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| **Supplementary table 1** Associations of intake of various types of fiber at the 1st grade with BMI SD-score, waist-to-height ratio, and serum fasting glucose during follow-up among 2,784 children. |
| 　 | Fiber intake in the 1st grade | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| 　 | Q1 | 　 | 　 | Q2 | 　 | Q3 | 　 | 　 | Q4 | 　 |  *p* | *trend p* |
| mean | (SE) | 　 | mean | (SE) | 　 | mean | (SE) | 　 | mean | (SE) |
| *n* | 696 | 　 | 　 | 696 | 　 | 　 | 696 | 　 | 　 | 696 | 　 | 　 | 　 |
| Cereal fiber | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| BMI SD-score at the 1st gradea | -0.411  | (0.036) | 　 | -0.334  | (0.035) | 　 | -0.348  | (0.035) | 　 | -0.337  | (0.035) | 0.38  | 0.20  |
| BMI SD-score at the 4th gradeb | -0.241  | (0.020) | 　 | -0.275  | (0.020) | 　 | -0.256  | (0.020) | 　 | -0.263  | (0.020) | 0.69  | 0.59  |
| Change in BMI SD-score from the 1st grade to the 4th gradeb | 0.102  | (0.016) | 　 | 0.083  | (0.016) | 　 | 0.110  | (0.016) | 　 | 0.098  | (0.016) | 0.67  | 0.90  |
| Waist-to-height ratio at the 4th gradeb | 0.427  | (0.001) | 　 | 0.426  | (0.001) | 　 | 0.427  | (0.001) | 　 | 0.426  | (0.001) | 0.78  | 0.64  |
| Fasting glucose at the 4th gradec,d | 86.08  | (0.23) | 　 | 85.72  | (0.22) | 　 | 85.94  | (0.22) | 　 | 85.83  | (0.22) | 0.70  | 0.57  |
| Vegetable fiber | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| BMI SD-score at the 1st gradea | -0.321  | (0.036) | 　 | -0.347  | (0.035) | 　 | -0.364  | (0.035) | 　 | -0.398  | (0.035) | 0.49  | 0.12  |
| BMI SD-score at the 4th gradeb | -0.229  | (0.020) | 　 | -0.282  | (0.020) | 　 | -0.253  | (0.020) | 　 | -0.272  | (0.020) | 0.25  | 0.27  |
| Change in BMI SD-score from the 1st grade to the 4th gradeb | 0.112  | (0.016) | 　 | 0.066  | (0.016) | 　 | 0.116  | (0.016) | 　 | 0.099  | (0.016) | 0.11  | 0.94  |
| Waist-to-height ratio at the 4th gradeb | 0.429  | (0.001) | 　 | 0.425  | (0.001) | 　 | 0.427  | (0.001) | 　 | 0.425  | (0.001) | 0.064  | 0.058  |
| Fasting glucose at the 4th gradec,d | 86.39  | (0.23) | 　 | 85.70  | (0.22) | 　 | 86.07  | (0.22) | 　 | 85.42  | (0.22) | 0.013  | 0.008  |
| Fruit fiber | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| BMI SD-score at the 1st gradea | -0.333  | (0.036) | 　 | -0.329  | (0.035) | 　 | -0.355  | (0.035) | 　 | -0.412  | (0.036) | 0.33  | 0.076  |
| BMI SD-score at the 4th gradeb | -0.234  | (0.021) | 　 | -0.253  | (0.020) | 　 | -0.246  | (0.020) | 　 | -0.302  | (0.020) | 0.096  | 0.018  |
| Change in BMI SD-score from the 1st grade to the 4th gradeb | 0.110  | (0.017) | 　 | 0.096  | (0.016) | 　 | 0.098  | (0.016) | 　 | 0.090  | (0.016) | 0.86  | 0.46  |
| Waist-to-height ratio at the 4th gradeb | 0.430  | (0.001) | 　 | 0.427  | (0.001) | 　 | 0.426  | (0.001) | 　 | 0.423  | (0.001) | 0.004  | <0.001 |
| Fasting glucose at the 4th gradec,d | 85.80  | (0.23) | 　 | 86.11  | (0.22) | 　 | 86.05  | (0.22) | 　 | 85.62  | (0.22) | 0.40  | 0.34  |
| Soluble fiber | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| BMI SD-score at the 1st gradea | -0.302  | (0.035) | 　 | -0.357  | (0.035) | 　 | -0.343  | (0.035) | 　 | -0.427  | (0.035) | 0.086  | 0.016  |
| BMI SD-score at the 4th gradeb | -0.224  | (0.020) | 　 | -0.258  | (0.020) | 　 | -0.259  | (0.020) | 　 | -0.294  | (0.020) | 0.10  | 0.016  |
| Change in BMI SD-score from the 1st grade to the 4th gradeb | 0.111  | (0.016) | 　 | 0.102  | (0.016) | 　 | 0.085  | (0.016) | 　 | 0.095  | (0.016) | 0.71  | 0.43  |
| Waist-to-height ratio at the 4th gradeb | 0.429  | (0.001) | 　 | 0.427  | (0.001) | 　 | 0.426  | (0.001) | 　 | 0.424  | (0.001) | 0.041  | 0.004  |
| Fasting glucose at the 4th gradec,d | 86.23  | (0.22) | 　 | 85.83  | (0.22) | 　 | 85.78  | (0.22) | 　 | 85.73  | (0.22) | 0.37  | 0.13  |
| Insoluble fiber | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| BMI SD-score at the 1st gradea | -0.300  | (0.036) | 　 | -0.335  | (0.035) | 　 | -0.371  | (0.035) | 　 | -0.424  | (0.035) | 0.085  | 0.010  |
