

the science inside
ALCOHOL
project

A New Approach to Alcohol Education



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THE SCIENCE INSIDE ALCOHOL PROJECT, funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), is developing an interactive, Web-based science and health curriculum for middle school students and their families on how alcohol affects their bodies. The project, which is part of the highly regarded “The Science Inside” series from the American Association for the Advancement of Science (AAAS), helps provide children, teens, and adults with a science-based understanding of critical developmental and health issues.

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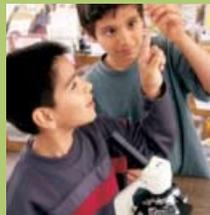
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February, 2008

Trying Alcohol in Middle School

MIDDLE SCHOOL is an extremely vulnerable time for adolescents. At no other point in students' lives will they undergo such rapid and dramatic physical, emotional, social, and developmental changes. And with these changes come choices that can influence their behavior for years to come.

Most alcohol education programs have the same goal: Delay the age at which children start drinking. Those who drink alcohol early are almost 4 times more likely to have problems with it later on. A recent study found that 47% of adolescents who start drinking before the age of 14 become dependent, compared with 9% of those who start after 21. Programs that reach children early and continue throughout high school are more successful than those which only provide information once.

But preventing children from trying alcohol is not an easy task. The pre-teen years are largely about exercising independence and individuality, as well as trying new things. Peer pressure is fierce, at a time when friendships take on greater meaning.

Drinking Can Start in Fourth Grade



Percentage of Students Who Report Drinking in the Past Month

(Source: Pride Survey Poll of 37,345 school children, 2004-2005 academic years)



So if teens' friends are drinking, odds are they will. And despite many prevention efforts, encouraging students to "Just Say No" is only moderately successful.

Recent research shows that discussions with children about alcohol should begin early and be held often in school and at home. A study of adolescent drinking data published in the September 2007 issue of *Prevention Science*, cited one national survey in which 6.9% of fourth graders, and 12.9% of sixth graders reported alcohol use during the past 12 months. Another study found that 11% of 6th graders reported binge drinking (5 or more drinks at one time for boys, 4 for girls, in the past two weeks). The data makes a strong case for holding alcohol discussions as early as fourth grade.

We conducted an extensive review of current anti-alcohol programs in an effort to identify what is available for middle school students. This publication summarizes our findings and offers resources for more information.

The Science Inside Alcohol Project

IN THEIR FINAL DAYS of true childhood before teen skepticism sets in, middle school students still get a thrill from learning. They are fascinated by how their bodies work, the intricacies of the world around them, the taste, smell, and effects of new and different things. And in our experience, visiting hundreds of classrooms over the past few years, we have seen that they truly love science.

To capitalize on this fascination with science, AAAS recently launched **The Science Inside Alcohol Project**. The Project is developing a week-long curriculum for middle school students to give them a science-based understanding of how alcohol affects their bodies. A key goal is that armed with scientific information, teens will make smarter decisions about alcohol use.

A plain language book is under development that links with the curriculum, in order to engage parents, community members, educators, and others in this effort. It will provide easy-to-understand information so they can hold discussions about alcohol

The Science Inside Alcohol curriculum will answer such key questions as:



1. Are kids who begin drinking before the age of 21 more likely to become alcoholics?
2. What are three important body organs that alcohol can harm?
3. Can drinking alcohol hurt your sports performance?
4. Can drinking alcohol make you gain weight?

(answers at right)



and science outside of the classroom. A report by the Robert Wood Johnson Foundation analyzing its 17 years of funding substance abuse in youth, found that the most effective intermediaries are part of a local community that understands its history, priorities, needs, ideas, and is attuned to local opportunities. The Project will share its curriculum and findings widely. The interactive curriculum will be posted on Science NetLinks, a Web site that has more than 3.8 million visitors each year.

The Project's work will be promoted in consumer broadcast, print, online, radio, and other media to reach parents and educators. Evaluation will be conducted at key points to assess student learning, ease of use and implementation, and ensure that what is taught links to national science standards. Students may be asked to do a presentation on what they've learned, after the course is completed, explaining the reasons why they now know they shouldn't use alcohol.

