

Supplemental Data

Supplemental Table 1: Continuous and categorical characteristics of non-participants (No available hand grip strength test measurement).

	Mean (SD) or median [IQR] or n (%)	Min-max	P-value ¹
n (%)			
- Total	212		-
- Boys	121 (57)		
- Girls	91 (43)		
Age (years)	5.0 [0.04]	5.0-5.2	0.447
Height (cm), n=206			0.444
- Total	111.7 (4.4)	94.8-123.1	
- Boys	112.0 (4.1)	103.0-123.0	
- Girls	111.4 (4.8)	94.8-123.1	
Weight (kg), n=196			0.755
- Total	19.32 (2.22)	14.30-28.20	
- Boys	19.31 (2.18)	14.85-25.85	
- Girls	19.32 (2.28)	14.30-28.20	
Triceps skinfold (mm), n=188			0.966
- Total	8.9 [2.5]	5.4-20.5	
- Boys	8.4 [2.0]	5.4-12.6	
- Girls	9.7 [2.7]	6.0-20.5	
Subscapular skinfold (mm), n=185			0.144
- Total	5.4 [1.5]	3.4-15.3	
- Boys	5.1 [1.3]	3.5-7.3	
- Girls	5.7 [1.5]	3.4-15.3	
Body fat (%), n=184			0.588
- Total	14.0 [3.3]	8.4-28.5	
- Boys	13.4 [3.0]	8.4-18.3	
- Girls	14.8 [3.7]	9.5-28.5	
BMI (kg/m ²), n=195			0.217
- Total	15.44 (1.22)	13.00-20.50	
- Boys	15.37 (1.24)	13.18-19.68	
- Girls	15.53 (1.21)	13.00-20.50	
Parents' education			0.943
- Lower ²	20 (13)		
- Intermediate ³	81 (53)		
- Higher ⁴	52 (34)		
Ethnicity			0.135
- Western ⁵	207 (98)		
- Non-western	5 (2)		
Vitamin D supplements			0.564
- Yes	92 (58)		
- No	66 (42)		
Organized sports ⁶			0.042
- Yes	107 (68)		
- No	51 (32)		

¹P-value from Mann-Whitney and student's t-test where appropriate for difference between

participants and non-participants. ² High school or less. ³ High school + 1-3 years. ⁴ High school + 4

years or more. ⁵ European, American or Australian background. ⁶ At least once a week for the last year. Significant p-values in bold. Percentages may not add up due to rounding.

Supplemental Table 2: Hand grip strength reference values in percentiles.

	10th	25th	50th	75th	90th	Mean (SD)
Girls	6.2	7.1	8.1	9.2	10.2	8.11 (1.64)
Boys	6.4	7.7	8.6	9.8	11.0	8.76 (1.76)
Total	6.3	7.3	8.4	9.5	10.7	8.44 (1.73)

SD: Standard deviation.

Supplemental Table 3: Univariate associations with hand grip strength at five years for boys and girls separately and combined.

	Girls		Boys		All	
	Coefficient [95% CI]	P- value	Coefficient [95% CI]	P- value	Coefficient [95% CI]	P- value
Height (cm)	0.159 [0.127;0.191]	<0.001	0.207 [0.173;0.242]	<0.001	0.189 [0.165;0.212]	<0.001
Weight (kg)	0.240 [0.180;0.300]	<0.001	0.383 [0.319;0.447]	<0.001	0.311 [0.267;0.356]	<0.001
Boy	-	-	-	-	0.645 [0.420;0.869]	<0.001
BMI (kg/m ²)	0.179 [0.056;0.301]	0.004	0.404 [0.268;0.540]	<0.001	0.266 [0.173;0.359]	<0.001
Triceps skinfold (mm)	-0.040 [- 0.110;0.031]	0.271	0.014 [- 0.067;0.095]	0.737	-0.060 [- 0.111;-0.009]	0.021
Body fat (%)	-0.009 [- 0.062;0.043]	0.725	0.012 [- 0.045;0.069]	0.679	-0.032 [- 0.070;0.005]	0.091
Birth weight (kg)	0.160 [- 0.181;0.502]	0.357	0.815 [0.481;1.149]	<0.001	0.610 [0.371;0.849]	<0.001
Birth length (m)	0.013 [- 0.025;0.051]	0.506	0.013 [- 0.017;0.043]	0.398	0.017 [- 0.007;0.041]	0.158
Parental education Intermediate ¹ vs. lower ²	0.189 [- 0.373;0.751]	0.509	0.573 [0.004;1.142]	0.048	0.389 [- 0.016;0.795]	0.060
Parental education Higher ³ vs. lower Examination	0.535 [- 0.047;1.116]	0.071	0.335 [- 0.276;0.947]	0.281	0.410 [- 0.017;0.837]	0.060
season winter vs. summer	-0.047 [- 0.361;0.267]	0.768	-0.094 [- 0.425;0.236]	0.575	-0.073 [- 0.305;0.159]	0.537
Ethnicity Western ⁴ vs. non- western	0.535 [- 0.168;1.238]	0.135	-0.122 [- 0.931;0.688]	0.768	0.261 [- 0.282;0.803]	0.346
Organized sports ⁵ Yes vs. no	0.207 [- 0.203;0.618]	0.321	0.301 [- 0.110;0.712]	0.150	0.213 [- 0.080;0.506]	0.153
Vitamin D supplements Yes vs. no	-0.279 [- 0.620;0.062]	0.109	0.048 [- 0.322;0.417]	0.800	-0.128 [- 0.382;0.126]	0.324
Smoking Yes vs. no	0.034 [- 0.631;0.698]	0.920	-0.613 [- 1.399;0.173]	0.126	-0.299 [- 0.817;0.219]	0.258
Parity ≥second birth vs. first birth	-0.081 [- 0.392;0.230]	0.608	-0.236 [- 0.562;0.090]	0.155	-0.166 [- 0.395;0.063]	0.154