| BMI SD-score at the 4th gradeb | -0.219  | (0.020) | 　 | -0.260  | (0.020) | 　 | -0.268  | (0.020) | 　 | -0.288  | (0.020) | 0.11  | 0.021  |
| Change in BMI SD-score from the 1st grade to the 4th gradeb | 0.117  | (0.016) | 　 | 0.080  | (0.016) | 　 | 0.101  | (0.016) | 　 | 0.095  | (0.016) | 0.46  | 0.55  |
| Waist-to-height ratio at the 4th gradeb | 0.429  | (0.001) | 　 | 0.427  | (0.001) | 　 | 0.426  | (0.001) | 　 | 0.424  | (0.001) | 0.035  | 0.004  |
| Fasting glucose at the 4th gradec,d | 86.37  | (0.23) | 　 | 85.69  | (0.22) | 　 | 86.01  | (0.22) | 　 | 85.51  | (0.22) | 0.038  | 0.022  |
| Values are estimated mean (SE). Dietary fiber intakes were controlled for total energy using the residual method. | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| SE: standard error, BMI: body mass index, SD-score: standard deviation score. | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| aAdjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015), school (7 schools), age (years) at the 1st grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), physical activity time (tertiles), screen time (quartiles), and intake of total energy and carbohydrates (quartiles) at the 1st grade |
| bAdjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015) and school (7 schools) at the 1st grade and age (years), puberty (yes, no) at the 4th grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), physical activity time (tertiles), screen time (quartiles), intake of total energy and carbohydrates (quartiles) and BMI SD-score (quartiles) at the 1st grade. |
| cAdjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015) and school (7 schools) at the 1st grade and age (years), puberty (yes, no) at the 4th grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), mother's and father's history of diabetes (yes, no), physical activity time (tertiles), screen time (quartiles), intake of total energy and carbohydrates (quartiles) and BMI SD-score (quartiles) at the 1st grade |
| dThe anlyses on serum glucose are performed among 2,701 participantss.  |

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| **Supplementary table 2** Association between change in intake of various types of fiber and concurrent change in BMI SD-score from the 1st grade to the 4th grade among 2,744 children |
| 　 | Change in fiber intake | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| 　 | Q1 | 　 | 　 | Q2 | 　 | Q3 | 　 | 　 | Q4 | 　 |  *p* | *trend p* |
| mean | (SE) |  | mean | (SE) | 　 | mean | (SE) | 　 | mean | (SE) |
| *n* | 686 | 　 |  | 686 | 　 | 　 | 686 | 　 | 　 | 686 | 　 | 　 | 　 |
| Cereal fiber | 0.113  | (0.016) | 　 | 0.088  | (0.016) | 　 | 0.101  | (0.016) | 　 | 0.091  | (0.016) | 0.69  | 0.43  |
| Vegetable fiber | 0.110  | (0.016) | 　 | 0.084  | (0.016) | 　 | 0.120  | (0.016) | 　 | 0.078  | (0.016) | 0.19  | 0.34  |
| Fruit fiber | 0.102  | (0.016) | 　 | 0.103  | (0.016) | 　 | 0.088  | (0.016) | 　 | 0.098  | (0.016) | 0.91  | 0.71  |
| Soluble fiber | 0.120  | (0.016) | 　 | 0.087  | (0.016) | 　 | 0.109  | (0.016) | 　 | 0.075  | (0.016) | 0.19  | 0.12  |
| Insoluble fiber | 0.122  | (0.016) | 　 | 0.112  | (0.016) | 　 | 0.072  | (0.016) | 　 | 0.085  | (0.016) | 0.10  | 0.055  |
| Values are estimated mean (SE). Dietary fiber intakes were controlled for total energy using the residual method. |
| SE: standard error, BMI: body mass index, SD-score: standard deviation score. |
| Adjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015) and school (7 schools) at the 1st grade, age (years) and puberty (yes, no) at the 4th grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), physical activity time (tertiles), screen time (quartiles), BMI SD-score (quartiles) at the 1st grade, and the change in the intake of total energy and carbohydrates (quartiles). |

