



Figure S1. Directed acyclic graph to show the association between maternal pre-pregnancy BMI and children's cognitive development

**Table S1 Baseline characteristics of mother-child pairs included and excluded (*n* = 3273)**

Characteristics	Participants included in the analysis( <i>n</i> = 1685)	Participants excluded from the analysis( <i>n</i> = 1588)	<i>P</i> values
<b>Demographic characteristics</b>			
Maternal educational level [ <i>n</i> (%)]			0.55
Junior high school or below	331(19.6)	329(20.7)	
Senior middle school	372(22.1)	363(22.9)	
Junior college or above	982(58.3)	896(56.4)	
Paternal educational level [ <i>n</i> (%)]			0.17
Junior high school or below	236(14.0)	248(15.6)	
Senior middle school	490(29.1)	421(26.5)	
Junior college or above	959(56.9)	919(57.9)	
Household monthly income per capita (yuan) [ <i>n</i> (%)]			0.003
≤2500	481(28.5)	386(24.3)	
2500~4000	678(40.2)	724(45.6)	
>4000	526(31.2)	478(30.1)	
<b>Maternal characteristics</b>			
Age (years) [Mean(SD)]	26.6(3.5)	26.6(3.8)	0.85
IQ [Mean(SD)]	96.3(10.7)	95.4(10.7)	0.02
Occupation [ <i>n</i> (%)]			0.15
No job	684(40.6)	682(42.9)	
Mental job	824(48.9)	767(48.3)	
Manual job	177(10.5)	139(8.8)	
Parity [ <i>n</i> (%)]			0.66
Nulliparous	1521(90.3)	1426(89.8)	
Multiparous	164(9.7)	162(10.2)	
Previous adverse pregnancy outcomes [ <i>n</i> (%)]			0.15
Didn't have	1007(59.8)	910(57.3)	
Had	678(40.2)	678(42.7)	
Pregnancy complications [ <i>n</i> (%)]			0.52
Didn't have	1399(83.0)	1305(82.2)	
Had	286(17.0)	283(17.8)	
Smoking during pregnancy [ <i>n</i> (%)]			0.48
No	1616(95.9)	1515(95.4)	
Yes	69(4.1)	73(4.6)	
Drinking during pregnancy [ <i>n</i> (%)]			0.01
No	1570(93.2)	1442(90.8)	
Yes	115(6.8)	146(9.2)	
<b>Children's characteristics</b>			
Gestational age <sup>a</sup> (week) [Mean(SD)]	39.1(1.4)	39.0(1.4)	0.004
Birth weight (g) <sup>a</sup> [Mean(SD)]	3373.7(435.0)	3356.6(460.3)	0.28
Children's sex <sup>a</sup> [ <i>n</i> (%)]			0.06
Boy	888(52.7)	782(49.2)	
Girl	797(47.3)	801(50.4)	
Exclusive breastfeeding for 6 months <sup>a</sup> [ <i>n</i> (%)]			0.07
No	1490(88.4)	1366(84.1)	
Yes	154(9.1)	171(10.8)	
Main caregivers before 3 years of age <sup>a</sup> [ <i>n</i> (%)]			0.02
Parents	854(50.7)	861(54.2)	
Grandparents	820(48.7)	705(44.4)	

<sup>a</sup> Missing data: 3 in gestational age, 8 in birth weight, 5 in children's sex, 122 in exclusive breastfeeding for 6 months, 33 in main caregivers before 3 years of age.

**Table S2 Sensitivity analyses of the association between different maternal pre-pregnancy BMI and dimensions of children's cognition under different GWG classifications [OR (95%CI)]**

