

Is Decision Making the Right Framework for Research on Adolescent Risk Taking?

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When my son, Benjamin, was 14, he and three of his friends decided to sneak out of the house where they were spending the night and visit one of their girlfriends at around 2 in the morning. When they arrived at the girl's house, they positioned themselves under her bedroom window and, using the time-tested method of many young lovers, threw pebbles against her windowpanes. Modern technology, unfortunately, has diminished the usefulness of this approach. The boys' pebble throwing set off the house's burglar alarm, which activated a siren and simultaneously sent a direct notification to the local police station, which dispatched a patrol car. When the siren went off, the boys ran down the street and right into the police car, which was heading to the girl's home. Instead of stopping and explaining their activity, Ben and his friends scattered and ran off in different directions throughout the neighborhood. One of the boys was caught by the police and taken back to his home, where his parents were awakened and the boy questioned.

I found out about this affair the following morning, when the girl's mother called our home to tell us what Ben had done. (Her daughter had identified the four boys.) It was especially embarrassing, because the girl's mother, in addition to being a fellow parent at our children's school, happens to be my wife's gynecologist. After his near brush with the local police, Ben had returned to the house out of which he had snuck, where he slept soundly until I awakened him with an angry telephone call, telling him to gather his clothes and wait for me in front of his friend's house. On our drive home, after delivering a long lecture about what he had done and about the dangers of running from armed police in the dark when they believe they may have interrupted a burglary, I paused. "What were you thinking?" I asked. "That's the problem, Dad," Ben replied. "I wasn't."

Ben's behavior and his insightful, albeit brief, analysis of it illustrate why the approach that social scientists have taken to the study of adolescent risk taking has yielded so little

3 in the way of explaining the phenomenon. Cast within a decision-making framework, adolescent risk taking has been approached as if it were the product of a series of cognitions, involving the perception, appraisal, evaluation, and computation of the relative costs and benefits of alternative courses of action. Surely we would agree that what Ben and his friends did that night falls into the category of “risk taking” as most of us understand the phenomenon. But there was no evidence that Ben engaged in any of the processes, at least at a conscious level, that psychologists examine when they study adolescent risk taking. Had he paused for even a moment to perceive, appraise, evaluate, or compute the costs and benefits of sneaking out, trespassing, and running from the police, he probably would not have done any of these things. The problem isn’t that Ben’s thinking was deficient. The problem is that it was nonexistent.

Yet it is thinking that we continue to study when we attempt to explain risky behavior during adolescence. We study risk taking by giving individual adolescents questionnaires that ask them to tell us whether certain activities are risky or estimate the probability of various events or tell us what they would do in a hypothetical situation and describe how their behavior would change as a function of variations in levels of perceived risk. Under these conditions, adolescents look surprisingly similar to adults in the ways in which they process information. Indeed, my colleagues and I just finished a study in which, as a small part of it, we asked individuals between the ages of 11 and 24 to evaluate the riskiness, dangerousness, potential harmfulness, and relative costs of each of a series of genuinely risky activities, such as riding in a car with a drunk driver, having unprotected sex, or shoplifting (Cauffman, Steinberg, & Woolard, 2002). The 11- to 13-year-olds were more likely than any other age group to rate these activities as risky, scary, dangerous,

and more harmful than beneficial. After 13, however, there were no age differences in risk perception. In other words, 14-year-olds—individuals the same age as Ben when he and his friends took their risk—perceive the same amount of risk in things such as drunk driving, unprotected sex, or shoplifting as people 10 years older do. We didn’t include wandering around the neighborhood at 2 in the morning, trespassing, and running away from the police on our questionnaire, but I would bet that, had we done so, we would not have found age differences in evaluations of these activities, either. And yet, something tells me that a group of 14-year-olds is probably more likely to do what Ben and his friends did than is a group of 24-year-olds. I am not sure what questionnaires like ours are capturing—we used a widely used measure developed by Benthin (Benthin, Slovic, & Severson 1993)—but whatever they are measuring doesn’t seem to capture something very important about adolescent behavior.

If my son’s nighttime exploits were typical of the situations under which adolescents take risks, as I think they are, it is fair to say that the conditions under which psychologists study risk taking bear little resemblance to the real world in which adolescents live. I say this for three reasons. First, psychologists study adolescent risk taking one adolescent at a time, yet most adolescent risk taking is a group phenomenon. Delinquency and criminal behavior, for example, are more likely to occur in groups during adolescence than they are during adulthood (Zimring, 1998). Drinking also is a group activity during adolescence; according to Add Health data, only 25% of adolescents who drink say they were alone the last time they used alcohol (Udry, 1998). Risky driving is a group activity in adolescence, and teenagers are more likely to drive in groups than are adults (Simpson, 1996). And by usual definition, sexual risk taking is an activity that involves more than one person at a time.

