

## Description of Additional Supplementary Files

File Name: Supplementary Data 1

Description: ID of brain and retinal imaging traits used in phenotypic association analysis.

File Name: Supplementary Data 2

Description: Significant eye-brain phenotypic associations between retinal imaging traits and brain MRI traits.

File Name: Supplementary Data 3

Description: SNP-based heritability of 156 retinal imaging traits.

File Name: Supplementary Data 4

Description: Independent ( $LD < 0.1$ ) significant associations for retinal imaging traits.

File Name: Supplementary Data 5

Description: Validating significant retinal imaging associations in independent validation GWAS datasets.

File Name: Supplementary Data 6

Description: Performance of polygenic risk scores of the 156 retinal imaging traits.

File Name: Supplementary Data 7

Description: Genetic overlaps of eye-brain connections.

File Name: Supplementary Data 8

Description: Summary of the shared genetic effects between retinal imaging traits and brain phenotypes.

File Name: Supplementary Data 9

Description: Genetic correlations between retinal imaging traits and brain-related complex traits and diseases analyzed in previous studies.

File Name: Supplementary Data 10

Description: LDSC partitioned heritability enrichment analysis.

File Name: Supplementary Data 11

Description: Mendelian randomization analysis between retinal imaging traits and brain diseases.

File Name: Supplementary Data 12

Description: Predicting complex traits and diseases using retinal imaging traits.