**Supplemental Table 1**. Number of anthropometric measures used for modelling growth in weight, length/height, head circumference and abdominal circumference between birth and 5 years in children from the GUSTO cohort

| Outcomes | Measures | Subjects | Measures per Subject |
|---|---|---|---|
| Weight | | | |
| < 3 months | 1778 | 949 | 2 (1-4) |
| 3 months - 12 months | 2589 | 940 | 3 (1-5) |
| 12 months - 18 months | 1581 | 889 | 2 (1-3) |
| 18 months - 36 months | 1616 | 879 | 2 (1-3) |
| ≥ 36 months | 2919 | 876 | 3 (1-4) |
| Total study period | 10483 | 979 | 12 (1-14) |
| Length/Height | | | |
| < 3 months | 2754 | 979 | 3 (1-5) |
| 3 months - 12 months | 2561 | 940 | 3 (1-5) |
| 12 months - 18 months | 1726 | 880 | 2 (1-4) |
| 18 months - 36 months | 2599 | 872 | 3 (1-5) |
| ≥ 36 months | 2925 | 877 | 4 (1-4) |
| Total study period | 12565 | 979 | 14 (1-18) |
| Head Circumference | | | |
| < 3 months | 2747 | 978 | 3 (1-5) |
| 3 months - 12 months | 2551 | 940 | 3 (1-5) |
| 12 months - 18 months | 1584 | 889 | 2 (1-3) |
| 18 months - 36 months | 1592 | 879 | 2 (1-3) |
| ≥ 36 months | 2918 | 877 | 4 (1-4) |
| Total study period | 11392 | 979 | 13 (1-16) |
| Abdominal Circumference | | | |
| < 3 months | 2709 | 973 | 3 (1-5) |
| 3 months - 12 months | 2553 | 940 | 3 (1-5) |
| 12 months - 18 months | 1571 | 889 | 2 (1-3) |
| 18 months - 36 months | 1551 | 867 | 2 (1-3) |
| ≥ 36 months | 2893 | 876 | 3 (1-4) |
| Total study period | 11277 | 979 | 12 (1-16) |

**Supplemental Table 2**. Descriptive statistics of the parameters *a*, *b*, *c* and *d* resulting from the Jenss-Bayley growth modelling of weight, length/height, head circumference and abdominal circumference between birth and 5 years in children from the GUSTO cohort ($n = 979$)

| Parameters | Deciles | | | | | | | | | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $1^{st}$ | $2^{nd}$ | $3^{rd}$ | $4^{th}$ | $5^{th}$ | $6^{th}$ | $7^{th}$ | $8^{th}$ | $9^{th}$ | | |
| **Weight** | | | | | | | | | | | |
| *a* | 0.95 | 0.98 | 1.01 | 1.02 | 1.04 | 1.05 | 1.07 | 1.09 | 1.12 | 1.03 | 0.07 |
| *b* | -5.45 | -5.38 | -5.31 | -5.25 | -5.19 | -5.14 | -5.07 | -4.98 | -4.80 | -5.16 | 0.27 |
| *c* | 1.22 | 1.35 | 1.42 | 1.47 | 1.53 | 1.58 | 1.64 | 1.71 | 1.80 | 1.52 | 0.25 |
| *d* | -5.11 | -4.95 | -4.83 | -4.73 | -4.64 | -4.56 | -4.46 | -4.33 | -4.13 | -4.63 | 0.45 |
| **Length/Height** | | | | | | | | | | | |
| *a* | 3.85 | 3.87 | 3.88 | 3.89 | 3.90 | 3.91 | 3.92 | 3.93 | 3.94 | 3.90 | 0.04 |
| *b* | -4.00 | -3.96 | -3.94 | -3.91 | -3.90 | -3.88 | -3.86 | -3.84 | -3.80 | -3.90 | 0.08 |
| *c* | 2.97 | 3.02 | 3.06 | 3.09 | 3.11 | 3.13 | 3.16 | 3.19 | 3.24 | 3.11 | 0.10 |
| *d* | -5.46 | -5.38 | -5.32 | -5.27 | -5.23 | -5.18 | -5.14 | -5.09 | -5.03 | -5.24 | 0.17 |
| **Head Circumference** | | | | | | | | | | | |
| *a* | 3.48 | 3.50 | 3.51 | 3.52 | 3.52 | 3.53 | 3.54 | 3.55 | 3.56 | 3.52 | 0.03 |
| *b* | -6.08 | -6.04 | -6.02 | -6.00 | -5.98 | -5.95 | -5.93 | -5.90 | -5.85 | -5.97 | 0.10 |
| *c* | 2.38 | 2.42 | 2.44 | 2.47 | 2.48 | 2.50 | 2.52 | 2.55 | 2.58 | 2.48 | 0.08 |
| *d* | -5.19 | -5.13 | -5.09 | -5.06 | -5.02 | -5.00 | -4.96 | -4.92 | -4.86 | -5.03 | 0.13 |
| **Abdominal Circumference** | | | | | | | | | | | |
| *a* | 3.22 | 3.24 | 3.25 | 3.26 | 3.28 | 3.29 | 3.30 | 3.32 | 3.36 | 3.28 | 0.06 |
| *b* | -5.49 | -5.37 | -5.29 | -5.21 | -5.14 | -5.07 | -4.98 | -4.85 | -4.63 | -5.09 | 0.36 |
| *c* | 2.45 | 2.51 | 2.56 | 2.59 | 2.63 | 2.67 | 2.71 | 2.76 | 2.83 | 2.64 | 0.15 |
| *d* | -4.54 | -4.28 | -4.11 | -3.98 | -3.87 | -3.77 | -3.62 | -3.45 | -3.26 | -3.88 | 0.52 |

