

NAME OF PRESENTING AUTHOR: Daniel Bustamante

EMAIL ADDRESS OF PRESENTING AUTHOR: bustamanted@vcu.edu

## Variance decomposition and genetic correlations of brain volumes in children

Daniel Bustamante<sup>1,2</sup>, Ananda B. Amstadter<sup>1,3</sup>, Michael C. Neale<sup>1,3</sup>

<sup>1</sup>Virginia Institute for Psychiatric and Behavioral Genetics

<sup>2</sup>Integrative Life Sciences Doctoral Program, Virginia Commonwealth University, Richmond, VA. U.S.A.

<sup>3</sup>Department of Psychiatry, School of Medicine, Virginia Commonwealth University, Richmond, VA. U.S.A.

KEYWORDS: brain, volume, genetic, MRI, SEM

### ABSTRACT:

Small volumes in certain brain regions of interest (ROIs) have been linked to psychiatric disorders. However, most such work to date have studied adults. Using structural magnetic resonance imaging twin data from the ABCD study (N=1,722; M<sub>age</sub>=10.12) and structural equation modeling, we extend this work to children to estimate the genetic and environmental factors influencing the brain volumes of 41 subcortical and 256 cortical ROIs and their genetic correlations. Subcortical ROIs shared-environmental components did not differ significantly from zero and most were below this point. Additive genetic factors explained 43.98%-93.60% (M=70.21%; SD=15.90%) of the variability in the volumes of all subcortical ROIs, except in the inferior lateral ventricles (LH=35.71%, RH=32.26%). Unique environmental factors accounted for 6.40%-.56.01% (M=29.79%; SD=15.89%) of the variance in all subcortical regions aside from the same ROIs (LH=64.29%, RH=67.74%). Subcortical genetic correlations were consistently moderate to high between contiguous (e.g., pallidum-putamen=.48:.58), and similar structures (e.g., corpus callosum subregions=.38:.88). The caudate nuclei and the lateral ventricles were moderately genetically correlated (.37:.41). These ROIs are contiguous, located medially in the brain, and reveal low to no genetic correlation with the hippocampi (-.25:.03) and the amygdalae (-.09:.18). Conclusions: Additive genetic factors influenced most of the variability in the volumes of 35 of the 41 subcortical ROIs in children. The absent, low, or negative correlations among medial and distal subcortical ROIs may represent competition between certain adjacent regions, or shared genetic factors influencing their volume in opposite directions. Analyses of cortical ROIs are in progress and we will report the results.

GRANT SUPPORT: Bustamante: MH020030-21A1 NIMH, Amstadter: K02 AA023239 NIAAA, Neale: U01 DA051037-01 and R01 DA049867-01A1 NIDA