¹ High school + 1-3 years. ² High school or less. ³ High school + 4 years or more. ⁴ European,

American or Australian background. ⁵ At least once a week for the last year. Significant p-values in bold.

Supplemental Table 4: Multivariate regression with complete observations for all variables in Model 2, split by sex.

	Girls		Boys	
	Coefficient [95% CI]	P-value	Coefficient [95% CI]	P-value
Model 1 (N=839)				
Height (cm)	0.135 [0.084;0.187]	<0.001	0.110 [0.060;0.161]	<0.001
Weight (kg)	0.053 [-0.040;0.146]	0.264	0.233 [0.139;0.326]	<0.001

Significant p-values in bold.

Supplemental Table 5: Multivariate regression results predicting hand grip strength adjusted for parental education, stratified by sex.

	Girls		Boys	
	Coefficient [95% CI]	P-value	Coefficient [95% CI]	P-value
Model 1 Education				
Height (cm)	0.113 [0.057;0.170]	<0.001	0.097 [0.038;0.156]	0.001
Weight (kg)	0.119 [0.016;0.222]	0.024	0.252 [0.143;0.361]	<0.001
Intermediate vs. lower parental education	-0.044 [-0.554;0.466]	0.866	0.445 [-0.047;0.936]	0.076
Higher vs. lower parental education	0.186 [-0.345;0.717]	0.492	0.296 [-0.233;0.825]	0.272
Model 2 Education				
Height (cm)	0.041 [-0.024;0.106]	0.212	0.012 [-0.054;0.079]	0.716
Weight (kg)	0.320 [0.181;0.458]	<0.001	0.476 [0.335;0.618]	<0.001
Body fat (%)	-0.140 [-0.209;-0.071]	<0.001	-0.157 [-0.226;-0.088]	<0.001
Intermediate vs. lower parental education	-0.069 [-0.572;0.435]	0.788	0.400 [-0.074;0.874]	0.098
Higher vs. lower parental education	0.094 [-0.430;0.618]	0.725	0.246 [-0.265;0.757]	0.344
Model 3 Education				
Height (cm)	0.069 [-0.013;0.152]	0.099	0.001 [-0.094;0.095]	0.987
Weight (kg)	0.319 [0.149;0.490]	<0.001	0.515 [0.306;0.725]	<0.001
Body fat (%)	-0.160 [-0.245;-0.076]	<0.001	-0.170 [-0.275;-0.066]	0.002
5-year vitamin D (nmol/L)	0.011 [0.004;0.019]	0.004	0.006 [-0.003;0.015]	0.182
Intermediate vs. lower parental education	-0.135 [-0.814;0.543]	0.694	0.349 [-0.286;0.983]	0.279
Higher vs. lower parental education	0.008 [-0.692;0.707]	0.982	0.373 [-0.302;1.049]	0.277

Significant p-values in bold. Higher: High school + 4 or more years. Intermediate: High school + 1-3 years. Lower: High school or less.

Supplemental Table 6: Univariate regression checking association between child s-25-hydroxyvitamin D at different time points and hand grip strength at 5 years.

	Girls		Boys		All	
	Coefficient [95% CI]	P-value	Coefficient [95% CI]	P-value	Coefficient [95% CI]	P-value
5-year s-25OHD (nmol/L) (n=499)	0.009 [0.001;0.018]	0.030	0.005 [- 0.004;0.014]	0.274	0.008 [0.002;0.014]	0.012
5-year s-25OHD ≥50 vs. <50 nmol/L (n=499)	0.679 [0.206;1.151]	0.005	0.365 [- 0.170;0.900]	0.180	0.556 [0.197;0.916]	0.002
5-year s-25OHD vs. ≥75 vs. <50 nmol/L (n=343)	0.774 [0.234;1.314]	0.005	0.432 [- 0.135;1.000]	0.135	0.651 [0.256;1.045]	0.001
Cord s-25OHD (nmol/L)	0.002 [- 0.006;0.009]	0.622	-0.0002 [- 0.008;0.008]	0.965	0.0005 [- 0.005;0.006]	0.875
Early pregnancy s-25OHD ¹ (nmol/L)	-0.002 [- 0.012;0.008]	0.660	0.001 [- 0.008;0.011]	0.790	0.0004 [- 0.007;0.007]	0.903
Late pregnancy s-25OHD ² (nmol/L)	-0.002 [- 0.009;0.005]	0.505	0.004 [- 0.004;0.012]	0.294	0.001 [- 0.004;0.006]	0.758

¹ Gestational age (GA) <20 weeks, ² GA ≥20 weeks. S-25OHD: Serum 25-hydroxyvitamin D.

