Supplementary Online Content

Hicks BM, Foster KT, Iacono WG, McGue M. Genetic and environmental influences on the familial transmission of externalizing disorders in adoptive and twin offspring. *JAMA Psychiatry*. Published online August 21, 2013. doi:10.1001/jamapsychiatry.2013.258.

eAppendix. Methods
eReferences

This supplementary material has been provided by the authors to give readers additional information about their work.
Sample

Participants were members of the ongoing longitudinal Minnesota Twin and Family Study (MTFS) and Sibling Interaction and Behavior Study (SIBS). The design, goals, and sample of each study have been described in detail elsewhere1,2. Briefly, each study utilized a family design that included the mother, the father, and two siblings. MTFS families were recruited using public birth records the year the twins turned either 11 or 17 years old. Twins returned for follow-up assessments every 3-5 years with the two age cohorts overlapping at the target ages of 17, 20, 24, and 29. At the time of this report, all twins were old enough to have participated in either the age 24 or age 29 assessments. Zygosity was determined by the agreement of a standard zygosity questionnaire completed by mothers, MTFS staff evaluation of physical similarity, and comparison of ponderal and cephalic indices and fingerprint ridge counts. Zygosity has since been confined using the Illumina Human 660W-Quad Array that provides genome wide coverage of common single nucleotide polymorphisms.

Adoptive families from SIBS were recruited from the three largest, private adoption agencies in Minnesota, and control biological families were recruited using public birth records. The mean age of placement for the adoptive offspring was 4.7 months (SD = 3.4). The offspring participants of the SIBS were between 11 and 21 years old (mean = 14.9 years) at the intake assessment, were no more than 5 years apart in age, and have participated in two follow-up assessments at roughly 3.5 year intervals. Over 90% of the combined MTFS-SIBS sample reported European American ancestry, though a large number of the adoptive offspring reported Korean ancestry (n = 433). Retention rates for the follow-up assessments have been high for both the MTFS (mean 89%) and SIBS (mean 94%). In terms of the age distribution for the offspring sample, the mean age was 26.2 years (SD = 3.8, range 16.2 to 32.4), with only 2.5% of participants being < 18 years old while 84% were > 22 years old. As rates of antisocial behavior and substance use disorders peak in the late teens and early twenties, nearly all the offspring sample participated in an assessment during and/or shortly after these peak prevalence years.

Assessment

For illicit drug dependence, the assessment covered amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phencyclidine, and sedatives. The drug class a participant reported the most symptoms for was used for his or her number of drug dependence symptoms. Both abuse and dependence symptoms were included in the symptom counts for alcohol and drug dependence. Further, when calculating lifetime diagnostic rates for alcohol and drug dependence, both abuse and dependence symptoms contributed to a diagnosis. Therefore, a diagnosis of alcohol or drug dependence required 3 or more symptoms of abuse or dependence. A diagnosis of adult antisocial behavior required 4 or more symptoms of the adult criteria for antisocial personality disorder. Interviews were reviewed by at least two advanced clinical psychology graduate students prior to assigning symptoms, and diagnoses were assigned using a computer algorithm based on symptom endorsement. A reliability study of 600 representative cases of the MTFS and SIBS found uniformly high kappa reliabilities ranging from 0.81 for conduct disorder to 0.95 for adult antisocial behavior. All participants reported on lifetime symptoms at intake; offspring participants that returned for follow-up assessments reported on the period since the last assessment (typically 3-5 years). Only intake data was used for the parents, as most did not participate in a follow-up assessment. For offspring participants, lifetime symptoms for each disorder were calculated by taking the maximal symptom report across assessments.

eReferences