

Description of Additional Supplementary Files

File name: Supplementary Data 1

Description: Descriptive characteristics of UKB subjects used in this study.

File name: Supplementary Data 2

Description: Loadings and variance explained of SHS-PCs.

File name: Supplementary Data 3

Description: Phenotypic Pearson correlation and heritability of underlying self-reported sleep traits.

File name: Supplementary Data 4

Description: Additional loci associated with SHS traits that have not been reported in previous individual sleep trait GWAS ($8e-9 \leq p < 5e-8$).

File name: Supplementary Data 5

Description: Loci associated with SHS traits with a lead variant within 500kb from previously published GWS sleep variants.

File name: Supplementary Data 6

Description: Variant annotation for lead SNPs at 28 significant novel loci (Table 1) using HaploReg, CADD, and RegulomeDB.

File name: Supplementary Data 7

Description: Variant annotation for lead SNPs at 31 additional novel loci (SData 3) using HaploReg, CADD, and RegulomeDB.

File name: Supplementary Data 8

Description: Significant colocalized loci across SHS traits using HyprColoc.

File name: Supplementary Data 9

Description: Associations between all SHS loci (novel and previously reported; $p < 5e-8$) with self-reported and accelerometry derived sleep traits.

File name: Supplementary Data 10

Description: Associations between SHS GRS (Genetic Risk Scores based on GWS loci in ST9) with self-reported and accelerometry derived sleep traits.

File name: Supplementary Data 11

Description: Associations between previously reported sleep loci and SHS traits.

File name: Supplementary Data 12

Description: Associations between previous sleep GRS (Genetic Risk Scores based on GWS loci in ST11) and SHS traits.

File name: Supplementary Data 13

Description: Sensitivity analyses of significant and additional novel loci (in Table 1 and Stable 4) in UKB unrelated individuals.

File name: Supplementary Data 14

Description: Sample characteristics in HCHS/SOL and the Sueño Ancillary Study.

File name: Supplementary Data 15

Description: Marginal associations of 12 SHS loci in HCHS/SOL.

File name: Supplementary Data 16

Description: Genes implicated by positional, eQTL, or chromatin interaction mapping of 28 significant novel loci (Table 1) identified by FUMA.

File name: Supplementary Data 17

Description: Genes implicated by positional, eQTL, or chromatin interaction mapping of 31 additional novel loci (SData 3) identified by FUMA.

File name: Supplementary Data 18

Description: Genes implicated by positional, eQTL, or chromatin interaction mapping of previously reported sleep loci (SData 4) identified by FUMA.

File name: Supplementary Data 19

Description: Significant genes associated with SHS traits using MAGMA gene based test ($p < 2.64 \times 10^{-6}$).

File name: Supplementary Data 20

Description: Pathway enrichment analysis of mapped genes using PASCAL.

File name: Supplementary Data 21

Description: Tissue enrichment analysis of positional, eQTL, or chromatin interaction mapped genes using FUMA MAGMA.

File name: Supplementary Data 22

Description: GWAS Catalog enrichment analysis of positional, eQTL, or chromatin interaction mapped genes using FUMA MAGMA.

File name: Supplementary Data 23

Description: Pathway enrichment analysis of positional, eQTL, or chromatin interaction mapped genes using FUMA MAGMA.

File name: Supplementary Data 24

Description: Genetic correlations between sleep scores and representative panUKBB phenome-wide traits.

File name: Supplementary Data 25

Description: Mendelian Randomization Analysis: Sleep score exposures and representative phenome-wide trait outcome

File name: Supplementary Data 26

Description: Reverse Mendelian Randomization Analysis: Representative phenome-wide trait exposures and Sleep score outcomes

File name: Supplementary Data 27

Description: MaxH phenotypes: loadings, predicted heritability, and correlations with sleep phenotypes and other SHS