1. Yes. Research shows that almost half of all kids who begin drinking at age 14 or younger become alcohol dependent at some point in their lives. Less than 10% of people who begin drinking after the age of 21 become alcoholics.
2. **Your liver:** Alcohol can harm the liver's ability to remove poisons, germs, and bacteria from blood as well as produce immune agents to control infection. If you drink alcohol it weakens your immune system and you are more likely to get sick. **Your brain:** Kids' brains are not fully developed, particularly the part that stores memory. So when you have 2-3 drinks, you may be less likely to remember things that happen to you than a grown-up. **Your heart:** Alcohol reduces blood flow to heart muscles causing weakness and deterioration. If you start drinking now, as you get older it can cause problems. It should be noted that harm to organs depends on how much alcohol is consumed.
3. Absolutely. A recent report from the New York University School of Medicine, stated that drinking alcohol after a practice or a game can impair your ability to play sports for up to 14 hours. It can cause problems with balance and steadiness, dehydration, slowed reaction time, and a decline in motor skills.
4. Yes. Drinking alcohol regularly can make you fatter particularly in your stomach. The average alcoholic drink has about the same amount of calories as a large baked potato.

The Role of Family and Community

PARENTS are often in the dark about alcohol use during the early teen years. That's the wake-up call in two national surveys of almost 2,500 adolescents and more than 1,000 parents. Conducted by CASA Columbia, a research center housed at Columbia University, the surveys found one third of all teens went to parties where their peers were drinking, smoking marijuana, and/or using cocaine or ecstasy.

Alcohol and drugs infest the teen world, according to the surveys, and parents even when they are present, do not always see them. Fourteen year-olds are almost 3 times more likely than 13 year-olds to attend parties where there is drinking and parents present, the study found.

Environmental factors such as family, community, and school have the biggest influence on whether a child first uses alcohol, tobacco or other drugs. Children who feel safe, loved, and part of a strong community are less likely to experiment with things that can harm them.



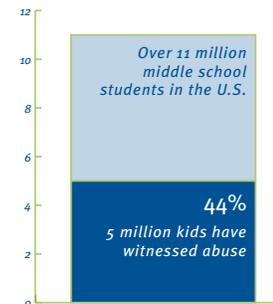
Fourteen year-olds are 3 times more likely than 13 year-olds to attend parties where parents are present and teens are drinking alcohol.



Genetic factors influence whether a child continues to use alcohol and drugs, as they get older. Even among children with two alcoholic parents, only half become alcohol dependent, explained Sandra A. Brown, a professor in psychiatry and psychology at the University of California at San Diego, in testimony before Congress.

Even those children who are genetically predisposed towards alcohol abuse can avoid it. Findings from the National Longitudinal Study of Adolescent Health confirm that attachment to school and family can help protect against drugs, alcohol, and violence.

Alcohol and Drug Abuse in Middle School



44% or 5 MILLION kids have personally witnessed on the grounds of their schools:

- *Students drunk*
- *Students high on drugs*
- *Illegal drug dealing*

(Source: CASA Columbia 2006-2007)



Adolescents Don't "Just Say No"

PROGRAMS for 11-14 year-olds have strong "Just Say No" messages that often address alcohol, cigarettes, and drugs under the single banner of dangerous substances. Many of these programs are sponsored by religious institutions, community or parent groups, which form as grassroots organizations to address problems locally. Their reach is small and longevity totally dependent on funding. Quite a few are aimed towards at-risk youth who live in families with parents, caregivers, or siblings who abuse alcohol or drugs.

Programs for families work to change the way members interact and communicate regarding risky behaviors. Workshops help them assess risk factors such as identifying if there is an abuser in the household, set policies, talk more, monitor adolescent and parental behavior, and manage conflict.

Some programs are housed at universities that receive federal grants and create programs which have affect, but once the funding ends so do they. Our research found multiple alcohol education programs with Web sites that have not been updated in several years.