**Supplemental Table 3.** Estimates of fixed effects, and correlation matrix of random effects, resulting from the Jenss-Bayley modelling of weight, length/height, head circumference and abdominal circumference between birth and 5 years in children from the GUSTO cohort[1]

| Parameters | Fixed effects | Correlation matrix of random effects | | |
|---|---|---|---|---|
| | Mean (SE) | *b* | *c* | *d* |
| Weight | | | | |
| *a* | 1.04 (0.007) | 0.63 | 0.98 | 0.75 |
| *b* | 5.18 (0.01) | 1.00 | 0.49 | 0.67 |
| *c* | 1.53 (0.01) | - | 1.00 | 0.73 |
| *d* | 4.65 (0.021) | - | - | 1.00 |
| RSD | 0.48 (0.004) | - | - | - |
| Length/Height | | | | |
| *a* | 3.9 (0.001) | -0.10 | -0.11 | 0.11 |
| *b* | 3.9 (0.004) | 1.00 | 0.22 | 0.30 |
| *c* | 3.1 (0.005) | - | 1.00 | 0.49 |
| *d* | 5.2 (0.009) | - | - | 1.00 |
| RSD | 1.3 (0.009) | - | - | - |
| Head Circumference | | | | |
| *a* | 3.52 (0.001) | 0.15 | -0.34 | 0.14 |
| *b* | 5.97 (0.009) | 1.00 | 0.18 | 0.53 |
| *c* | 2.48 (0.004) | - | 1.00 | 0.04 |
| *d* | 5.02 (0.008) | - | - | 1.00 |
| RSD | 0.67 (0.005) | - | - | - |
| Abdominal Circumference | | | | |
| *a* | 3.3 (0.005) | 0.34 | -0.35 | 0.77 |
| *b* | 5.1 (0.015) | 1.00 | 0.25 | 0.46 |
| *c* | 2.6 (0.01) | - | 1.00 | -0.15 |
| *d* | 4 (0.028) | - | - | 1.00 |
| RSD | 1.9 (0.014) | - | - | - |

[1]RSD, residuals standard deviation; SE, standard error.

