**Additional Document**

**Supplementary Table 1.**  **Results of Mendelian randomization heterogeneity test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Outcome** | **Exposure** | **Method** | **Q** | **Q\_df** | ***Q\_pval*** |
| finn\_Scoliosis | ukb\_Strabismus | MR Egger | 37.40 | 42 | *0.673* |
| finn\_Scoliosis | ukb\_Strabismus | Inverse variance weighted | 40.64 | 43 | *0.574* |
| finn\_Scoliosis | finn\_Strabismus | MR Egger | 11.20 | 13 | *0.594* |
| finn\_Scoliosis | finn\_Strabismus | Inverse variance weighted | 11.86 | 14 | *0.617* |

**A**  **B**

**Supplementary Figure 1****. Funnel plot of heterogeneity test results was analyzed by MR Method.**

( (A) Funnel plot of finn\_Scoliosis and ukb\_Strabismus; (B) Funnel plot of finn\_Scoliosis and finn\_Strabismus.)

**Supplementary Table 2** **Directional horizontal pleiotropy test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Exposure** | **Egger\_intercept** | **SE** | **P** |
| ukb\_Strabismus | -0.054 | 0.030 | *0.079* |
| finn\_Strabismus | 0.034 | 0.042 | *0.430* |

**A B**



**Supplementary Figure 2.**  **Sensitivity analysis results of "Leave-one-out"**

((A) Sensitivity analysis results of finn\_Scoliosis and ukb\_Strabismus (B) Sensitivity analysis results of finn\_Scoliosis and finn\_Strabismus.)

**Supplementary Table 3. Results of Mendelian random heterogeneity test for strabismus subsets**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **outcome** | **exposure** | **method** | **Q** | **Q\_df** | ***Q\_pval*** |
| finn\_Scoliosis | Ccs | MR Egger | 20.09 | 23.00 | *0.636* |
| finn\_Scoliosis | Ccs | Inverse variance weighted | 20.76 | 24.00 | *0.653* |
| finn\_Scoliosis | Dcs | MR Egger | 24.61  | 20 | *0.217*  |
| finn\_Scoliosis | Dcs | Inverse variance weighted | 24.61  | 21 | *0.264*  |
| finn\_Scoliosis | Os | MR Egger | 13.33  | 17 | *0.714*  |
| finn\_Scoliosis | Os | Inverse variance weighted | 13.42  | 18 | *0.766*  |
| finn\_Scoliosis | Osus | MR Egger | 15.43  | 9 | *0.080*  |
| finn\_Scoliosis | Osus | Inverse variance weighted | 17.07  | 10 | *0.073*  |

*Note: Convergent concomitant strabismus (Ccs); Divergent concomitant strabismus (Dcs); Other specified and unspecified strabismus (Osus); Other strabismus(Os).*

**A B**

****

**C D**



**Supplementary Figure 3. Funnel plot of heterogeneity test results was analyzed by MR Method.**

((A) Funnel plot of finn\_Scoliosis and Ccs; (B) Funnel plot of finn\_Scoliosis and Dcs; (C) Funnel plot of finn\_Scoliosis and Os; (D) Funnel plot of finn\_Scoliosis and Osus.)

**Supplementary Table 4. Directional horizontal pleiotropy test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Exposure** | **Egger\_intercept** | **SE** | ***P*** |
| Ccs | 0.020 | 0.025 | *0.425* |
| Dcs | 0.001 | 0.035 | *0.973* |
| Os | -0.010 | 0.031 | *0.764* |
| Osus | -0.065 | 0.067 | *0.354* |

**A B**



**C D**

**Supplementary Figure 4. Results of "Leave-one-out" sensitivity analysis of strabismus subtype**

((A) Sensitivity analysis results of finn\_Scoliosis and Ccs (B) Sensitivity analysis results of finn\_Scoliosis and Dcs. (C) Sensitivity analysis results of finn\_Scoliosis and Os (D) Sensitivity analysis results of finn\_Scoliosis and Osus.)

**Supplementary Table 5. Results of Mendelian randomization heterogeneity test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Outcome** | **exposure** | **method** | **Q** | **Q\_df** | ***Q\_pval*** |
| ukb\_Strabismus | finn\_Scoliosis | MR Egger | 13.48  | 12 | *0.335*  |
| ukb\_Strabismus | finn\_Scoliosis | Inverse variance weighted | 13.83  | 13 | *0.386*  |
| finn\_Strabismus | finn\_Scoliosis | MR Egger | 20.84  | 20 | *0.407*  |
| finn\_Strabismus | finn\_Scoliosis s | Inverse variance weighted | 20.85  | 21 | *0.468*  |

 **A B**



**Supplementary Figure 5. Funnel plot of heterogeneity test results was analyzed by MR Method.**

( (A) Funnel plot of finn\_Scoliosis and ukb\_Strabismus；(B) Funnel plot of finn\_Scoliosis and finn\_Strabismus.)

**Supplementary Table 6.** **Directional horizontal pleiotropy test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Exposure** | **outcome** | **Egger\_intercept** | **SE** | ***P*** |
| finn\_Scoliosis | ukb\_Strabismus | 0.002 | 0.015 | *0.917* |
| finn\_Scoliosis | finn\_Strabismus | 0.034 | 0.042 | *0.430* |

**A B**



**Supplementary Figure 6.** **Sensitivity analysis results of ‘Leave-one-out’**

( (A) Sensitivity analysis results of finn\_Scoliosis and ukb\_Strabismus (B) Sensitivity analysis results of finn\_Scoliosis and finn\_Strabismus.)

**Supplementary Table 7. Results of Mendelian random heterogeneity test for strabismus subsets**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **exposure** | **outcome** | **method** | **Q** | **Q\_df** | ***Q\_pval*** |
| finn\_Scoliosis | Ccs | MR Egger | 18.52  | 20.00  | *0.553*  |
| finn\_Scoliosis | Ccs | Inverse variance weighted | 18.69  | 21.00  | *0.605*  |
| finn\_Scoliosis | Dcs | MR Egger | 18.04  | 20.00  | *0.585*  |
| finn\_Scoliosis | Dcs | Inverse variance weighted | 18.10  | 21.00  | *0.643*  |

**A B**



**Supplementary Figure7. Funnel plot of heterogeneity test results was analyzed by MR Method.**

((A) Funnel plot of finn\_Scoliosis and Ccs；(B) Funnel plot of finn\_Scoliosis and Dcs. )

**Supplementary Table 8.** Directional horizontal pleiotropy test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **exposure** | **outcome** | **Egger\_intercept** | **SE** | ***P*** |
| finn\_Scoliosis | Ccs | 0.006 | 0.03  | *0.818*  |
| finn\_Scoliosis | Dcs | -0.013  | 0.03  | *0.682*  |

**A B**



**Supplementary Figure 8.** **Results of "Leave-one-out" sensitivity analysis of strabismus subtype**

**(**(A) Sensitivity analysis results of finn\_Scoliosis and Ccs (B) Sensitivity analysis results of finn\_Scoliosis and Dcs.)