

Supplementary Table 1 MR heterogeneity test of the effect of education on candidate mediators and GDM

Phenotype	Method	Q statistic	Q df	Q <i>P</i> -value
Outcome				
GDM	IVW	420.95	293	1.34E-06
	MR Egger	420.89	292	1.12E-06
Mediator				
WHR	IVW	166.44	144	0.10
	MR Egger	165.29	143	0.10
BMI	IVW	294.46	105	7.05E-20
	MR Egger	294.42	104	4.21E-20
HDL-C	IVW	493.29	244	5.08E-19
	MR Egger	492.68	243	4.15E-19
Apolipoprotein A-1	IVW	545.41	265	1.43E-21
	MR Egger	541.64	264	2.64E-21

Supplementary Table 2 MR directional pleiotropy test of the effect of education on candidate mediators and GDM

Phenotype	Egger intercept	SE	<i>P</i> -value
Outcome			
GDM	9.34E-04	4.39E-03	0.83
Mediator			
WHR	1.80E-03	1.81E-03	0.32
BMI	1.89E-04	1.64E-03	0.91
HDL-C	4.49E-04	8.23E-04	0.59
Apolipoprotein A-1	1.05E-03	7.72E-04	0.18

Supplementary Table 3 Reverse MR estimating the association of each mediator with education

Mediator	Method	MR results		Heterogeneity test			Directional pleiotropy test		
		Beta	P-value	Q statistics	Q df	Q P-value	Egger intercept	SE	P-value
WHR	IVW	-0.02	0.61	34.21	13	1.12E-03			
	MR Egger	0.25	0.16	28.08	12	5.38E-03	-6.72E-03	4.15E-03	0.13
	Weighted Median	0.01	0.66						
	MR-PRESSO	0.03	0.61						
BMI	IVW	-0.12	9.02E-34	1131.83	420	1.12E-66			
	MR Egger	-0.05	0.11	1113.86	419	1.95E-64	-1.19E-03	4.58E-04	0.01
	Weighted Median	-0.10	2.45E-16						
	MR-PRESSO	-0.12	3.59E-29						
HDL-C	IVW	0.02	4.47E-03	679.99	278	1.18E-35			
	MR Egger	-4.98E-03	0.63	657.55	277	5.65E-33	9.35E-04	3.04E-04	2.32E-03
	Weighted Median	2.32E-03	0.78						
	MR-PRESSO	0.02	4.80E-03						
Apolipoprotein A-1	IVW	0.01	0.04	538.16	233	3.43E-26			
	MR Egger	4.82E-04	0.97	532.37	232	1.18E-25	5.33E-04	3.35E-04	0.11
	Weighted Median	1.02E-03	0.91						
	MR-PRESSO	0.01	0.04						

Supplementary Table 4 MR heterogeneity and directional pleiotropy test of the effect of each mediator on GDM with adjustment for education

Mediator	Method	MVMR Heterogeneity test		MVMR directional pleiotropy test		
		Q statistic	P-value	Egger intercept	SE	P-value
WHR	MV-IVW	252.49	5.61E-07			
	MVMR Egger	252.47	4.31E-07	-5.50E-04	4.90E-03	0.91
BMI	MV-IVW	846.86	2.44E-31			
	MVMR Egger	844.18	3.38E-31	1.06E-03	1.69E-03	0.53
HDL-C	MV-IVW	536.36	1.72E-07			
	MVMR Egger	535.75	1.58E-07	1.10E-03	1.69E-03	0.52
Apolipoprotein A-1	MV-IVW	543.73	5.20E-10			
	MVMR Egger	543.44	4.40E-10	7.74E-04	1.80E-03	0.67