**Supplemental Table 4.** Main characteristics of the studied mother-offspring pairs[1]

|  | % (*n*) or M ± SD |
|---|---|
| Study centre, % NUH | 26.1 (257) |
| Familial characteristics |  |
|     Ethnicity, % Chinese | 54.3 (535) |
|     Ethnicity, % Malay | 26.6 (262) |
|     Incomes, % < 2000 SGD | 14.6 (144) |
|     Incomes, % ≥ 6000 SGD | 26.3 (259) |
| Maternal characteristics |  |
|     Education, % University diploma | 33.8 (333) |
|     Age, y | 31.1 ± 5.1 |
|     Height, cm | 158.2 ± 5.7 |
|     Pre-pregnancy BMI, kg/m² | 22.7 ± 4.4 |
|     Gestational weight gain at 26-28 wk, kg | 8.7 ± 4.5 |
|     Fasting glucose level at 26-28 wk, mmol/L | 4.34 ± 0.45 |
|     Vitamin D level at 26-28 wk, nmol/L | 80.9 ± 26.6 |
| Paternal characteristics |  |
|     Height, cm | 170.8 ± 6.2 |
|     BMI, kg/m² | 25.9 ± 4.9 |
| Offspring characteristics |  |
|     Sex, % male | 51.9 (511) |
|     Parity, % first born | 42.3 (417) |
|     Gestational age at birth, wk | 38.8 ± 1.4 |
|       Born very preterm (< 33 wk), % | 0.7 (7) |
|       Born late preterm (33-36 wk), % | 6.3 (62) |

[1]*n* = 985, except for paternal height (*n* = 811) and BMI (*n* = 804). NUH, national university hospital; SGD, Singapore dollars.

**Supplemental Table 5.** Descriptive statistics of main offspring anthropometric, adiposity and body composition outcomes in the GUSTO cohort

| Outcomes | *n* | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|---|
| Anthropometrics at 26 weeks' gestation | | | | | |
| Estimated fetal weight, kg | 924 | 1.0 | 0.2 | 0.6 | 2.1 |
| Femur length, cm | 924 | 4.9 | 0.3 | 4.1 | 6.2 |
| Anthropometrics at 32 weeks' gestation | | | | | |
| Estimated fetal weight, kg | 924 | 2.0 | 0.3 | 1.1 | 3.0 |
| Femur length, cm | 924 | 6.1 | 0.3 | 5.0 | 7.1 |
| Anthropometrics at birth | | | | | |
| Weight, kg | 977 | 3.1 | 0.5 | 1.2 | 5.4 |
| Length, cm | 977 | 48.7 | 2.3 | 34.0 | 57.0 |
| Head circumference, cm | 975 | 33.4 | 1.4 | 25.0 | 37.5 |
| Abdominal circumference, cm | 935 | 28.4 | 2.4 | 21.3 | 38.0 |
| Triceps skinfold thickness, mm | 937 | 5.4 | 1.3 | 3.0 | 10.4 |
| Subscapular skinfold thickness, mm | 936 | 4.9 | 1.2 | 2.2 | 10.4 |
| Body composition at 10 days | | | | | |
| Fat Mass, % | 252 | 11.5 | 4.5 | 1.2 | 25.8 |
| Abdominal adipose tissue volumes at 10 days | | | | | |
| Superficial Subcutaneous, mL | 317 | 77.9 | 21.8 | 36.3 | 174.5 |
| Deep Subcutaneous, mL | 317 | 13.3 | 5.6 | 3.5 | 38.4 |
| Internal, mL | 317 | 22.8 | 7.6 | 7.2 | 64.3 |
| Anthropometrics at 54 months | | | | | |
| Weight, kg | 794 | 17.4 | 3.0 | 12.2 | 33.5 |
| Height, cm | 805 | 105.6 | 4.4 | 91.0 | 120.1 |
| Head circumference, cm | 802 | 50.2 | 1.5 | 45.4 | 55.0 |
| Abdominal circumference, cm | 797 | 51.7 | 4.8 | 40.0 | 75.4 |
| Triceps skinfold thickness, mm | 785 | 10.1 | 3.1 | 3.8 | 28.3 |
| Subscapular skinfold thickness, mm | 786 | 7.5 | 3.3 | 3.6 | 30.2 |

