

Teen Science- Investigators

Three teens' remarkable research projects help reveal the science behind drug abuse and addiction

Volunteering in a hospital in Texas, 17-year-old Kapil Ramachandran saw a patient admitted for an overdose of narcotics and alcohol. "What would possibly drive someone to inflict so much pain on themselves and their family?" he wondered. In Oklahoma, 17-year-old Ethan Guinn had read about the growing problem of video-game addiction in teens. Knowing how often he played, he wondered, "Do I have a problem with addiction?" In Florida, 15-year-old Shelby Raye noticed how some of her friends seemed "cool," others not. Raye wondered, "How are perceptions of *coolness* shaped? Is there a *coolness factor*?"

These teens had one thing in common: They were curious about something in the world around them and sought out answers to their questions. Sound easy? Not so fast. Being curious is only the first step. Scientific research involves taking a question at hand and exploring a *hypothesis* (a proposed explanation that can be tested), and then testing that hypothesis to come away with answers—and perhaps more hypotheses.

In their search for answers, each of these teens conducted unique and highly creative research, from the molecular level to the behavioral, which contributes valuable knowledge to *addiction science*. In recognition of their achievements, each was honored with a NIDA-Scholastic *Addiction Science Award* at the 2008 Intel International Science and Engineering Fair (ISEF), the premier science competition in the world for high school students. Read on for more about these extraordinary teens and why their curiosity about the world around them, methods of research, and eventual discoveries in addiction science may have relevance for you.

FRUIT FLIES AND ALCOHOL ADDICTION

Kapil Vishveshwar Ramachandran



Kapil's questions about what could propel someone to addiction despite its devastating consequences led him to a novel experiment with fruit flies. Working in a laboratory at the University of Texas, he was able to show that the deletion of a specific protein, called Diazepam Binding Inhibitor (DBI), prevented the flies from becoming tolerant to alcohol's behavioral effects. Tolerance, in this case, means that the flies are less affected by the alcohol the second time they are exposed to it, compared to

the first. This is important because the ability to develop tolerance goes hand in hand with the risk of becoming addicted to a substance.

Kapil, from Austin, Texas, hopes his findings about DBI will lead to the development of new medications to treat alcohol abuse and addiction in humans. "A lot of teens don't realize that drugs and alcohol can cause incredibly long-term physical changes in their body. Drugs can change the way your neurons fire," he says. "If teens knew this, they might reconsider their actions." Next up for Kapil: Duke University, where he'll study biomedical engineering and neuroscience.



Photos, clockwise from bottom left: © iStockphoto.com; Courtesy of John Guinn; Courtesy of Tejasvi Srivangipuram; © David Scharf/Science Faction/Getty Images; © RubberBall/veer.

VIDEO-GAME ADDICTION

Ethan Guinn



Ethan studied 385 students to see whether the rising popularity of video gaming was, in fact, becoming an "addiction" in some players and, if so, how it impacted their lives. Using criteria that diagnose other addictions, he determined that 62 percent of respondents showed some signs of video-game addiction. Examples included thinking about the games when not playing, feeling driven to play again after losing, or feeling irritable or listless when unable to play. "The most surprising discovery," according to Ethan, "was the number of negative effects that video games had on people's health and social skills." Nearly half of the students said they consumed junk food and sugary beverages while gaming, and nearly one third reduced the amount of homework they completed. Others admitted to lying, stealing, skipping school or work, and failing to bathe or brush their teeth in order to play video games.

