

Genetics of addiction: Twin studies

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Twin studies offer a critical method to studying questions of nature and nurture in addiction research. Identical twins arise from the same fertilized egg, so they share 100 percent of their genes. If a trait is entirely genetic, identical twins strongly resemble one another in that trait. Think of hair color, eye color, height. Fraternal twins, on the other hand—people born from the same mother at the same time, but formed from separate eggs—share just 50 percent of their genes, like regular siblings. Two unrelated people, in contrast, are far less alike from a genetic perspective.

Scientists at the Virginia Institute for Psychiatric and Behavioral Genetics (VIPBG) at Virginia Commonwealth University use data from thousands of twins all over the world. Their databases include data from pairs of twins from Virginia, Sweden, Finland and China, acquired through VCU collaborations.

"Everybody here is spoiled with the amount of data we have to work with," said Alexis Edwards, Ph.D., an assistant professor of genetics who arrived at VCU as a post-doctoral researcher in Kenneth S. Kendler's lab. Edwards has conducted research on alcohol problems, depression and [nicotine addiction](#). Kendler is an internationally known psychiatric geneticist, director of the VIPBG and a faculty member in the VCU School of Medicine.

Edwards' work has found genetic links between alcoholism and ADHD and between nicotine and depression.

In twin studies, Edwards compares the mental health of identical and fraternal twins. The Virginia Adult Twin Study of Psychiatric & Substance Use Disorder (VATSPSUD) includes 4,500 male and female twin pairs and looks at seven common psychiatric and [addiction](#) disorders, including alcoholism and nicotine/ drug addiction. The Virginia twins have undergone thorough psychological interviews on their mental health history, both as adults and, retrospectively, in childhood and adolescence.

Edwards runs analyses on the massive dataset, in search of links between addiction and other prior or concurrent conditions, which suggest the two disorders may be influenced by common genes. One of her recent studies found that adolescents with ADHD or conduct disorder, who are hyperactive or "act out" in class, are likely to also have a genetic liability toward alcohol problems.

Another of Edwards' projects suggests a link between the genetics of smoking and depression: 20 percent of depressed people smoke vs. 10 percent of the population at large, and a whopping 80 percent of schizophrenics smoke. Her analyses suggested that one possible explanation for this is a genetic correlation between depression and nicotine dependence. However, it's also possible that smoking actually makes people more likely to experience problems with depression. Since we know smokers may be at higher risk for depression, they could be targeted by their doctors with particular warnings or precautions. Likewise, knowing that hyperactive children are more at risk for addiction in adolescence and adulthood, doctors could identify these kids early and try to intervene before substance abuse becomes a problem.

Edwards is an example of the "translational" character of VCU's addiction medicine initiative. While she is a laboratory researcher with a Ph.D. in genetics, not a medical doctor, she has recently received National Institutes of Health (NIH) funding to sit in on in-patient

interviews at the hospital and group counseling sessions with alcoholics and addicts.

"In these walls with a computer and a bunch of data in front of me, you can lose track (of medical applications)," she said. "The clinicians don't lose track: They keep us focused.

"A clinical perspective is invaluable. Patients are who we're trying to help. Even if we researchers don't work with patients directly, we need to keep them and their real-world situations in mind.

"The interdisciplinary approach helps us have that global view."

Edwards' interest in psychiatric genetics is personal – there is a history of alcoholism and [depression](#) in her family. When you've seen firsthand the havoc that addiction brings to relationships, she said, you are compelled to try to understand where they come from.

"Some people who have substance abuse problems are not sympathetic figures," Edwards said. "They can be infuriating. (I know) based on personal experience. But knowing what I do about the genetics of these problems, I know it's not their fault. Some people think [substance abuse](#) problems are nothing more than a choice, so they are more stigmatized than other mental illnesses.

"At the end of the day, what I'm concerned about is helping people with disorders that destroy families and lives. These problems are very interesting and heartbreaking."

Provided by Virginia Commonwealth University

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