**Supplemental Table 6**. Adjusted associations of maternal plasma PUFA ratios during pregnancy with the standardized parameters *a*, *b*, *c* and *d* resulting from the Jenss-Bayley growth modelling of weight, length/height, head circumference and abdominal circumference between birth and 5 years in children from the GUSTO cohort. ($n = 979$)[1]

| Fatty acids | Weight | Length/Height | HC | AC |
|---|---|---|---|---|
| Parameter *a* (model-predicted measure at birth[2]) | | | | |
| LA/ALA | 0.0001 (-0.0001, 0.0004)[3] | 0.0004 (-0.0001, 0.0009) | 0.0003 (-0.0002, 0.0008) | 0.0004 (-0.0002, 0.0009) |
| AA/DHA | -0.03 (-0.08, 0.01) | -0.08 (-0.16, 0.01) | -0.04 (-0.13, 0.05) | 0.08 (-0.02, 0.18) |
| Total n-6/n-3 PUFA | 0.00 (-0.02, 0.01) | -0.01 (-0.04, 0.01) | 0.00 (-0.03, 0.02) | 0.01 (-0.02, 0.04) |
| Total n-6/n-3 LCPUFA | -0.02 (-0.06, 0.01) | -0.05 (-0.12, 0.02) | -0.06 (-0.13, 0.02) | 0.05 (-0.03, 0.13) |
| Parameter *b* (growth velocity beyond 2-3 years) | | | | |
| LA/ALA | -0.0001 (-0.0007, 0.0004) | -0.0003 (-0.0008, 0.0003) | -0.0004 (-0.0010, 0.0002) | 0 (-0.0005, 0.0006) |
| AA/DHA | -0.17 (-0.26, -0.07) | -0.09 (-0.19, 0.01) | -0.06 (-0.17, 0.05) | -0.17 (-0.27, -0.07) |
| Total n-6/n-3 PUFA | -0.03 (-0.06, 0.00) | -0.02 (-0.05, 0.01) | -0.01 (-0.04, 0.03) | -0.05 (-0.08, -0.02) |
| Total n-6/n-3 LCPUFA | -0.10 (-0.18, -0.03) | -0.06 (-0.14, 0.02) | -0.04 (-0.12, 0.05) | -0.13 (-0.21, -0.05) |
| Parameter *c* (growth spurt before 2-3 years) | | | | |
| LA/ALA | 0.0001 (-0.0004, 0.0007) | 0.0004 (-0.0002, 0.001) | -0.0003 (-0.0009, 0.0003) | -0.0007 (-0.0013, -0.0002) |
| AA/DHA | 0.01 (-0.08, 0.11) | -0.02 (-0.12, 0.08) | 0.06 (-0.04, 0.16) | -0.05 (-0.15, 0.05) |
| Total n-6/n-3 PUFA | 0.00 (-0.03, 0.03) | -0.01 (-0.04, 0.02) | 0.00 (-0.03, 0.03) | 0.01 (-0.02, 0.04) |
| Total n-6/n-3 LCPUFA | 0.01 (-0.07, 0.09) | -0.02 (-0.10, 0.06) | 0.04 (-0.04, 0.13) | -0.01 (-0.08, 0.07) |
| Parameter *d* (deceleration rate before 2-3 years) | | | | |
| LA/ALA | -0.0002 (-0.0008, 0.0004) | -0.0004 (-0.0009, 0.0002) | -0.0002 (-0.0007, 0.0004) | -0.0002 (-0.0007, 0.0004) |
| AA/DHA | -0.12 (-0.22, -0.02) | 0.02 (-0.08, 0.12) | -0.02 (-0.12, 0.08) | -0.13 (-0.23, -0.03) |
| Total n-6/n-3 PUFA | -0.01 (-0.04, 0.02) | 0.02 (-0.02, 0.05) | 0.00 (-0.03, 0.04) | -0.02 (-0.05, 0.01) |
| Total n-6/n-3 LCPUFA | -0.07 (-0.15, 0.01) | 0.02 (-0.06, 0.10) | 0.00 (-0.08, 0.08) | -0.10 (-0.18, -0.02) |

[1] Models were adjusted for study center, ethnicity, child's sex, familial income, maternal education and age, parity, fasting glucose levels, vitamin D levels, gestational weight gain at 26-28 weeks' gestation, maternal height and pre-pregnancy BMI, paternal height and BMI. AA, arachidonic acid; AC, abdominal circumference; ALA, α-linolenic acid; DHA, docosahexaenoic acid; HC, head circumference; LA, linoleic acid; LCPUFA, long-chain polyunsaturated fatty acids; PUFA, polyunsaturated fatty acids.