So the first mistake we make is studying adolescent risk taking as if it were an individual phenomenon when in reality it occurs in groups. The second problem is that psychologists study risk taking mainly by asking individuals to respond to hypothetical dilemmas, but in the real world, the risky, or potentially risky, situations in which adolescents find themselves are anything but hypothetical. The prospect of visiting a hypothetical girl from class cannot possibly carry the excitement about the possibility of surprising someone you have a crush on with a visit in the middle of the night. It is easier to put on a hypothetical condom during an act of hypothetical sex than it is to put on a real one when one is in the throes of passion and when one does not want to dampen the pleasurable feeling of sexual contact that everyone knows (but no one acknowledges) is diminished by using a condom. It is easier to just say no to a hypothetical beer than it is to a cold frosty one on a summer night. Shoplifting a CD from a music store seems like a much riskier proposition when posed in the abstract than when one is staring face-to-face at the actual CD whose music is blaring over the store's stereo system, where it suddenly doesn't seem so risky after all. And so on.

Finally, psychologists typically study risk taking under conditions designed to minimize emotional influences on decision making, yet most risk taking likely occurs under conditions of emotional arousal. Indeed, if any emotion is activated by the way we usually study risk taking, it is likely anxiety, because the procedures for studying risk taking often involve administering testlike stimuli to individuals in unfamiliar settings and under unfamiliar circumstances. This, I would assume, would lead to less risk taking than one would expect to see under non-anxiety-producing circumstances. Yet the emotion that serves as the backdrop for much adolescent risk taking is euphoria, either natural or drug

induced. How many of our research subjects are in a state of euphoria when they complete our risk-taking questionnaires? How would their responses to these questionnaires differ if they were euphoric rather than anxious when they completed them?

I noted earlier the general absence of age differences in questionnaire studies of risk perception and risk assessment. Frankly, I have never been very surprised by the finding that adolescents' performance in paper-and-pencil studies of risky decision making is not that different from that of adults, especially if the adolescents are 15 or 16 years old and especially if the decision-making tasks are largely cognitive in nature. In a review of this literature that Elizabeth Cauffman and I published several years ago, we concluded that the sorts of reasoning abilities activated in most decision-making studies were fully developed, or nearly so, by 16, and that the growth curve mapping these abilities reached an asymptote at around this age (Steinberg & Cauffman, 1996). By the time they have reached 16, most adolescents reason about hypothetical dilemmas about as well as adults do.

So let's stipulate that by the middle of high school, adolescents and adults do not differ in the cognitive abilities underlying risk perception and appraisal. This, then, leaves us with a puzzle: If adolescents and adults do not differ in their capacity to perceive and appraise risk, why do adolescents take more risks than adults?

There are several answers to this question. The most frequently asserted one concerns the different values and priorities that adolescents and adults have. The argument here is that in evaluating risk, adolescents and adults use similar reasoning processes but draw on different data in reaching their conclusions (e.g., Jacobs-Quadrel, Fischhoff, & Davis, 1993). Thus, in the putative multivariate model that individuals use in deciding among alternative courses of action, some of

which may be risky, adolescents and adults may put different variables into their mental regression equation and, even when they use the same variables, may attach different beta weights to them. It is therefore possible for adolescents and adults, in this framework, to evaluate the riskiness of a given act in the same way but to make different decisions about how to behave, either because they take into account different implications of their decision, because they weight the same implications differently, or because of some combination of the two. Thus, in assessing whether to try cocaine for the first time, both an adolescent and an adult might perceive the health risks of experimenting with the drug similarly but place different degrees of importance on health as a consideration. In addition, the adolescent may factor into account the possibility of rejection by his peers for refusing to try the drug, whereas this variable may not enter the adult's equation at all. Because adolescents and adults enter different variables into their calculus and because they weight these variables differently, they reach different conclusions about how to act.

