**Supplementary Information**

**Supplementary Table 1.** Input variables for the Features II, PRS + Features II, Features III, and PRS + Features III models. Abbreviations: body mass index (BMI), C-reactive protein (CRP), glycated hemoglobin (HbA1c), insulin-like growth factor 1 (IGF-1) and polygenic risk score (PRS).

|  | **Machine Learning Model** |
| --- | --- |
| **Input Variables** | *1) Features II* | *2) PRS + Features II* | *3) Features III* | *4) PRS + Features III* |
| **Genetic** |  | PRS |  | PRS |
| **Demographics** | Age | Age | Age | Age |
| Father’s history | Father’s history | Father’s history | Father’s history |
| Sibling history | Sibling history | Sibling history | Sibling history |
| Ethnicity  | Ethnicity  | Ethnicity  | Ethnicity  |
| **Clinical Measurements** | BMI | BMI | BMI | BMI |
| **Laboratory values** | HbA1c | HbA1c | HbA1c | HbA1c |
| CRP | CRP | CRP | CRP |
| IGF-1 | IGF-1 | IGF-1 | IGF-1 |
| **Medical History** | Smoking status  | Smoking status  | Smoking status  | Smoking status  |
|  |  | Number of same sex partners | Number of same sex partners |
|  |  | Diabetes diagnosis | Diabetes diagnosis |
|  |  | Diabetes medication  | Diabetes medication  |

**Supplementary Table 2.** Performance metrics of the Features II, PRS + Features II, Features III, and PRS + Features III models. Abbreviations: Area under the receiver operating characteristic (AUROC); diagnostic odds ratio (DOR); likelihood ratio positive (LR+), likelihood ratio negative (LR-), polygenic risk score (PRS).

|  | *Features II only* | *PRS + Features II* | *Features III only* | *PRS + Features III* |
| --- | --- | --- | --- | --- |
| **AUROC**  | 0.742(0.708, 0.774) | 0.788 (0.758, 0.819) | 0.742(0.708, 0.774) | 0.788 (0.758, 0.819) |
| **Sensitivity** | 0.800(0.736, 0.864) | 0.800(0.736, 0.864) | 0.800(0.736, 0.864) | 0.800(0.736, 0.864) |
| **Specificity** | 0.560 (0.553, 0.567) | 0.629 (0.622, 0.636) | 0.560 (0.553, 0.567) | 0.629 (0.622, 0.636) |
| **DOR** | 5.095 (4.694, 5.496) | 6.783 (6.382, 7.184) | 5.095 (4.694, 5.496) | 6.783 (6.382, 7.184) |
| **LR+** | 1.819(1.676, 1.974) | 2.157(1.986, 2.341) | 1.819(1.676, 1.974) | 2.157(1.986, 2.341) |
| **LR-** | 0.357(0.259, 0.492) | 0.318(0.231, 0.438) | 0.357(0.259, 0.492) | 0.318(0.231, 0.438) |

**Supplementary Figure 1.** SHapely Additive ExPlanations plots of the (**A**) Features I, (**B**) PRSs + Features I, (**C**) Features II, (**D**) PRS + Features II model, and (**E**) Minimal Features models.

**A**

****

**B**

****

**C**

****

**D**

****

**E**

****