[2] Except for parameter *a* for weight which is not interpretable (see Methods), and was replaced by measured birth weight.

[3] β coefficient (95% CI) are expressed in SD unit per increase in PUFA ratio.

**Supplemental Table 7**. Adjusted associations of maternal plasma PUFA levels during pregnancy with body composition in neonates from the GUSTO cohort[1]

| Fatty acids, % | PEA POD at birth (*n* = 302) | | | PEA POD at 10 days (*n* = 252) | | |
|---|---|---|---|---|---|---|
| | Fat Free Mass, kg | Fat Mass, kg | Fat Mass, % | Fat Free Mass, kg | Fat Mass, kg | Fat Mass, % |
| 18:2n-6 (LA) | 0.06 (0.02, 0.10)[2] | 0.01 (-0.01, 0.03) | 0.14 (-0.40, 0.67) | 0.07 (0.02, 0.12) | 0.02 (-0.01, 0.05) | 0.25 (-0.52, 1.02) |
| 20:4n-6 (AA) | -0.01 (-0.12, 0.09) | -0.02 (-0.07, 0.03) | -0.40 (-1.75, 0.94) | 0.00 (-0.12, 0.11) | 0.02 (-0.05, 0.09) | 0.52 (-1.19, 2.23) |
| Σn-6 PUFA | 0.06 (0.01, 0.10) | 0.01 (-0.01, 0.03) | 0.18 (-0.37, 0.74) | 0.06 (0.00, 0.12) | 0.02 (-0.01, 0.05) | 0.31 (-0.51, 1.12) |
| Σn-6 LCPUFA | -0.03 (-0.11, 0.05) | 0.00 (-0.04, 0.04) | 0.15 (-0.86, 1.16) | -0.04 (-0.13, 0.05) | 0.00 (-0.05, 0.05) | 0.10 (-1.16, 1.36) |
| 18:3n-3 (ALA) | -0.43 (-1.64, 0.78) | -0.07 (-0.66, 0.52) | -0.67 (-16.25, 14.91) | -0.58 (-2.12, 0.95) | -0.59 (-1.44, 0.26) | -14.18 (-36.15, 7.79) |
| 20:5n-3 (EPA) | -0.11 (-0.40, 0.18) | -0.01 (-0.15, 0.13) | 0.17 (-3.52, 3.87) | -0.04 (-0.36, 0.28) | -0.11 (-0.29, 0.06) | -2.89 (-7.42, 1.64) |
| 22:6n-3 (DHA) | 0.06 (-0.05, 0.18) | 0.00 (-0.06, 0.06) | -0.12 (-1.64, 1.41) | 0.06 (-0.08, 0.20) | -0.02 (-0.09, 0.06) | -0.45 (-2.47, 1.58) |
| Σn-3 PUFA | 0.03 (-0.06, 0.12) | 0.01 (-0.04, 0.05) | 0.14 (-1.02, 1.31) | 0.04 (-0.07, 0.14) | -0.02 (-0.08, 0.04) | -0.64 (-2.18, 0.90) |
| Σn-3 LCPUFA | 0.04 (-0.06, 0.13) | 0.01 (-0.04, 0.05) | 0.15 (-1.03, 1.33) | 0.04 (-0.07, 0.15) | -0.02 (-0.08, 0.04) | -0.59 (-2.15, 0.98) |

[1] Models were adjusted for study center, ethnicity, child's sex, familial income, maternal education and age, parity, fasting glucose levels, vitamin D levels, gestational weight gain at 26-28 weeks' gestation, maternal height and pre-pregnancy BMI, paternal height and BMI. AA, arachidonic acid; ALA, α-linolenic acid; DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; LA, linoleic acid; LCPUFA, long-chain polyunsaturated fatty acids; PUFA, polyunsaturated fatty acids.

