

# FACTORS THAT PREDICT ABNORMAL GROWTH

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## AIM

The main aim of the study is to identify the primary trajectories of Body Mass Index (BMI) development. More specific, the aim is to identify the trajectories that may lead to overweight or obesity for children at later stages of life and which factors are affecting this abnormal growth.

## MATERIAL AND METHODS

The longitudinal data consists of growth measurements from 6906 Finnish children from six birth cohorts: 1974 (n=1108), 1981 (n=977), 1991 (n=586), 1995 (n=786), 2001 (n=765) and 2004 (n=2684). The anthropometric data was collected from birth up to age 15 in the health records as well as the pregnancy health data for birth cohorts 1991, 1995, 2001 and 2003-04.

A trajectory analysis was used to identify trajectories for BMI development. Factors that lead to abnormal growth tracks were analyzed using logistic regression models.

## RESULTS

- Trajectory analysis identified four main trajectories of BMI growth. The highest growth track appears to lead to overweight (the overweight growth track, OGT). The second interesting track (pink line), which differs from the "normal growth tracks" was named as the low birth BMI track (LBT). The main characteristic of this track is that early BMI level is low, but the growth accelerates after approximately the adiposity rebound point. The other two trajectories were named as the upper normal growth track (UNT) and the lower normal growth track (LNT).

**Table 1.** Size and percentage of observations on each track with sex and birth cohorts.

	Size n	Boys %	Girls %	1974 %	1981 %	1991 %	1995 %	2001 %	2003-04* %	Total %
<b>LBT</b>	346	7	6	7	4	6	7	6	7	6
<b>OGT</b>	1282	24	22	19	22	24	26	26	23	23
<b>UNT</b>	2446	43	44	49	44	45	42	42	42	44
<b>LNT</b>	1534	27	28	25	30	25	25	28	28	27

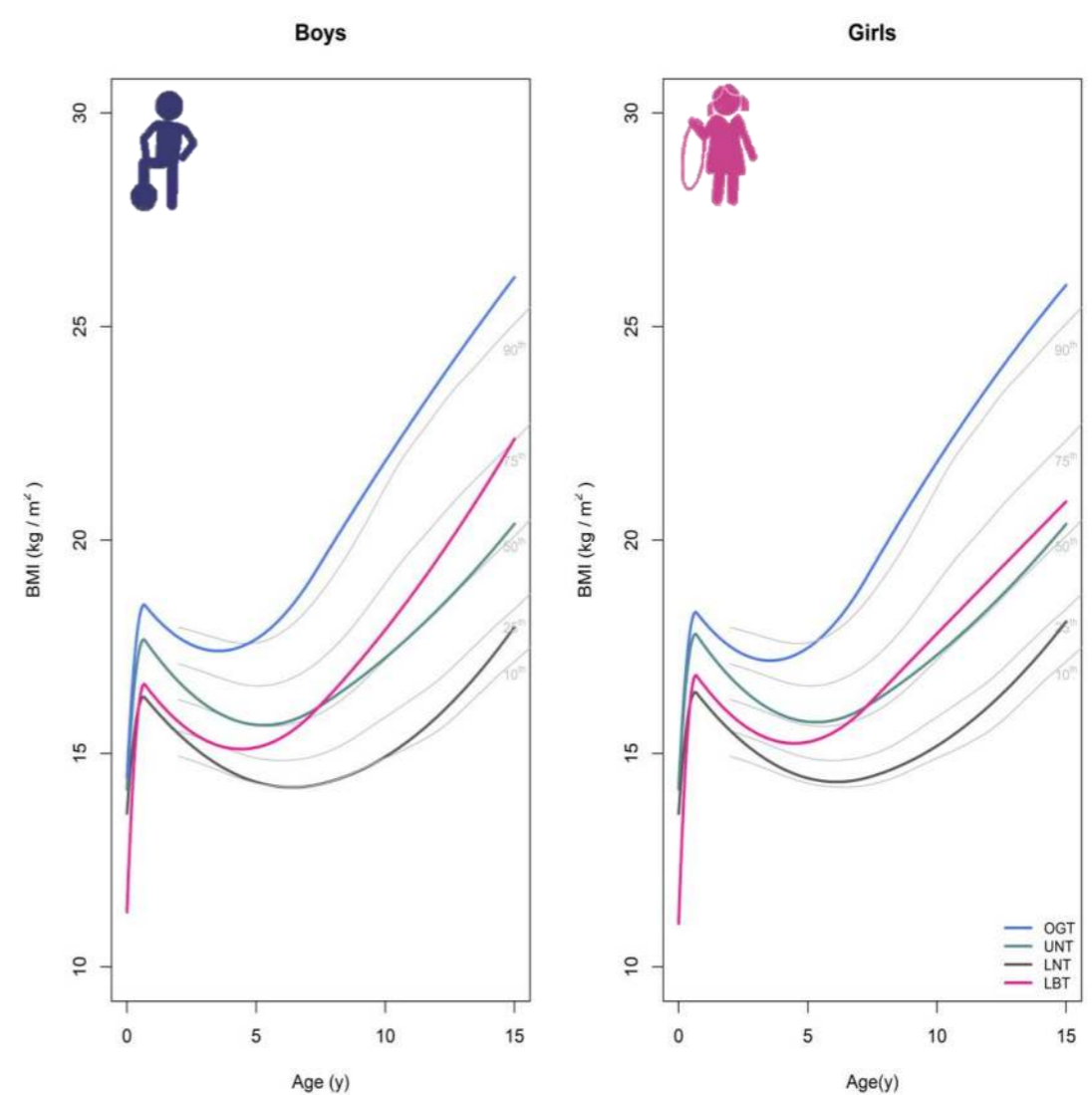
\* This cohort is measured only until 12 years of age.