I do not doubt that adolescents have different values and priorities than adults, but I don't believe that this is an especially useful way to think about developmental differences in risk taking, because it presumes that we can use a decision-making framework to model a phenomenon that is not really a decision. To say that Ben and his friends "decided" to sneak out is true only in the sense that their behavior was volitional. But there are many acts in which we engage that are volitional but that aren't best described as decisions. When I drive around suburban Philadelphia on a beautiful summer day with the top down on my convertible, I often lose myself in the moment and drive faster than the speed limit. I press on the accelerator willingly, but I would hardly describe my act to speed as a "decision." If

an officer were to pull me over and ask what I was thinking when I broke the speed limit, the honest answer would be Ben's answer to my question: "I wasn't."

It's like the bumper sticker: "Risk taking happens." Adolescents find themselves in situations that sometimes unfold in risky or dangerous ways, and they often fail to stop them from unfolding, either because they are not paying attention to what is happening, can't envision where the unfolding is leading, or are unable to extricate themselves from their circumstances. Beth Cauffman and I have argued that an awful lot of risk taking during adolescence is the product not of deficient thinking but of immature judgment. In our model, judgment refers to the complexity and sophistication of the process of individual decision making as it is affected by a range of cognitive, emotional, and social factors. We believe that *judgment* better captures the mix of cognitive and psychosocial processes of interest than does *decision making*, a term that traditionally has had a more purely cognitive flavor within the psychological literature.

In addition to being influenced by cognitive factors, judgment is influenced by three sets of psychosocial factors: responsibility (the capacity for autonomous behavior that is not unduly influenced by others), perspective (the capacity to place a decision within a temporal and social context), and temperance (the capacity to regulate one's impulses) (Steinberg & Cauffman, 1996). Unlike the literature on cognitive development, however, which suggests few age differences in reasoning beyond early adolescence, the literature on psychosocial development suggests that these sets of capacities continue to mature through middle adolescence and perhaps into late adolescence. As a consequence, adolescents' judgment is less mature than that of adults. In our view, therefore, adolescents take more risks than adults because they more are susceptible to peer

pressure, more oriented to the present rather than to the future, and less able to inhibit their impulses.

A study carried out by Beth Cauffman several years ago provided clear support for this view (Cauffman & Steinberg, 2000a). She had individuals ranging in age from preadolescence to middle adulthood complete a series of decision-making tasks in which they were asked about their likelihood of engaging in a mildly antisocial act, such as shoplifting, using an illicit drug, or deceiving one's employer under three conditions: if they were unlikely to get caught, if they were likely to get caught, or if they were not sure whether they would get caught. She also administered a battery of instruments designed to assess various aspects of responsibility, perspective, and temperance. Three main findings from this study support the notion that immaturity of judgment accounts for age differences in risk taking. First, adolescents made more antisocial decisions than adults (this is not the same as, but is akin to, the notion that adolescents take more risks than adults). Second, immature individuals, as indexed by their scores on measures of responsibility, perspective, and temperance, make more antisocial decisions than mature individuals. And third, age differences in decision making disappear once one controls for age differences in maturity. As predicted, then, adolescents exhibit worse judgment than adults—and presumably take more risks as a consequence—because they are less self-reliant, more shortsighted, and more impulsive.

These psychosocial liabilities are, I hypothesize, accentuated under conditions of high positive arousal—that is, under the conditions of euphoria that often develop when teenagers are with their friends in social situations. In other words, when adolescents are in this state, they become even more susceptible to coercion, more shortsighted, and more impulsive. Extant research on risk taking

misses this, however. When we study decision making in the usual laboratory paradigms, we construct a social and emotional context that removes peers, dampens individuals' emotional arousal, and permits individuals to be more circumspect (Cauffman & Steinberg, 2000b).

The logical implication of this conclusion is to try to find ways of studying adolescent risk taking under the social and emotional conditions that more closely approximate the real world. This has proven enormously difficult to do. One of my current graduate students, Margo Gardner, has recently completed a study in which she attempted to do this, at least a little. In this study, she presented a sample of individuals between the ages of 13 and 22 with a series of tasks designed to assess risk taking and the psychosocial components hypothesized to affect judgment. In a computer-administered risk-taking task, subjects were given the opportunity to take chances while driving a car. The game simulates the situation in which one is approaching an intersection, sees a traffic light turn yellow, and tries to decide whether to stop or proceed through the intersection. In the task, a moving car is on the screen, and a yellow traffic light appears, signaling that at some point soon, a wall will appear and the car will crash. Loud music is playing in the background. As soon as the yellow light appears, participants must decide whether to keep driving or apply the brakes. Participants are told that the longer they drive, the more points they earn but that if the car crashes into the wall, all the points that have been accumulated are lost. The amount of time that elapses between the appearance of the light and the appearance of the wall is varied across trials, so there is no way to anticipate when the car will crash. Individuals who are more inclined to take risks in this game drive the car longer than those who are more risk averse. Performance on this task was correlated with responses to the questionnaire

measure of antisocial decision making used by Cauffman in her study, such that individuals who took more chances in the driving game were more likely to say they would commit an antisocial act if they believed they would not be caught.