The programs with political backing and multiple funders from the public and private sectors tend to last. One example is Leadership for Alcohol Free Children, a federally funded group comprised of Governors' spouses trying to prevent alcohol use by children 9-14. The spouses make sure that alcohol education is top of mind at Governor's conferences, in speeches, and when local legislators meet.



Adolescent literature is also available to help teenagers address their own drinking and that of their friends and family. Some of the more popular topics in current literature are dealing with alcoholic parents, the angst of adolescence, and the tragedy of being the grown-up in a household where parents are under the influence on a regular basis. The titles reflect these issues such as *Lush* by Natasha Friend and *Door Near Here* by Heather Quarles.



Programs for younger teens focus on teaching them how to resist peer pressure, boost self-esteem, and make smarter decisions.

The Emerging Role of Social Networking

THE MAJORITY of alcohol education programs today are aimed at older teens and college students to point out the risks and consequences of underage drinking. Only a handful of programs are aimed at the middle school audience.

Encouraging moderation appears to be more effective than abstinence-oriented programs. According to the work of Dr. David Hanson, a professor emeritus at SUNY Potsdam who has worked in this area for more than three decades, programs focusing on moderation are “demonstrably more successful than no-use-only programs.” But this approach is far better suited to older teenagers and young adults.



Social marketing Web sites offer new opportunities for sharing anti-alcohol messages. Sites such as Xanga, Facebook, MySpace, Flickr and YouTube are used by many groups to reach middle and high school students. Teens post information on their drinking habits and their positions on whether or not they should drink.

The Science Inside Alcohol Project is conducting ongoing research on these sites to determine the most effective ways to reach young audiences through them.

Sites frequented by adolescents are an excellent dissemination vehicle. Facebook, a prime destination of high school students and some late middle schoolers, has more than 500 groups addressing alcohol usage by teens, most sponsored by anti-

drinking organizations. The names of these groups are not in the language of young teens, but their messages are clear:

Alcohol is for Losers, buy a Snapple

Alcohol? No thanks. I'm enough fun sober.

If you NEED alcohol to have fun, you're lame

Sure I'll party with you as long as there is no alcohol there

YouTube, with an audience that includes elementary and middle school students, has more than 43,000 videos that contain drinking, over 150 videos about “alcohol education,” and almost 300 videos on alcohol and teens.

Additional information on this research will be posted on **The Science Inside Alcohol Project** Web site which can be found at www.aaas.org.



The Science Inside Alcohol Curriculum



ADOLESCENTS are fascinated with “The Science Inside” how the human body works. Popular culture influences students, particularly through television shows focused on scientific investigations and complex medical cases.

Still there is confusion about basic biology. Middle and high school students have difficulty thinking of the human body as a chemical system and little knowledge about how what they ingest can change it. **The Science Inside Alcohol** curriculum will help them understand how each system affected by alcohol functions within the body and works with others.

The Science Inside Alcohol Project will develop standards-based science materials for health and science classes. It will explore chemistry by examining alcohol as a chemical, biology by explaining how alcohol affects the body, and neuroscience by discussing how alcohol affects adult and adolescent brains.

The project’s highlight will be an interactive module that shows students how each organ affected by alcohol in the body works and how the body functions as a system to process alcohol. Students will be able to participate in activities that simulate measurement of blood alcohol levels.

AAAS’ “The Science Inside” series is a natural outgrowth of inquiry-based instruction, so popular across elementary and middle school science classrooms. Inquiry mimics the process used by scientists by encouraging students to gather evidence and draw conclusions based on their findings. Teachers act as guides rather than telling students what to do.

Sharing What We Learn

A PRIMARY GOAL of this Project is to share broadly the results of our research and the products developed with the general public. Stern Communications, a partner in this project, will work with AAAS’ Office of Public Programs to develop and implement a detailed communications plan that will help reach parents, educators, legislators, and other stakeholders through a wide variety of media, conferences, and other venues.