GWG classifications		Inadequate GWG			Adequate GWG			Excessive GWG			
Pre-pregnancy BMI		<18.5	18.5–24.9	≥25	<18.5	18.5–24.9	≥25	<18.5	18.5–24.9	25–29.9	≥30
VCI	Model 3	0.81	Ref	1.40	0.80	Ref	2.16	1.76	Ref	1.16	4.05
		(0.07-9.89)		(0.12-16.80)	(0.30-2.14)		(0.58-8.04)	(0.93-3.31)		(0.55-2.44)	(1.60-10.26)
	Model 4	0.70	Ref	1.53	0.82	Ref	2.02	1.77	Ref	1.07	3.74
		(0.05-9.36)		(0.12-20.23)	(0.30-2.22)		(0.56-7.31)	(0.94-3.33)		(0.51-2.21)	(1.50-9.29)
	Model 5	0.55	Ref	1.60	0.81	Ref	2.17	1.79	Ref	1.06	3.85
		(0.04-6.80)		(0.12-20.75)	(0.30-2.16)		(0.61-7.73)	(0.95-3.38)		(0.51-2.20)	(1.55-9.54)
VSI	Model 6	0.81	Ref	2.08	0.82	Ref	2.14	1.69	Ref	1.20	4.21
		(0.05-12.51)		(0.15-28.23)	(0.31-2.21)		(0.57-7.99)	(0.88-3.27)		(0.58-2.48)	(1.68-10.56)
	Model 3	2.29	Ref	2.77	0.21	Ref	1.79	1.27	Ref	1.17	1.08
		(0.63-8.24)		(0.21-36.47)	(0.05-0.88)		(0.39-8.28)	(0.73-2.20)		(0.67-2.04)	(0.33-3.51)
	Model 4	2.39	Ref	2.34	0.21	Ref	1.46	1.24	Ref	1.21	1.12
		(0.63-9.02)		(0.19-29.23)	(0.05-0.89)		(0.33-6.42)	(0.71-2.16)		(0.70-2.07)	(0.34-3.63)
FRI	Model 5	2.15	Ref	2.05	0.22	Ref	1.60	1.26	Ref	1.17	1.10
		(0.59-7.83)		(0.16-27.19)	(0.05-0.92)		(0.36-7.07)	(0.73-2.18)		(0.68-2.01)	(0.34-3.56)
	Model 6	2.30	Ref	2.51	0.21	Ref	1.30	1.28	Ref	1.15	1.07
		(0.61-8.60)		(0.18-34.23)	(0.05-0.90)		(0.29-5.83)	(0.74-2.22)		(0.67-1.99)	(0.33-3.50)
	Model 3	-	Ref	1.29	0.90	Ref	0.97	1.33	Ref	0.97	0.38
		(0.12-13.67)		(0.43-1.92)	(0.21-4.45)		(0.68-2.60)	(0.46-2.07)		(0.05-2.86)	
WMI	Model 4	-	Ref	1.30	0.78	Ref	1.18	1.35	Ref	0.87	0.37
		(0.13-12.98)		(0.37-1.66)	(0.27-5.21)		(0.69-2.64)	(0.42-1.82)		(0.05-2.71)	
	Model 5	-	Ref	1.07	0.89	Ref	1.59	1.35	Ref	0.88	0.36
		(0.09-12.27)		(0.42-1.88)	(0.35-7.15)		(0.69-2.65)	(0.42-1.84)		(0.05-2.67)	
	Model 6	-	Ref	1.47	0.89	Ref	1.27	1.27	Ref	0.88	0.37
		(0.14-16.06)		(0.42-1.89)	(0.28-5.74)		(0.63-2.56)	(0.42-1.85)		(0.05-2.75)	
PSI	Model 3	1.69	Ref	1.30	0.82	Ref	0.55	1.62	Ref	1.72	1.20
		(0.27-10.46)		(0.12-14.81)	(0.39-1.74)		(0.07-4.22)	(0.91-2.87)		(0.94-3.17)	(0.29-5.02)
	Model 4	1.63	Ref	1.51	0.82	Ref	0.51	1.60	Ref	1.55	1.11
		(0.25-10.51)		(0.14-16.71)	(0.38-1.76)		(0.07-3.81)	(0.90-2.86)		(0.85-2.83)	(0.27-4.61)
	Model 5	1.89	Ref	1.50	0.83	Ref	0.52	1.59	Ref	1.53	1.09
		(0.30-11.84)		(0.14-16.43)	(0.39-1.76)		(0.07-3.84)	(0.89-2.83)		(0.84-2.78)	(0.26-4.56)
FSIQ	Model 6	2.23	Ref	1.71	0.89	Ref	0.53	1.63	Ref	1.44	1.03
		(0.31-15.88)		(0.15-19.24)	(0.42-1.89)		(0.07-4.02)	(0.92-2.90)		(0.79-2.62)	(0.25-4.30)
	Model 3	1.96	Ref	-	0.83	Ref	1.50	1.17	Ref	1.88	1.28
		(0.55-7.03)		(0.42-1.64)	(0.33-6.90)		(0.64-2.14)	(1.11-3.18)		(0.39-4.17)	
	Model 4	2.25	Ref	-	0.88	Ref	1.52	1.18	Ref	1.73	1.21
		(0.55-9.20)		(0.44-1.74)	(0.35-6.73)		(0.65-2.16)	(1.03-2.88)		(0.37-3.93)	
FSIQ	Model 5	1.93	Ref	-	0.84	Ref	1.69	1.19	Ref	1.70	1.20
		(0.51-7.36)		(0.43-1.64)	(0.38-7.46)		(0.65-2.18)	(1.02-2.83)		(0.37-3.87)	
	Model 6	1.95	Ref	-	0.79	Ref	1.44	1.21	Ref	1.68	1.15
		(0.55-6.92)		(0.40-1.59)	(0.32-6.42)		(0.66-2.22)	(1.00-2.81)		(0.35-3.76)	
	Model 3	1.56	Ref	1.35	0.57	Ref	3.02	2.49	Ref	1.63	3.15
		(0.23-10.58)		(0.11-16.94)	(0.19-1.67)		(0.63-14.58)	(1.32-4.70)		(0.78-3.44)	(1.05-9.44)
FSIQ	Model 4	1.71	Ref	1.28	0.59	Ref	2.31	2.53	Ref	1.39	2.80
		(0.20-14.90)		(0.08-19.78)	(0.20-1.75)		(0.52-10.31)	(1.34-4.78)		(0.67-2.88)	(0.95-8.24)
	Model 5	1.09	Ref	2.11	0.62	Ref	2.31	2.50	Ref	1.40	2.90
		(0.15-7.72)		(0.15-30.74)	(0.21-1.83)		(0.51-10.41)	(1.33-4.72)		(0.68-2.91)	(0.99-8.51)
FSIQ	Model 6	2.10	Ref	2.44	0.48	Ref	2.81	2.34	Ref	1.43	2.92
		(0.28-15.95)		(0.14-41.28)	(0.14-1.63)		(0.60-13.13)	(1.22-4.50)		(0.69-2.95)	(0.99-8.64)

Abbreviations: GWG: gestational weight gain, VCI: verbal comprehension index, VSI: visual space index, FRI: fluid reasoning index, WMI: working memory index, PSI: processing speed index, FSIQ: full scale intelligence quotient.

The cognitive level of average or above IQ was used as the reference group.

“-”: no results due to the limited cases. “Ref”: reference.

Model 3: Further adjusted for maternal pregnancy complications; Model 4: Further adjusted for birth weight Z scores by gestational age; Model 5: Further adjusted for children’s sex; Model 6: Further adjusted for exclusive breastfeeding for 6 months and the main caregivers before 3 years of age.