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**Heritability and GWAS analyses of punishment sensitivity
and cocaine avoidance in HS rats**

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We tested 1230 heterogeneous stock (HS) rats on a runway operant cocaine-seeking task that is particularly sensitive to cocaine's aversive effects. These rats were also tested on four other measures of motivated behavior: progressive ratio, progressive punishment, delayed punishment, and locomotion in a novel chamber. SNP heritabilities (calculated using autosomes only) range from 0.0 to 0.31, with the highest heritabilities occurring for punishment and locomotor tasks. For most tasks, heritabilities calculated using pedigree and SNPs were in good concordance, and did not show obvious sex differences. However, for runway measures, pedigree-calculated heritabilities were in the 0.1-0.3 range for female rats, but much lower for males, while SNP heritabilities were near zero for both sexes. GWAS analyses show several significant loci for the punishment, delayed punishment, and locomotor tasks. DNA samples from several hundred rats are currently queued for sequencing, and analyses will be updated when those results are available.