



Master project 2021-2022

Personal Information

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Group	Psychiatry, Mental Health and Addiction

Project

Computational genomics

Project Title:

Polygenic and transcriptomic risk score analyses in a sample of school children: assessing the effect of the genetic background of neurodevelopmental disorders on school performance

Keywords:

polygenic risk score, GWAS, TWAS, ADHD

Summary:

Access to education is a predictor for a wide range of later life outcomes such as employment, income, and health. While it is well established that school performance is an indicator of future social success, there is a need for understanding why some children have difficulty learning. About 30-50% of children have poor school performance, which impacts on individual, family, education and social spheres, and predicts worse life outcomes, including health compromising behaviors and physical, mental, and emotional problems. In this project we will aim to explore to which extent the genetic background associated with neurodevelopmental disorders, such as attention deficit/hyperactivity disorder (ADHD), impacts on school performance outcomes in 3500 children from primary and secondary schools with genotype data available. We will use publicly available summary statistics from genome-wide and transcriptome-wide association studies of neurodevelopmental disorders to generate risk scores in our sample of children and assess their effect on school performance (1,2). We will build these risk scores in two different ways: using genotype data and gene expression data. First of all, we will impute genotypes in our sample against a reference panel to increase the number of genetic variants available, and we will also impute gene expression data, using reference panels linking genotypes with gene expression in relevant tissues. Then, we will build the risk scores and test their effect on school performance in our sample. This strategy may lead us to identify vulnerable groups of individuals with higher risk for poor school performance, and could inform preventive strategies for school failure and to promote population-wide positive development.

References:

1. Demontis, D., Walters, R.K., Martin, J. et al. Discovery of the first genome-wide significant risk loci for attention deficit/hyperactivity disorder. *Nat Genet* 51, 63–75 (2019). <https://doi.org/10.1038/s41588-018-0269-7> 2. Pujol-Gualdo N, Sánchez-Mora C, Ramos-Quiroga JA, Ribasés M, Soler Artigas M. Integrating genomics and transcriptomics: Towards deciphering ADHD. *Eur Neuropsychopharmacol*. 2021 Mar;44:1-13. doi: 10.1016/j.euroneuro.2021.01.002. Epub 2021 Jan 23. PMID: 33495110.

Expected skills::

R programming, flexibility to work with different softwares

Possibility of funding::

No

Possible continuity with PhD: :

To be discussed

Comments:

Any queries please contact maria.soler@vhir.org