- Pre-pregnancy BMI, gestational diabetes mellitus (GDM) and gestational weight gain (GWG) are associated with higher risk for overweight growth track.

**Table 2.** Association between maternal variables and OGT and LBT in birth cohorts 1991, 1995, 2001 and 2003-04.

	N (%)	Risk of OGT		Risk of LBT	
		OR (95%CL)	OR <sup>a</sup> (95%CL)	OR (95%CL)	OR <sup>a</sup> (95%CL)
<b>Pre-pregnancy BMI &amp; GDM</b>					
Normal weight, <25 kg/m <sup>2</sup> , no GDM	2030 (69%)	1.00	1.00	1.00	1.00
Normal weight, <25 kg/m <sup>2</sup> , yes GDM	115 (4%)	1.25 (0.69-2.26)	1.13 (0.47-2.71)	0.50 (0.12-2.09)	0.79 (0.09-6.97)
Overweight/obesity, ≥25 kg/m <sup>2</sup> , no GDM	499 (17%)	2.35 (1.82-3.02)	1.77 (1.17-2.68)	1.61 (1.06-2.46)	1.36 (0.45-4.12)
Overweight/obesity, ≥25 kg/m <sup>2</sup> , yes GDM	287 (10%)	2.94 (2.13-4.04)	2.12 (1.31-3.45)	1.40 (0.79-2.48)	1.78 (0.53-5.97)
<b>GWG according to IOM (2)</b>					
Normal weight gain	778 (58%)	1.00	1.00	1.00	1.00
Greater weight gain than recommendation	561 (42%)	1.91 (1.41-2.58)	1.47 (1.06-2.05)	0.66 (0.38-1.16)	1.09 (0.47-2.54)

<sup>a</sup> Adjusted for birth weight, gender, pregnancy weeks, maternal age, smoking during pregnancy, child order, and breastfeeding.



**Figure 1.** Mean trajectory curves for boys (left) and girls (right). The blue line indicates the overweight growth track (OGT) and the pink line indicates the low birth BMI growth track (LBT). Finnish reference quartile curves (95th, 50th, 10th and 5th) are marked in grey.

## CONCLUSION

- Trajectory analysis provides a powerful tool to analyse longitudinal data and the development of BMI.
- Maternal factors are associated with higher risk for overweight growth track.
- These results suggest primary prevention strategies for offspring obesity by targeting maternal pre-pregnancy BMI and gestational weight gain.

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### Reference:

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