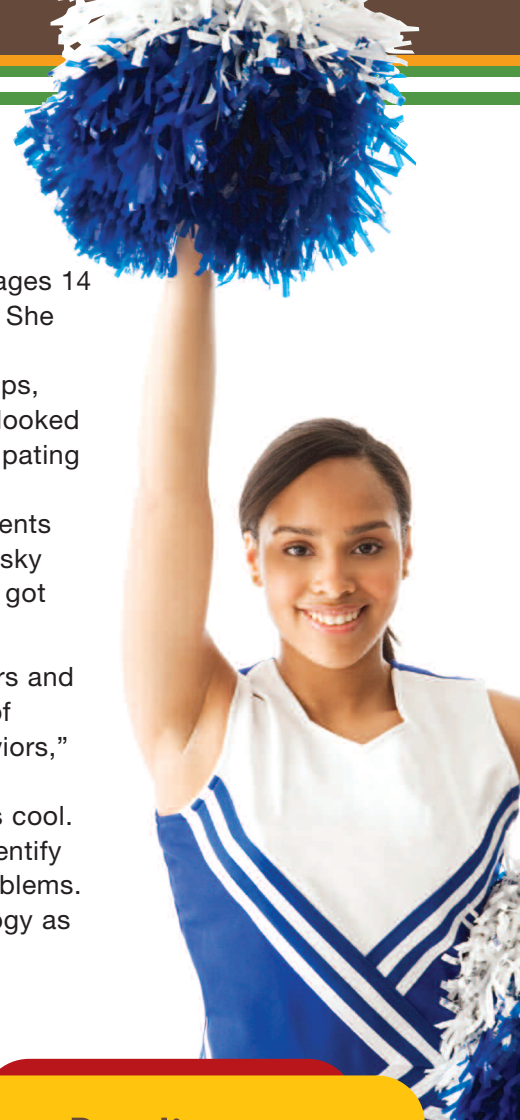
Ethan, from Moore, Oklahoma, hopes his research will help alert the public to the seriousness of this problem, with the ultimate goal of preventing it and treating those already afflicted. Next up for Ethan: His dream is to become an animator for Pixar Animation Studios or a science teacher.



WHAT'S COOL? Shelby Raye

Shelby surveyed 389 teens at her high school, ages 14 to 18, to determine what makes someone “cool.” She looked at five areas that she suspected might be important: athletics, academics, social relationships, personal qualities, and risky behaviors. She also looked separately at male and female responses. All teens thought that participating in athletics was cool: football was rated highest for guys, and cheerleading/dance was rated highest for girls. Almost half of the students surveyed felt that GPA was not a factor in coolness. The coolness of risky behaviors—smoking and drinking—tended to increase as the students got older, and peaked among 17-year-olds.

Shelby, from Bradenton, Florida, hopes her research will help teachers and parents better understand what motivates teens. “Social perceptions of coolness may act as strong motivators or deterrents for specific behaviors,” Shelby says. Her research points out that teens may engage in risky behaviors as an easy, yet dangerous, way to distinguish themselves as cool. She hopes this information can be put to practical use in helping to identify students at risk, and to prevent the escalation of substance-abuse problems. Next up for Shelby: further studies in physics, chemistry, and psychology as she prepares for college—three years away.



Awards for Teen Science Projects

The NIDA-Scholastic *Addiction Science Awards* were given for the first time this year for exemplary projects that advance addiction science. They were presented at the Intel International Science and Engineering Fair (ISEF), the premier science competition in the world for high school students. These projects were chosen from among dozens of others on such intriguing topics as the hidden risks of caffeine, the effects of cocaine over a period of use, and even “sand-eating” addiction in Western Africa. “We were thrilled at the quality of projects that explored addiction science,” says lead judge Lucinda Miner, deputy director of the Office of Science Policy and Communications at NIDA. For more information about addiction-science topics and how to enter next year’s *Addiction Science Award* competition, visit www.drugabuse.gov/sciencefair.

After Reading

- What is the importance of studying something like DBI in fruit flies?
- Why is video-game addiction a serious problem for teens?
- How might understanding teens’ perceptions of *coolness* help prevent drug abuse and addiction?
- What unique perspective do you think teens bring to addiction-science research?



Web Extra

Make sure to check out the complete interviews with these three teen science-investigators at www.scholastic.com/headsup.