The Science Inside Alcohol interactive and teaching modules will be shared through [ScienceNetLinks](#), a Web site that provides free lesson plans, activities, and reviews for teachers and students. This popular ten year-old resource has users all over the world.



Lessons range from teaching about static electricity to managing the Everglades ecosystem. All lessons address specific learning goals identified in either *Benchmarks for Science Literacy* developed by AAAS’ long-term science education initiative, Project 2061, or the National Academy of Sciences’ National Science Education Standards.



[ScienceNetLinks](#) is part of Thinkfinity, a partnership between the Verizon Foundation and a group of premier educational organizations, including AAAS.



The new curriculum will explore chemistry, biology, and neuroscience.

New Developments in Adolescent Brain Research

NEW DISCOVERIES about the brain made through neuroscience indicate that adolescent brains respond differently to alcohol than those of adults. Until recently, it was widely believed that brain development ended in the first few years of life. But recent improvements in Magnetic Resonance Imagery (MRI) and other technologies now offer better pictures and images of the brain. Scientists now know that brain development continues well into a person's twenties.



Some of this research helps explain the behavioral characteristics of adolescents, who often exhibit feelings of invulnerability, make rash decisions, and can be quite forgetful. The brain's prefrontal cortex — buried deep inside the skull and the part that processes memory, complex thinking, planning, and inhibition — is one of the last to fully develop.

The most intriguing findings, particularly for adolescents since they relate directly to their own experiences, are the differences between their brains and those of grown-ups. Studies of the youngest drinkers are done with rats — since underage children cannot be given alcohol — and the results are inferred. Others are done with older teenagers who report on their drinking habits and legal drinkers who participate voluntarily.



Scientists now know that brain development continues well into a person's twenties.



Here are some new insights assembled from current research:

- **Memory loss** occurs after 2-3 drinks when people in their early 20s use their memories, while people in their late 20s do not experience it.
- **Cravings and increased brain activity** start when alcohol dependent young women hear words associated with drinking.
- **The prefrontal cortex may develop more slowly** in the brains of adolescents who begin drinking as teenagers than in those who refrain from doing so.
- **The brain's reward center** (ventral striatum) is more active during adolescence and can be more easily damaged by alcohol, as can the abilities to reason and control emotions.
- **Sedation and motor function impairment** are less severe in a young person than in an adult who consumes alcohol, which can lead to more risky behavior, particularly behind the wheel of a car.

It is our hope that **The Science Inside Alcohol Project** will improve middle school students' understanding of how alcohol affects them, and reduce the likelihood that they will use and/or abuse it.

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RESOURCES

1. **Girls Inc. Friendly PEERsuasion**
Girls Inc. Friendly PEERsuasion, initiated in 1988, is a program aimed at preventing substance abuse and changing the substance abuse behavior of at-risk middle-school aged girls. www.girlsinc.org
2. **Leadership to Keep Children Alcohol Free**
The Governors' spouses initiative is a unique coalition of Governors' spouses, Federal agencies, and public and private organizations. It is the only national effort that specifically targets drinking in the 9-to-15 year-old age group. www.alcoholfreechildren.org
3. **NIAAA**
Provides a special Web-based resource for young teens discussing the dangers of alcohol in their language. <http://www.thecoolspot.gov/index.asp>
4. **The National Center for Addiction and Substance Abuse at Columbia University (CASA Columbia)**
CASA Columbia is the only nationwide organization that studies alcohol and nicotine as well as illegal, prescription, and performance enhancing drugs in all sectors of society. www.casacolumbia.org
5. **The Robert Wood Johnson Foundation**
From 1989-2006, it spent more than \$400 million to prevent substance abuse among youth, including underage drinking. This Foundation focuses on environmental and behavioral factors that affect youth. www.rwjf.org
6. **Society for Neuroscience**
A non-profit society comprised of scientists and medical professionals specializing in neuroscience with over 38,000 members. www.sfn.org
7. **Science NetLinks**
A Web site that provides free lesson plans and activities as well as reviews Internet resources for teachers and students to use in their classrooms. A guide to standards-based learning for students. www.sciencenetlinks.com



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