

The Spit for Science project: Characterizing Genetic and Environmental Influences
on Patterns of Substance Use in College Students

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Risky substance use among college students is widespread, with 39% of students reporting that they binge drink, and 36% of students reporting illicit drug use in the past year, most commonly marijuana. Nearly half (47%) of all students meet criteria for an alcohol or marijuana use disorder at least once in the first three years of college. Problem substance use is associated with far-reaching consequences, including decreased academic performance and graduation rates, unwanted sexual encounters, legal consequences, assault, injury, suicide, and even death; however, very few students seek treatment and current prevention/intervention programs have only modest effectiveness.

Spit for Science is a university-wide research opportunity at a large, diverse, urban public university, which is following 9890 students across their college years and beyond, in order to characterize genetic and environmental influences on substance use and related behavioral outcomes. For four years (2011-2014) we invited all incoming freshmen to complete on-line surveys in the fall semester of their freshman year, with follow-ups each spring thereafter. Students who completed surveys were also given the opportunity to provide a saliva sample. We had 68% of students complete surveys, and 97% of those students also participated in the DNA component of the project. The sample of participants closely maps onto the diverse university demographics: 40% male in Spit for Science compared to 41% overall VCU; racial/ethnic distribution of the Spit for Science sample with the breakdown for the university shown in parentheses: 15% (14%) Asian, 20% (19%) African American, 7% (8%) Hispanic, 6% (5%) more than 1 race, and 50% (48%) White.

Rates of substance use in the Spit for Science sample are comparable to other national surveys. There is considerable use of alcohol and marijuana: 75.3% of incoming freshmen have tried alcohol on at least one occasion (and virtually all of those individuals report drinking on 5+ occasions), and 45% of freshmen report cannabis use. This proportion rises steadily across the college years, such that by senior year 94% of students report alcohol use and 59% report cannabis use. Further, a latent class analysis of substance use patterns across time found that patterns of polysubstance use were the norm and were highly stable (Cho ref).

The first three cohorts have been genotyped on the Affymetrix Biobank array, with the fourth cohort currently slated for genotyping on the Smokescreen array. Initial GWAS of alcohol phenotypes yielded two genome-wide significant markers, in *GRID1* and *SAMD12*. Analyses are underway to identify genes involved in polysubstance use and key component processes related to substance use. We are focusing on dimensions of impulsivity as key domains of risk for substance use. Preliminary analyses indicate that this is a fruitful approach for gene identification. Better understanding of the underlying mechanisms and associated etiological pathways will advance our ability to develop personalized prevention and intervention.