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| **Supplementary table 3** Associations of fiber intake at the 1st grade with BMI SD-score, waist-to-height ratio, and serum fasting glucose during follow-up among 2,784 children. |
| 　 | Fiber intake at the 1st grade (median: g/day) | 　 | 　 | 　 | 　 | 　 | 　 |
| 　 | Q1 (7.4) | 　 | Q2 (9.5) | 　 | Q3 (11.7) | 　 | Q4 (15.3) |  *p* | *trend p* |
| mean | (SE) |  | mean | (SE) | 　 | mean | (SE) | 　 | mean | (SE) |
| *n* | 696 | 　 | 　 | 696 | 　 | 　 | 696 | 　 | 　 | 696 | 　 | 　 | 　 |
| BMI SD-score at the 1st gradea | -0.297  | (0.045) | 　 | -0.347  | (0.036) | 　 | -0.407  | (0.036) | 　 | -0.379  | (0.044) | 0.37  | 0.31  |
| BMI SD-score at the 4th gradeb | -0.190  | (0.025) | 　 | -0.294  | (0.021) | 　 | -0.266  | (0.021) | 　 | -0.286  | (0.025) | 0.010  | 0.11  |
| Change in BMI SD-score from the 1st grade to the 4th gradeb | 0.135  | (0.020) | 　 | 0.069  | (0.017) | 　 | 0.110  | (0.017) | 　 | 0.079  | (0.020) | 0.032  | 0.26  |
| Waist-to-height ratio at the 4th gradeb | 0.430  | (0.002) | 　 | 0.425  | (0.001) | 　 | 0.426  | (0.001) | 　 | 0.424  | (0.001) | 0.042  | 0.039  |
| Fasting glucose at the 4th gradec,d | 86.47  | (0.28) | 　 | 86.15  | (0.23) | 　 | 85.41  | (0.23) | 　 | 85.55  | (0.28) | 0.046  | 0.049  |
| Values are estimated mean (SE). | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| SE: standard error, BMI: body mass index, SD-score: standard deviation score. | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| aAdjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015), school (7 schools), age (years) at the 1st grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), physical activity time (tertiles), screen time (quartiles), and intake of total energy and carbohydrates (quartiles) at the 1st grade |
| bAdjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015) and school (7 schools) at the 1st grade and age (years), puberty (yes, no) at the 4th grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), physical activity time (tertiles), screen time (quartiles), intake of total energy and carbohydrates (quartiles) and BMI SD-score (quartiles) at the 1st grade. |
| cAdjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015) and school (7 schools) at the 1st grade and age (years), puberty (yes, no) at the 4th grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), mother's and father's history of diabetes (yes, no), physical activity time (tertiles), screen time (quartiles), intake of total energy and carbohydrates (quartiles) and BMI SD-score (quartiles) at the 1st grade |
| dThe anlyses on serum glucose are performed among 2,701 participants.  |

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| **Supplementary table 4** Association between change in fiber intake and concurrent change in BMI SD-score from the 1st grade to the 4th grade among 2,744 children |
| 　 | Change in fiber intake (median: g/day) | 　 | 　 | 　 | 　 | 　 | 　 | 　 | 　 |
| 　 | Q1 (-1.1) | 　 | Q2 (1.5) | 　 | Q3 (3.2) | 　 | Q4 (6.2) |  *p* | *trend p* |
| mean | (SE) |  | mean | (SE) | 　 | mean | (SE) | 　 | mean | (SE) |
| *n* | 686 | 　 |  | 686 | 　 | 　 | 686 | 　 | 　 | 686 | 　 | 　 | 　 |
| Change in BMI SD-score | 0.114  | (0.019) | 　 | 0.114  | (0.017) | 　 | 0.077  | (0.017) | 　 | 0.086  | (0.020) | 0.41  | 0.32  |
| Values are estimated mean (SE). |
| SE: standard error, BMI: body mass index, SD-score: standard deviation score. |
| Adjusted for sex (boy, girl), year of entry (2011, 2012, 2013, 2014, 2015) and school (7 schools) at the 1st grade, age (years) and puberty (yes, no) at the 4th grade, sibling (yes, no), birth weight (quartiles), feeding at 4 months old (breast-fed, mix-fed, bottle-fed), exposure to household smoking (0, ≤6, >6 pack-years), mother's age (<30, 30–<35, 35–<40, ≥40 years), mother's and father's overweight (yes, no), physical activity time (tertiles), screen time (quartiles), BMI SD-score (quartiles) at the 1st grade, and the change in the intake of total energy and carbohydrates (quartiles). |