S3 Text: Data resources

We list the datasets that we have used in the paper and their download sources. Table A and table B summarize how these datasets are used in different analyses in the paper. Intermediate results for screening of 5 risk factors on 25 diseases are available at [https://www.dropbox.com/sh/myh8xgxne8fo17v/AABWJf781VrCGnqNFMLtnqIea?dl=0](https://www.dropbox.com/sh/myh8xgxne8fo17v/AABWJf781VrCGnqNFMLtnqIea?dl=0).

| Analysis | Risk factor datasets | Disease dataset |
|----------|----------------------|-----------------|
|          | Selection | Estimation      |                  |
| **Validation1:** | | |
| BMI → BMI | BMI-ukb | BMI-giant17eu-F | BMI-giant17eu-M |
| T2D → T2D | T2D-ukb | T2D-diagram12-F | T2D-diagram12-M |
| Height → Height | Height-ukb | Height-giant13-F | Height-giant13-M |
| **Validation2:** | | |
| BMI → T2D | BMI-ukb | BMI-giant17eu | T2D-diagram12-Im |
| LDL-C → CAD | LDL-gera18 | LDL-glgc13 | CAD-Nelson17 |
| Height → Smoking | Height-giant14 | Height-ukb | Smoking-ukb19 |
| SBP → Stroke | SBP-gera17 | SBP-ukb | AS-Malik18eu |
| **Validation3:** | | |
| BMI → T2D | BMI-ukb | BMI-giant17eu-F/M | T2D-diagram-F/M |
| T2D → BMI | T2D-ukb | T2D-diagram12-F/M | BMI-giant17eu-F/M |
| LDL-C → CAD | LDL-gera18 | LDL-glgc13 | CAD-Nelson17 |
| CAD → LDL-C | CAD-c4d11 | CAD-CARDIoGRAM11 | LDL-glgc13 |
| **Validation4:** | | |
| CRP → CAD | CRP-Prins17 | CRP-Dehghan11 | CAD-Nelson17 |
| CRP + LDL-C → CAD | (CRP-Prins17, LDL-gera18) | (CRP-Dehghan11, LDL-glgc13) | CAD-Nelson17 |

**Screening risk factors:**

| Risk factor datasets | |
|----------------------|---|
| LDL-C | LDL-gera18 |
| HDL-C | HDL-gera18 |
| TG-C | TG-gera18 |
| BMI | BMI-JapB |
| SBP | SBP-gera17 |

**Simulation:**

| Risk factor datasets | |
|----------------------|---|
| BMI → SBP | BMI-giant17eu |
| | BMI-ukb |

Table A: Names of the datasets used in validation analyses and screening risk factors

- BMI-ukb: downloaded from UK Biobank Neale’s lab [12] with phenotype code 21001.
| Screening Disease                  | dataset               | Screening Disease                | dataset               |
|-----------------------------------|-----------------------|----------------------------------|-----------------------|
| CAD                               | CAD-Nelson17          | Insomnia                         | Insomnia-ukb19        |
| Type 2 diabetes                   | T2D-diagram12-Im     | Intelligence                     | IQ-Savage18           |
| Stroke                            | AS-Malik18eu          | Neuroticism                      | Neuro-Hill19          |
| Chronic kidney disease            | CKD-Wuttke19          | Male pattern baldness            | MBP-ukb19             |
| eGFR                              | eGFR-Wuttke19         | IBD                              | IBD-Liu15             |
| MDD                               | MDD-PGC18             | Crohn’s disease                  | CR-Liu15              |
| Depressed affect                  | Dep-Nagel18           | Ulcerative colitis               | UC-Liu15              |
| ADHD                              | ADHD-pgc19            | Breast cancer ER+                | Breast-Micha7erp       |
| Bipolar Disorder                  | BIP-pgc19             | Breast cancer ER-                | Breast-Micha17ern      |
| Autism                            | Autism-pgc17          | Ovarian cancer                   | Ovarian-Phelan17ni    |
| Schizophrenia                     | SCZ-pgc13             | (non-invasive)                    | Ovarian-Phelan17si    |
| Obsessive compulsive disorder     | OCD-pgc18             | Ovarian cancer (serous invasive) |                      |
| Alzheimer                          | Alzhe-Marioni18       | Prostate cancer                  | Prostate-ellipse18     |

Table B: Names of the datasets used for the 25 diseases in the screening application

