size of blue winning color to red. In this case, there is equal, 50–50, chance of winning $20 and nothing.

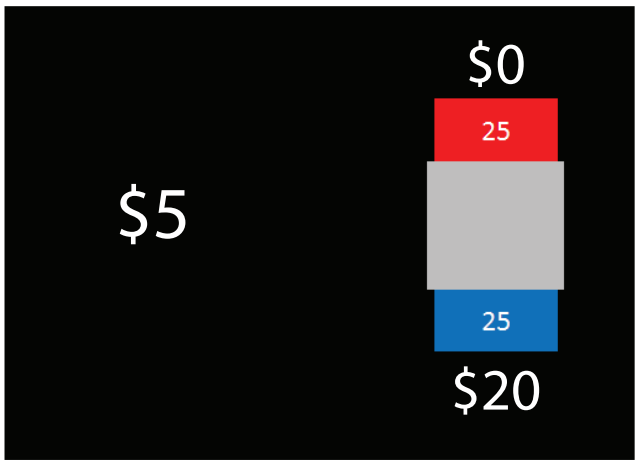

FIGURE 2 - An example of decision problem with unknown risks.
Study participant can either choose to receive $5 for sure (option on the left) or take a risky lottery (on the right) where (s)he can win $20 or nothing. The probability of winning is not known precisely because a part of the red-and-blue bar is hidden by a gray rectangle. It is possible that the hidden part is all blue (in which case the probability of winning $20 is very high), that it is all red (in which case the probability of winning $20 is low), or that it is part red and part blue. Because the participant does not know the exact likelihood of winning, we call this a situation with unknown risk. In this example, the gray box covers half of the red-blue bar – meaning that the probability of winning is somewhere between 25 and 75% – but the participant does not know its exact value.

determine whether or not they had won. If they did win they went home with between $8 and $125. And of course if they lost, they went home with nothing.

What we found when we did this was really quite startling. It turned out that the average adolescent was very careful when the risks were known – more cautious than college students or parent-aged adults, and about as cautious as grandparent-aged adults [5]. This means that when the risks were known, adolescents were not risky in their behavior at all. Only when the risks were unclear did teenagers choose them more often than other groups. Under those kinds of conditions, they were much more willing to take a chance than any other group.

In the study, we focused on a specific type of decisions that have to do with money and financial risks. Although we cannot be 100% sure that the findings would be the same for other types of risky decisions – like smoking, drinking, driving, or disagreeing with friends – let us imagine what our findings would imply for other types of situations. To return to the video game example, it turned out that what distinguished adolescents was their willingness to try uncertain paths. Once they knew that a path was risky they tended to avoid it and played quite conservatively. But when a path was new and unknown, that is when they took risks.

In a sense, this makes teenagers explorers in a way that older people are not. Teenagers seem to be able to put aside their fear of the unknown and take a chance when things are unclear. And of course this can be both a good and a bad thing. It means that teenagers have a natural tendency to explore – which is good – but that tendency to explore shows up even when they are exploring really dangerous things like alcohol, tobacco, or driving under the influence of alcohol.

So what does all of this mean for adults? Well, remember that at the beginning of this article we pointed out that adults tended to protect teenagers from risks by either (1) imposing age limits on what they consider to be really dangerous activities

or (2) trying to educate adolescents about risks. Our research suggests that adults should probably focus more energy on trying to educate adolescents about risks than limiting them. Teenagers who understand the risks associated with a decision are more likely to be conservative in their behavior, suggesting that a real focus for adults should probably be education.

SOURCE ARTICLE

Tymula A., Rosenberg Belmaker L., Roy A., Ruderman L., Manson K., Glimcher P. W., and Levy I. Adolescents' Risk-Taking Behavior is Driven by Tolerance to Ambiguity. Proceedings of the National Academy of Sciences, 109 (42), October 2012, p. 17135–17140. doi: 10.1073/pnas.1207144109

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REVIEWED BY:

Abby, 15 years old

I am a freshman in high school. My favorite classes are physics and history because I love figuring out why things are the way they are. That fascination began when I was little and my mom, who is a neurosurgeon, set up experiments for me to do in her lab. When I am not busy with school, I spend my free time riding my horse and hanging out with my friends.

Young Minds of the USA Science and Engineering Festival, 8–15 years old

This review was conducted through the cooperation of kids from around the DC area who came together at the Frontiers for Young Minds booth during the 2014 USA Science and Engineering Festival. Their combined experiences and opinions resulted in not only a great review but also a great conversation about science. Reviewers include:

Darrik, 14 years old

I live in Washington DC with my mom, dad, and sister. I like to write poems, read, and play soccer. I want to be a programmer, to create apps and websites, and I want to continue to write poetry as well.

Michael, 14 years old

I live in Washington DC. I would like to become a corporate lawyer when I get older. My favorite subjects in school are biology and history.

Tyron, 14 years old

I live in Washington DC with my mom and my siblings. I like to play basketball and read for fun. I want to be a professional basketball player for the NBA.

AUTHORS

Agnieszka Anna Tymula

I am a neuroeconomist. I study how people make decisions and why some people make different decisions than others. I am particularly interested in how the willingness to take risks changes as people age and how this relates to changes in the brain. When I am not doing research I enjoy swimming in the ocean, long walks, and bike rides with my family.

Paul William Glimcher

I am a neurobiologist and an economist and I basically spend all of my time trying to figure out how those two things go together. Most of the time I am either studying how the brain makes decisions as a neuroscientist or studying how people make choices about what they buy or who they spend time with, which I do when I am being an economist. When I am not studying how people make decisions I am mostly hanging out with my three kids, who range in age from 5 to 14, on sailboats.