BMI development and early adolescent psychosocial well-being: UK Millennium Cohort Study

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Pediatrics, forthcoming
Objectives were to:

1. identify BMI developmental trajectories across the first decade of life;
2. examine early life predictors of trajectory membership;
3. investigate whether being on a particular BMI trajectory is associated with markers of psychosocial well-being.
Millennium Cohort Study (MCS)

• Sample drawn from all live births in the 4 countries of the UK during 2000-2002
• Clustered at the electoral ward level with oversampling
• 18,552 households
• Home interviews
• 5 sweeps deposited: 9 months and 3, 5, 7 & 11 years
• Next sweep (age 14) available soon
Variables

BMI data (n=16 936)

Exposures:

Pregnancy and infancy factors – mother smoked during pregnancy; child was breastfed; Solids introduced before 4 months; gross motor delay

Early childhood factors – Maternal BMI; sugary drinks; Fruit consumption; skip breakfast; sports participation; TV viewing; non-regular bedtime; late bedtime
Psychosocial outcomes:

- Socioemotional difficulties
- Antisocial activities
- Cigarette smoking
- Drinking alcohol
- Low self-esteem
- Unhappiness
- Body dissatisfaction
Statistical methods:

- Latent class analysis used for trajectory membership
- Regression models to estimate predictors of BMI trajectory membership, and their psychosocial correlates.
BMI trajectories in childhood

- T1 Stable
- T2 Decreasing
- T3 Moderate Increasing
- T4 High Increasing

Age:
- 3
- 5
- 7
- 9
- 11

BMI:
- Overweight range
- Obese range

- 14
- 16
- 18
- 20
- 22
- 24
- 26
- 28
- 30
- 32
‘Modifiable’ predictors of BMI trajectory membership

<table>
<thead>
<tr>
<th></th>
<th>Moderate Increasing</th>
<th>High Increasing</th>
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</thead>
<tbody>
<tr>
<td><strong>Pregnancy and infancy factors</strong></td>
<td></td>
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<tr>
<td>Smoked in pregnancy (Yes)</td>
<td>1.17 (1.03 to 1.33)*</td>
<td>1.97 (1.51 to 2.58)***</td>
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<tr>
<td>Gross motor delay (Yes)</td>
<td>0.92 (0.76 to 1.13)</td>
<td>1.47 (1.05 to 2.04)*</td>
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<tr>
<td><strong>Early childhood factors</strong></td>
<td></td>
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</tr>
<tr>
<td>Maternal BMI</td>
<td>1.10 (1.09 to 1.11)***</td>
<td>1.14 (1.12 to 1.16)***</td>
</tr>
<tr>
<td>Skip breakfast (Yes)</td>
<td>1.66 (1.37 to 2.02)***</td>
<td>1.76 (1.21 to 2.56)**</td>
</tr>
<tr>
<td>Non-regular bedtime (Yes)</td>
<td>1.22 (1.01 to 1.46)*</td>
<td>1.55 (1.08 to 2.22)*</td>
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<tr>
<td>Late bedtime (Yes)</td>
<td>1.26 (1.00 to 1.57)*</td>
<td>1.50 (0.93 to 2.41)</td>
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</tbody>
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*p<0.05, **p<0.01, ***p<0.001
### Psychosocial well-being at age 11 by BMI trajectory compared with the ‘stable’ group

<table>
<thead>
<tr>
<th>Category</th>
<th>Moderate Increasing</th>
<th>High Increasing</th>
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</thead>
<tbody>
<tr>
<td>Emotional symptoms</td>
<td>0.18 (0.05 to 0.32)**</td>
<td>0.53 (0.25 to 0.80)***</td>
</tr>
<tr>
<td>Conduct problems</td>
<td>0.03 (-0.06 to 0.11)</td>
<td>0.38 (0.17 to 0.60)***</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>-0.04 (-0.19 to 0.11)</td>
<td>0.27 (-0.07 to 0.60)</td>
</tr>
<tr>
<td>Peer problems</td>
<td>0.27 (0.16 to 0.38)***</td>
<td>0.84 (0.58 to 1.11)***</td>
</tr>
<tr>
<td>Prosocial behaviour</td>
<td>0.16 (0.06 to 0.25)**</td>
<td>0.16 (-0.04 to 0.35)</td>
</tr>
<tr>
<td>Antisocial activities</td>
<td>0.00 (-0.04 to 0.03)</td>
<td>0.03 (-0.06 to 0.11)</td>
</tr>
<tr>
<td>Smoked cigarettes</td>
<td>2.03 (1.65 to 2.75)***</td>
<td>5.05 (2.56 to 16.11)***</td>
</tr>
<tr>
<td>Drank alcohol</td>
<td>1.19 (0.98 to 1.43)</td>
<td>1.82 (1.23 to 2.66)*</td>
</tr>
<tr>
<td>Low self-esteem</td>
<td>0.28 (0.15 to 0.41)***</td>
<td>0.84 (0.51 to 1.16)***</td>
</tr>
<tr>
<td>Unhappiness</td>
<td>0.66 (0.27 to 1.06)**</td>
<td>2.07 (1.15 to 2.99)***</td>
</tr>
<tr>
<td>Body dissatisfaction</td>
<td>0.47 (0.37 to 0.57)***</td>
<td>0.98 (0.76 to 1.19)***</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001
Conclusion:

• Several potentially modifiable early life factors including smoking in pregnancy, skipping breakfast and bedtime routines were important predictors of BMI development in the overweight and obese range

• BMI growth in the overweight and obese range was linked to worse psychosocial well-being in early adolescence.
Bridging social and biological sciences

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