- BMI-giant17eu-F, BMI-giant17eu-M, BMI-giant17eu: downloaded from GIANT consortium website [2], 2017 adjusted for smoking data.
- BMI-JapB: data originally from [4] and downloaded from GWAS Catalog [3] with study accession number GCST004904.
- T2D-diagram12-F, T2D-diagram12-M, T2D-diagram12-Im: data originally from [19] and downloaded from https://diagram-consortium.org/downloads.html.
- T2D-ukb: downloaded from UK Biobank Neale’s lab [12] with phenotype code 20002-1223.
- Height-giant13-F, Height-giant13-M: data originally from [24] and downloaded from GIANT consortium website [2].
- Height-giant14: data originally from [31] and downloaded from GIANT consortium website [2].
- Height-ukb: downloaded from UK Biobank Neale’s lab [12] with phenotype code 50.
- LDL-glgc13, HDL-glgc13, TG-glgc13: data originally from [30] and downloaded from http://csg.sph.umich.edu/willer/public/lipids2013/ (Joint analysis of metoboship and GWAS data).
- LDL-gera18, HDL-gera18, TG-gera18: data originally from [11] and downloaded from GWAS Catalog with study accession numbers GCST007141, GCST007140 and GCST007142.
- SBP-gera17: data originally from [10] and downloaded from GWAS Catalog with study accession number GCST007095.
- SBP-ukb: downloaded from UK Biobank Neale’s lab [12] with phenotype code 4080.
- CAD-Nelson17: data originally from [21] and downloaded from GWAS Catalog with study accession number GCST004787.
- CAD-c4d11: data originally from [6] and downloaded from http://www.cardiogramplusc4d.org/data-downloads/
- CAD-CARDIoGRAM11: data originally from [28] and downloaded from http://www.cardiogramplusc4d.org/data-downloads/
- CRP-Prins17: data originally from [23] and downloaded from GWAS Catalog with study accession number GCST005067.
- CRP-Dehghan11: Data from [7] and requested from original authors.
- AS-Malik18EU: data originally from [16] and downloaded from GWAS Catalog with study accession number GCST006906.
- Smoking-ukb19: data originally from [14] and downloaded from GWAS Catalog with study accession number GCST007327.
- CKD-Wuttke19, eGFR-Wuttke19: data originally from [33] and downloaded from GWAS Catalog with study accession numbers GCST008065 and GCST008059.
- Dep-Nagel18: data originally from [20] and downloaded from GWAS Catalog with study accession number GCST006475.
- ADHD-pgc19: data originally from [8] and downloaded from the PGC website https://www.med.unc.edu/pgc/download-results/.
- MDD-pgc18: data originally from [32] and downloaded from the PGC website https://www.med.unc.edu/pgc/download-results/.
- BIP-pgc19: data originally from [29] and downloaded from the PGC website https://www.med.unc.edu/pgc/download-results/.
- Autism-pgc17: data originally from [1] and downloaded from the PGC website https://www.med.unc.edu/pgc/download-results/.
- SCZ-pgc13: data originally from [25] and downloaded from the PGC website https://www.med.unc.edu/pgc/download-results/.
- OCD-pgc18: data originally from [5] and downloaded from the PGC website https://www.med.unc.edu/pgc/download-results/.
- Alzhe-Marioni18: data originally from [17] and downloaded from GWAS Catalog with study accession number GCST005922.
- Neuro-Hill19: data originally from [9] and downloaded from GWAS Catalog with study accession number GCST007710.
• IQ-Savage18: data originally from [26] and downloaded from GWAS Catalog with study accession number GCST006250.

• Insomnia-ukb19: data originally from [13] and downloaded from GWAS Catalog with study accession number GCST007387.

• MBP-ukb19: data originally from [34] and downloaded from GWAS Catalog with study accession number GCST007020.

• IBD-Liu15, UC-Liu15, CR-Liu15: data originally from [15] and downloaded from GWAS Catalog with study accession numbers GCST003043, GCST003045 and GCST003044.

• Breast-Micha17erp, Breast-Micha17ern: data originally from [18] and downloaded from GWAS Catalog with study accession number GCST004988.

• Ovarian-Phelan17ni, Ovarian-Phelan17si: data originally from [22] and downloaded from GWAS Catalog with study accession numbers GCST004462 and GCST004478.

• Prostate-ellipse18: data originally from [27] and downloaded from GWAS Catalog with study accession number GCST006085

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