



The Community Family and Twin Studies

University of Colorado

Understanding Substance Use & Abuse

Substance use and abuse are growing problems in the U.S. According to a recent Monitoring the Future study report, 80% of adolescents had used alcohol and 54% of adolescents had used an illicit drug by the end of 12th grade. It has been shown that individuals who use substances at a young age are more likely to develop addictions later in life.

A main focus of this research project is to identify causes of substance use and abuse. This research may lead to new prevention and treatment strategies in the future. The following study looks at genetic and environmental influences on substance use in adolescents.



In this study data were collected and analyzed from 1062 pairs of individuals, including twins and sibling pairs. Researchers looked at the initiation, use and problem use of tobacco, alcohol, marijuana, and other drugs.

They found that genetics strongly influenced whether or not individuals would try a substance, and if they would progress to regular

or problem use. In twins, identical twins were more similar in their usage patterns than fraternal twins. There were few differences between males and females.

Environment also played a role in substance use. Fraternal twins, who are the same genetically as any brother or sister, showed more similar patterns of substance use than did siblings who were not twins. However, twins share a more similar environment than brothers and sisters of different ages. The environmental influences that fraternal twins have in common, such as peer pressure and availability of substances, contributed to substance use patterns.

Although both genetics and environment influence whether or not an individual uses or abuses substances, in this study investigators found that genetics had a stronger impact than environment.

Rhee, S.H., Hewitt, J.K., Young, S.E., Corley, R.P., Crowley, T.J., Stallings, M.C. (2003, in press) Genetic and Environmental Influences on Substance Initiation, Use, and Problem Use in Adolescents. *Archives of General Psychiatry*.

Follow-up Interviews Underway

Some personality traits change through time, whereas others remain constant. Are changes and stability in personality due to genetics, environment, or a combination of the two?

We have started contacting study participants for follow-up interviews to answer these and other questions. These confidential in-person interviews are very similar to prior interviews we have conducted.

They take approximately 2-4 hours and measure a variety of things, including reasoning abilities, personality traits, and life choices and events.

We greatly appreciate your continued support of this important research project. Please contact us with any questions you may have about your participation. Thanks!

Fall 2003
Volume 4

Who is Participating?

- *The Community Family sample is composed of families living in the Colorado front range. We contacted families who had an adolescent in drug treatment, as well as matched 'control' families who lived in the same area and had a similar family structure, but were not in drug treatment programs.*
- *The Community Twin sample is made up of twins ages 12-18 who live throughout the entire state of Colorado. We interview both fraternal and identical twins as well as the brother or sister closest in age.*

Twin families interviewed since project began	1000
Community families interviewed since project began	847
Investigators, researchers and staff involved with project	29
Funding to continue until	2008
Journal articles, books, and chapters in books	54



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Several research divisions at the University of Colorado are involved with this project. These include the Institute for Behavioral Genetics, the Department of Molecular, Cellular and Developmental Biology, and the Division of Substance Dependence at the University of Colorado Health Sciences Center. Each department plays a unique and important role in the collection, analysis, and security of the data.

If you have any questions or comments about your participation in this research project, or about the general nature of our work, please call or email us at the addresses to the left. Also, you can visit our website for more in-depth information. Thank you again for your contribution to our understanding of genetics and behavior.

HTTP://IBGWWW.
COLORADO.EDU/CADD



A Tour of the DNA Lab

Swish, rinse for 10 seconds and spit back into the cup

No, this isn't a visit to the dentist, but rather a simple process we use to collect DNA.

DNA stands for Deoxyribonucleic Acid. It is a form of genetic material that is found in all living creatures. DNA carries the complete instructions necessary for the creation of a living organism.

In genetic and twin research, DNA collection is an important piece of the puzzle. Not only can it be used to determine zygosity (whether or not twins are identical or fraternal) it is also analyzed to find patterns in individuals. These patterns are then compared to an individual's behaviors and traits. Researchers are finding that certain patterns of DNA correspond to certain traits, such as intelligence, addictive behavior, and shyness.



DNA in a test tube, before analyses

So what happens to your DNA once it is spit out from your mouth in the form of cheek cells and into a plastic tube?

At IBG we have a DNA lab where all the work is done on site. Once the DNA is brought over to the lab, it is combined with a solution of soap, salt and buffer. This solution breaks open the cells and kills any organisms that may harm the DNA.

The sample is then heated to 150 degrees Fahrenheit and a chemical called Proteinase K is added for 1 hour. When this process is complete, a small amount of rubbing alcohol is added. This causes the DNA to stick together and it can be "spooled" out of the sample with a glass rod.

This "spooled" DNA is then reduced further by a centrifuge, which is a lab

instrument that spins very rapidly and separates the DNA from any other material.

At the end of this process, a small amount of pure DNA remains. Researchers can then prepare the DNA for analyses by a specially designed computer.



A researcher prepares DNA for computer analysis.

To determine zygosity, researchers look at 12 different genetic markers (a genetic marker is a sequence of DNA). Each marker must match up identically in order for twins to be confirmed as identical. The odds of sharing these 12 genetic markers and not being identical are less than 1 in 10,000.

This year researchers at IBG will analyze between 10,000 and 15,000 DNA samples from various projects, including reading studies conducted in New Zealand, Norway, and Sweden.