

## Description of Additional Supplementary Files

**File name:** Supplementary Data 1

**Description:** Descriptive statistics for samples in each data layer.

**File name:** Supplementary Data 2

**Description:** Telomere genetic associations - Li et al 2020 replication.

**File name:** Supplementary Data 3

**Description:** Telomere genetic associations - Novel GWAS ( $P < 1 \times 10^{-5}$ ).

**File name:** Supplementary Data 4

**Description:** Phenotype overview.

**File name:** Supplementary Data 5

**Description:** Phenotype vs Telomere length associations. Age, sex corrected.

**File name:** Supplementary Data 6

**Description:** Phenotype vs Telomere length associations. Age, sex, cell count corrected.

**File name:** Supplementary Data 7

**Description:** Methylation mediation effect to parental phenotypes associations with telomere length.

**File name:** Supplementary Data 8

**Description:** Single cell. Azimuth Cell type classification.

**File name:** Supplementary Data 9

**Description:** Single cell. DEA results using method 1.

**File name:** Supplementary Data 10

**Description:** Single cell. DEA results using method 2.

**File name:** Supplementary Data 11

**Description:** Single cell. Annotation of DEA genes.

**File name:** Supplementary Data 12

**Description:** Single cell. Functional enrichment.

**File name:** Supplementary Data 13

**Description:** Summary statistics Cox-regression.