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Data supplement

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Supplementary Table 1. Raw counts and proportions of parental and offspring variables with and without imputed data

	Without imputed data	With imputed data		Without imputed data	With imputed data
Parental variables	**N (Prop.)**	**N (Prop.)**	**Offspring variables**	**N (Prop.)**	**N (Prop.)**
Age mother at intake	4334	4334	**Sex child**	4334	4334
< 25 years	475 (0.11)	475 (0.11)	Boy	2204 (0.51)	2204 (0.51)
>=25 & < 30	1114 (0.26)	1114 (0.26)	Girl	2130 (0.49)	2130 (0.49)
>=30 & < 35	1938 (0.45)	1938 (0.45)	*Missing*	*0*	
> 35 years	807 (0.19)	807 (0.19)	**Gestational age at time of birth**	4334	4334
Missing	*0*		>= 41.5 weeks	652 (0.15)	652 (0.15)
Age biological father at intake	3981	4334	>= 40.5 weeks & < 41.5 weeks	1049 (0.24)	1049 (0.24)
< 30 years	901 (0.23)	1017 (0.23)	>= 39.5 weeks & < 40.5 weeks	1205 (0.28)	1205 (0.28)
>=30 & < 35	1642 (0.41)	1758 (0.41)	>=38.5 weeks & < 39.5 weeks	790 (0.18)	790 (0.18)
>=35 & < 40	983 (0.25)	1066 (0.25)	< 38.5 weeks	638 (0.15)	638 (0.15)
>=40	455 (0.11)	493 (0.11)	*Missing*	*0*	
*Missing**	*353 (0.08)*		**Birth weight infant**	4334	4334
BMI mother	4196	4334	>= 4000 grams	652 (0.15)	652 (0.15)
< 20	151 (0.04)	164 (0.04)	< 4000 grams & >= 3500	1049 (0.24)	1049 (0.24)
>= 20 - < 25	2160 (0.51)	2194 (0.51)	< 3500 grams & >= 3000	1205 (0.28)	1205 (0.28)
>= 25 - < 30	1381 (0.33)	1451 (0.33)	< 3000 grams	790 (0.18)	790 (0.18)
> 30	504 (0.12)	525 (0.12)	*Missing*	*0*	
*Missing**	*138 (0.03)*				
Smoking mother during pregnancy	3883	4334			
No	3434 (0.88)	3815 (0.88)			
Yes	449 (0.12)	519 (0.12)			
Missing	*451 (0.10)*				
Educational level mother	4212				
Primary school or less	267 (0.06)	278 (0.06)			
Secondary school phase 1	449 (0.11)	468 (0.11)			

Secondary school phase 2	1202 (0.29)	1241 (0.29)			
Higher education phase 1	1015 (0.24)	1037 (0.24)			
Higher education phase 2	1279 (0.30)	1310 (0.30)			
*Missing**	*1220.03*				

Notes: Counts and proportions are based on all individuals with data on vitamin D measured from Mid-gestation and/or Cord blood and data on the SRS and/or cASD; a total of 12 cASD cases do not have data on the SRS; Prop. = proportion; Parental variables and Offspring variables except for 'Ethnicity of child' were imputed for missing data (see Methods section for details on imputation protocol); * The count of missing values and related proportions (which were based on adjusted totals combining observed plus missing counts). All other proportions based on observed data.

Supplementary Table 2. Association between mid-gestation and cord 25OHD deficiency and Autism case-control status in children with European ethnic background only

	N	OR (95% CI)	χ2(1)	p
Maternal serum, mid-gestation: Deficient vs Sufficient	**2056**	**2.91 (1.21-6.34)**	**5.52**	**0.02***
Maternal serum, mid-gestation: Insufficient vs Sufficient	2548	0.82 (0.37-1.68)	0.27	0.61
Cord blood, at birth: Deficient vs Sufficient	1131	0.97 (0.34-2.64)	0.00	0.95
Cord blood, at birth: Insufficient vs Sufficient	1556	1.33 (0.63-2.95)	0.54	0.46

Notes: Estimates are based on a general linear model; Firth correction was applied to the model; N = sample size; OR = odds ratio, 95% CI = 95% confidence interval; $X^2(1)$ = chi-squared test statistic with 1 degree of freedom; p = p-value; * = significant at alpha of 0.05; covariates included in the model are: sex child, birth weight child, gestational age at time of birth, age mother at intake, age father at intake, smoking mother during pregnancy, educational level mother, and BMI mother at mid-gestation.

Supplementary Table 3. Association between mid-gestation and cord 25OHD deficiency and Autism case-control status including a genetic component to adjust for sample structure

	N	OR (95% CI)	χ2(1)	p
Maternal serum, mid-gestation: Deficient vs Sufficient	**2122**	**2.19 (1.42-3.38)**	**6.27**	**0.01***
Maternal serum, mid-gestation: Insufficient vs Sufficient	2452	0.98 (0.45-2.15)	0.00	0.96
Cord blood, at birth: Deficient vs Sufficient	1628	0.86 (0.29-2.58)	0.08	0.77
Cord blood, at birth: Insufficient vs Sufficient	1724	1.07 (0.54-2.12)	0.03	0.86

Notes: Estimates are based on a multivariate mixed linear model; the genetic relationship matrix (GRM) of genome-wide genotype data was fitted as a random effect in the model to account for sample structure; N = sample size, β = effect size; 95% CI = 95% confidence interval; t = Wald test statistic with 1 degree of freedom; p = p-value; * = significant at alpha of 0.05; covariates included in the model are: sex child, birth weight child, gestational age at time of birth, age mother at intake, age father at intake, smoking mother during pregnancy, educational level mother, and BMI mother at mid-gestation; estimates of the OR and 95% CIs were transformed onto the liability scale.[1]

Supplementary Table 4. Association between mid-gestation and cord 25OHD concentrations and Autism case-control status (25OHD is continuous measure)

	N	OR (95% CI)	χ2(1)	p
Mid-gestation - 25OHD	3728	0.992 (0.982-1.002)	2.55	0.11
Cord - 25OHD	2772	0.999 (0.983-1.015)	0.01	0.94

Notes: Estimates are based on a general linear model; Firth correction was applied to the model; N = sample size, OR = odds ratio; 95% CI = 95% confidence interval; $X^2(1)$ = chi-squared test statistic with 1 degree of freedom; p = p-value; covariates included in the model are: ethnicity of child; sex child, birth weight child, gestational age at time of birth, age mother at intake, age father at intake, smoking mother during pregnancy, educational level mother, and BMI mother at mid-gestation.

Supplementary Figure 1. Flowchart of the study participants