

AD and PD risk genes

We defined GWAS-derived AD risk genes based on Jansen et al.¹, where they defined AD potential causal genes with four gene-mapping strategies (nearest, eQTL, chromatin interaction, and genome-wide gene-based association analysis). We extracted gene symbols from the supplementary Table S13 and S18 of Jansen et al.¹ and defined the 217 unique genes as GWAS-derived AD risk genes.

Similarly, we defined GWAS-derived PD risk genes based on Nalls et al.², where they defined PD potential causal genes based on nearest position and QTL. We extracted gene symbols from their Table S2 and defined the 109 unique genes as GWAS-derived PD risk genes.

1. Jansen, I. E. *et al.* Genome-wide meta-analysis identifies new loci and functional pathways influencing Alzheimer's disease risk. *Nature Genetics* **51**, 404–413 (2019).
2. Nalls, M. A. *et al.* Identification of novel risk loci, causal insights, and heritable risk for Parkinson's disease: a meta-analysis of genome-wide association studies. *The Lancet. Neurology* **18**, 1091–1102 (2019).