Supplementary Data 1 | Phenotypes mapped from original image annotation and compendium of physical activities codes.

Supplementary Data 2 | Other suggestive ($5x10^{-8}$) loci associated with accelerometer-measured physical activity and sleep duration traits in 91,105 UK Biobank participants. *Beta and SE are in standard deviation units.*

Supplementary Data 3 | Results in this UK Biobank accelerometer cohort for genetic variants previously reported to be associated with traits related to physical activity and sleep duration in UK Biobank and other datasets. *Significant associations (p<2.3x10-4, accounting for 213 candidate loci) are highlighted in green. Beta and SE are in standard deviation units.*

Supplementary Data 4 | Significant genes associated with accelerometer-measured physical activity and sleep duration traits in 91,105 UK Biobank participants. *This is based on gene-based analysis by MAGMA integrated in FUMA where input SNPs were mapped by position to 18,232 protein-coding genes. Significant associations (p<5.48x10-7, accounting for 18,232-genes and 5 traits) did not find additional loci to those already identified in the SNP association analysis.*

Supplementary Data 5 | Significant genetic correlations for accelerometer-measured physical activity and sleep duration in 91,105 UK Biobank participants with other traits and diseases using LD score regression on the LD-Hub web resource.

Supplementary Data 6 | PheWAS results at P<1.25e-6 for genome-wide significant accelerometer measured physical activity and sleep duration loci in 91,105 UK Biobank participants.

Supplementary Data 7 | Reported associations of objectively measured physical activity and sleep duration SNPs identified in 91,105 UK Biobank participants with traits in the NHGRI GWAS catalog.

Supplementary Data 8 | Mendelian Randomization analysis of accelerometer-measured physical activity and sleep duration, and their association with disease outcomes. *This includes data from UK Biobank participants who were not in the accelerometer discovery dataset and other GWAS datasets available on MR-Base. SE and beta are in exposure SD units.*

Supplementary Data 9 | Meta analysis of Mendelian Randomization results for adiposity traits using GIANT and UK Biobank participants not in accelerometer discovery dataset. *SE and beta are in exposure SD units.*

Supplementary Data 10 | Effect of instrument variable selection by GWAS discovery threshold on Mendelian Randomization analysis outcomes. B*eta and SE are in exposure SD units.*

Supplementary Data 11 | Directionality, horizontal pleiotropy, and confounding sensitivity analyses for Mendelian Randomization associations suggesting evidence of causality from Supplementary Data 8, 9, and 10.

Supplementary Data 12 | Mendelian randomization bi-directional (and associated sensitivity) tests for traits suggesting evidence of causality.