The added twist in Gardner's study was that individuals were asked to come to the lab under one of two conditions: either with two of their friends or alone. When playing the driving game, therefore, some individuals played it alone, whereas others had their friends looking over their shoulder, giving them advice on what to do. The data indicate that individuals at all the ages we have studied take more chances when they are with their friends than when they are alone, paralleling findings on the links between vehicle occupancy and automobile accidents in adolescence. The effect of being in a group on task performance did not vary as a function of age, but this may be because the age range in the study is very constricted. We need to replicate this experiment with adults who are older to see if the group effect still holds. Our hypothesis is that the group effect will be weaker among adults than adolescents, but even if the group effect is seen among older individuals, it may nevertheless be important in understanding adolescent risk taking, because as I noted earlier, in the real world, adolescents are more likely to drive in groups than are adults.

I should also note that we did not find the same group effect for two other tasks employed in this study: a delayed discounting task (in which individuals are asked to choose between a larger reward given sometime in the future and a smaller reward given immediately) and a gambling task (in which individuals choose between a large reward with a low probability of attainment and a small reward with a higher probability of attainment). Group administration had no effect whatsoever on performance in the delayed discounting task. And in the gambling

task, contrary to prediction, we found that the group effect was more powerful among the older participants than the younger ones. My suspicion is that the sort of group effect hypothesized to operate in adolescence is operative mainly in tasks in which adolescents get excited and "lost in the moment," such as our driving task. When the task starts to look too much like a decision-making task (as I believe our gambling and discounting tasks did), we may miss what I believe is distinctive about adolescent risk taking, which is not, as I have suggested, best thought of as a decision-making process.

There has been a flurry of interest in the last several years in linking adolescent risk taking with emerging results from studies of brain maturation. Much of the discussion of this in the popular media has focused on the discovery that areas of the prefrontal cortex involved in executive functioning are still undergoing significant maturation in middle and late adolescence, in the form of myelination and synaptic pruning (Huttenlocher, 1994; Spear, 2000). This maturation ostensibly has implications for the development of capabilities such as planning, goal setting, and decision making. (I say "ostensibly" because no studies have linked changes in brain structure and function in adolescence with changes in cognition or behavior.) However, in light of the findings from the decision-making research I have discussed, it does not make a great deal of sense to search for the biological underpinnings of adolescent risk taking in the part of the brain primarily associated with decision making, because we do not see great age differences in this realm of cognition. It strikes me that what we should be looking at, to the extent that we want to link brain maturation with risk taking, are brain systems implicated in psychosocial development, not straight cognitive development. This is, in fact, what my colleagues and I are planning in connection with some work we are doing on the development of

culpability, or blameworthiness, during adolescence. More specifically, we are interested in understanding the neurobiological and neuropsychological underpinnings of such phenomena as susceptibility to peer pressure, inhibitory control, and future orientation.

I do not believe that the decision-making framework that has guided the study of adolescent risk taking for the past decade has proven as useful as we might have hoped. As I have suggested, although some of the risks that adolescents take may be best thought of as decisions, many of them—perhaps even most—are not. I believe it is time to reassess the utility of the decision-making framework and think carefully about alternative conceptualizations of risk taking that emphasize psychosocial differences between adolescents and adults and the implications of these differences for the development of mature judgment.

I am hesitant to make explicit recommendations, based on the ideas advanced here, about the ways we might intervene to reduce

risk taking by adolescents. To the extent that adolescent risk taking has its origins in immature psychosocial development, much of which is normative, there is probably very little we can do with respect to intervention that will magically stimulate the growth of emotional and social maturity. It would seem to me that rather than attempting to change the way that adolescents perceive, appraise, and evaluate risk, a more profitable strategy might focus on limiting opportunities for immature judgment to have harmful consequences. Thus, strategies such as raising the price of cigarettes, more vigilantly enforcing laws governing the sale of alcohol, expanding access to mental health and contraceptive services, and raising the driving age would likely be more effective in limiting adolescent smoking, substance abuse, suicide, pregnancy, and automobile fatalities than strategies aimed at making adolescents wiser, less impulsive, or less shortsighted. Some things just take time to develop, and mature judgment is probably one of them.