[2] β coefficient (95% CI) are expressed in outcome unit per 5% change in PUFA level.

**Supplemental Table 8**. Adjusted associations of maternal plasma PUFA levels during pregnancy with abdominal tissue volumes in neonates from the

GUSTO cohort ($n = 317$)[1]

| Fatty acids, % | Total, mL | Superficial Subcutaneous, mL | Superficial Subcutaneous, % total | Deep Subcutaneous, mL | Deep Subcutaneous, % total | Internal, mL | Internal, % total |
|---|---|---|---|---|---|---|---|
| 18:2 n-6 (LA) | 6.4 (1.6, 11.2)[2] | 4.6 (1.3, 7.8) | -0.0 (-0.7, 0.6) | 0.6 (-0.22, 1.48) | -0.1 (-0.5, 0.3) | 1.2 (0.1, 2.4) | 0.1 (-0.5, 0.7) |
| 20:4 n-6 (AA) | -0.3 (-9.7, 9.1) | -0.5 (-6.9, 5.8) | -0.1 (-1.4, 1.1) | 0.6 (-1.03, 2.25) | 0.4 (-0.4, 1.1) | -0.3 (-2.6, 1.9) | -0.2 (-1.4, 0.9) |
| Σ n-6 PUFA | 4.5 (-0.6, 9.6) | 3.1 (-0.4, 6.5) | -0.1 (-0.8, 0.6) | 0.6 (-0.35, 1.4) | 0.0 (-0.4, 0.4) | 0.9 (-0.3, 2.1) | 0.1 (-0.5, 0.8) |
| Σ n-6 LCPUFA | -4.9 (-12.2, 2.4) | -3.7 (-8.6, 1.2) | -0.1 (-1.1, 0.8) | -0.3 (-1.57, 0.99) | 0.1 (-0.5, 0.65) | -0.9 (-2.6, 0.8) | 0.1 (-0.8, 1.0) |
| 18:3 n-3 (ALA) | -65.3 (-188.8, 58.3) | -37.1 (-120.8, 46.5) | 5.5 (-10.9, 21.8) | -1.0 (-22.7, 20.7) | 8.2 (-1.5, 17.9) | -27.2 (-56.5, 2.1) | -13.7 (-28.7, 1.4) |
| 20:5 n-3 (EPA) | -25.7 (-52.6, 1.3) | -16.9 (-35.1, 1.4) | 0.3 (-3.3, 3.8) | -2.1 (-6.85, 2.6) | 0.8 (-1.4, 2.9) | -6.7 (-13.1, -0.3) | -1.0 (-4.3, 2.3) |
| 22:6 n-3 (DHA) | 5.2 (-7.2, 17.7) | 5.2 (-3.6, 13.6) | 1.1 (-0.6, 2.7) | 1.3 (-0.91, 3.4) | 0.8 (-0.2, 1.8) | -1.3 (-4.2, 1.67) | -1.9 (-3.4, -0.4) |
| Σ n-3 PUFA | -1.4 (-10.8, 8.0) | 0.1 (-6.3, 6.5) | 0.7 (-0.6, 1.9) | 0.4 (-1.2, 2.1) | 0.7 (-0.1, 1.4) | -1.9 (-4.1, 0.3) | -1.3 (-2.5, -0.2) |
| Σ n-3 LCPUFA | -1.0 (-10.5, 8.5) | 0.4 (-6.1, 6.8) | 0.6 (-0.6, 1.9) | 0.4 (-1.2, 2.1) | 0.6 (-0.1, 1.4) | -1.8 (-4.0, 0.5) | -1.3 (-2.4, -0.1) |

[1] Models were adjusted for study center, ethnicity, child's sex, familial income, maternal education and age, parity, fasting glucose levels, vitamin D levels, gestational weight gain at 26-28 weeks' gestation, maternal height and pre-pregnancy BMI, paternal height and BMI. AA, arachidonic acid; ALA, α-linolenic acid; DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; LA, linoleic acid; LCPUFA, long-chain polyunsaturated fatty acids; PUFA, polyunsaturated fatty acids.

[2] β coefficient (95% CI) are expressed in outcome unit per 5% change in PUFA level.