Supplemental Table 7: Multivariate regression checking association between child s-25-hydroxyvitamin D (s-25OHD) at different time points and hand grip strength at 5 years, stratified by sex.

	Girls		Boys	
	Coefficient [95% CI]	P-value	Coefficient [95% CI]	P-value
Cord s-25OHD, n=735				
Height (cm)	0.10 [0.04;0.16]	0.001	0.03 [-0.03;0.09]	0.341
Weight (kg)	0.13 [0.00;0.26]	0.050	0.42 [0.30;0.55]	<0.001
Body fat (%)	-0.09 [-0.16;-0.02]	0.013	-0.16 [-0.22;-0.09]	0.001
Cord s-25OHD (nmol/L)	0.00 [-0.00;0.01]	0.161	0.00 [-0.01;0.01]	0.978
Cord s-25OHD, n=432				
Height (cm)	0.149 [0.070;0.229]	<0.001	0.001 [-0.084;0.086]	0.979
Weight (kg)	0.091 [-0.074;0.256]	0.280	0.475 [0.292;0.657]	<0.001
Body fat (%)	-0.091 [-0.179;-0.004]	0.040	-0.181 [-0.276;-0.087]	<0.001
5-year s-25OHD (nmol/L)	0.010 [0.001;0.018]	0.024	0.005 [-0.003;0.014]	0.215
Cord s-25OHD (nmol/L)	0.004 [-0.005;0.014]	0.352	-0.002 [-0.011;0.007]	0.685
Early s-25OHD¹, n=497				
Height (cm)	0.100 [0.022;0.179]	0.013	0.049 [-0.023;0.122]	0.182
Weight (kg)	0.151 [-0.020;0.321]	0.083	0.406 [0.250;0.561]	<0.001
Body fat (%)	-0.095 [-0.176;-0.014]	0.022	-0.147 [-0.234;-0.061]	0.001
Early pregnancy s-25OHD (nmol/L)	-0.002 [-0.011;0.007]	0.662	-0.001 [-0.009;0.007]	0.835
Early s-25OHD, n=301				
Height (cm)	0.166 [0.067;0.265]	0.001	0.009 [-0.091;0.109]	0.858
Weight (kg)	0.030 [-0.185;0.244]	0.786	0.481 [0.270;0.691]	<0.001
Body fat (%)	-0.050 [-0.153;0.052]	0.336	-0.170 [-0.281;-0.058]	0.003
5-year s-25OHD (nmol/L)	0.015 [0.006;0.025]	0.002	0.006 [-0.004;0.015]	0.229
Early pregnancy s-25OHD (nmol/L)	0.005 [-0.007;0.017]	0.391	-0.003 [-0.014;0.008]	0.594
Late s-25OHD¹, n=504				
Height (cm)	0.066 [-0.005;0.136]	0.069	0.046 [-0.025;0.117]	0.206
Weight (kg)	0.251 [0.095;0.406]	0.002	0.397 [0.245;0.550]	0.397
Body fat (%)	-0.119 [-0.196;-0.043]	0.002	-0.122 [-0.200;-0.044]	-0.122
Late pregnancy s-25OHD (nmol/L)	0.001 [-0.005;0.007]	0.825	0.003 [-0.003;0.010]	0.003
Late s-25OHD, n=286				
Height (cm)	0.101 [0.008;0.195]	0.034	0.023 [-0.079;0.125]	0.660
Weight (kg)	0.197 [-0.006;0.400]	0.057	0.468 [0.239;0.697]	<0.001
Body fat (%)	-0.105 [-0.202;-0.009]	0.033	-0.139 [-0.258;-0.021]	0.022
5-year s-25OHD (nmol/L)	0.010 [0.000;0.019]	0.041	0.005 [-0.005;0.014]	0.327
Late pregnancy s-25OHD (nmol/L)	0.002 [-0.006;0.010]	0.628	0.003 [-0.007;0.012]	0.551

Significant p-values in bold. ¹ Gestational age (GA) <20 weeks, ² GA ≥20 weeks. 95% CI: 95%

confidence interval. S-25OHD: Serum 25-hydroxyvitamin D.

Supplemental Table 8: Multivariate regression with complete observations for all variables in Model 3-5, stratified by sex.

	Girls		Boys	
	Coefficient [95% CI]	P-value	Coefficient [95% CI]	P-value
Model 2 (n=493)				
Height (cm)	0.107 [0.031;0.183]	0.006	0.021 [-0.059;0.101]	0.610
Weight (kg)	0.195 [0.039;0.351]	0.014	0.455 [0.282;0.628]	<0.001
Body fat (%)	-0.133 [-0.214;-0.051]	0.002	-0.158 [-0.249;-0.067]	0.001

Significant p-values in bold.