

# Are age and initial BMI-SDS in obese children and adolescents associated with the BMI-SDS trajectories during and after the attendance of an inpatient weight-loss program (LOGIC-trial)?\*

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## Conclusion

Our results suggest that the degree of overweight is an essential determinant for BMI-SDS trajectories in children and adolescents under and after termination of an inpatient weight loss program up to 1-year follow-up examination. Moderate overweight participants showed a stronger decrease in BMI-SDS values under treatment than severely obese participants. Age group at baseline had no significant effect on BMI-SDS trajectories. Long-term results are needed.

## Introduction

A longitudinal observation study of obese children and adolescents, which took part on a 3-year behavioral treatment study to reduce their weight, showed, that treatment was less effective for the older moderately obese children. Several obese adolescents showed no reduction in BMI-SDS score at all after 1,2, or 3 years of behavioral treatment. The effect of behavioral treatment was more effective among 6 to 9 years old children than in the older age groups [Danielsson et al. (2012):Response of severely obese children and adolescents to behavioral treatment. Arch Pediatr Adolesc Med; 166(12):1103-8].

## Aim

The aim of this study was to investigate the impact of age and degree of overweight at baseline on the BMI-trajectories under treatment (inpatient weight loss treatment) and after termination up to 1-year follow-up examination in participants of the LOGIC-trial.

## Methods

### Long-term effects of lifestyle intervention in Obesity and Genetic Influence in Children (LOGIC-trial)

#### Study participants

- 6 to 19 years old overweight and obese children, who are referred to the rehabilitation center Klinik Schönsicht in Berchtesgaden (Germany) by their local pediatrician to have an inpatient weight-loss treatment
- *Criteria for attending the inpatient weight loss program:* overweight (BMI 90.-97th percentile), obesity (BMI 97.-99.5th percentile) or severely obesity (BMI > 99.5th percentile), repeated failure to accomplish weight-loss in outpatient therapies
- *Exklusion criteria:* obesogenic diseases and disorders such as the Prader-Willi Syndrome, Cushing Syndrome, early withdrawal from the inpatient program (< 3 weeks) → N=1.010 participants

#### Study design

- *Intervention:* focuses on a calorie restricted balanced diet, an increase in physical activity and behavioral counseling
- *Duration of intervention:* 4 to 6 weeks
- *Baseline examination (T0):* (a) Clinical examination: age (yrs), gender, tanner stage, BMI (kg/m<sup>2</sup>), BMI-SDS [Kromeyer-Hauschild, 2001], waist circumference (cm); (b) Questionnaire: parental BMI (kg/m<sup>2</sup>), school education (years) and migration background (no vs yes)
- *End of treatment (T1) and at 1-year Follow-up examination (T2):* age, BMI-SDS

#### Statistics

- *Variates:* BMI-SDS at T0, T1, T2; gender; age group at T0 (7-11 yrs, 12-14 yrs, ≥15 yrs), BMI-SDS at T0: moderate overweight (<75th internal percentile), severely obesity (≥75th internal percentile)
- *Handling missing longitudinal BMI-values and baseline covariates:* Multiple Imputation (MI)
- *Modeling of BMI-SDS trajectories:* linear mixed effects models (piecewise linear spline with a knot at T1)

## Contact

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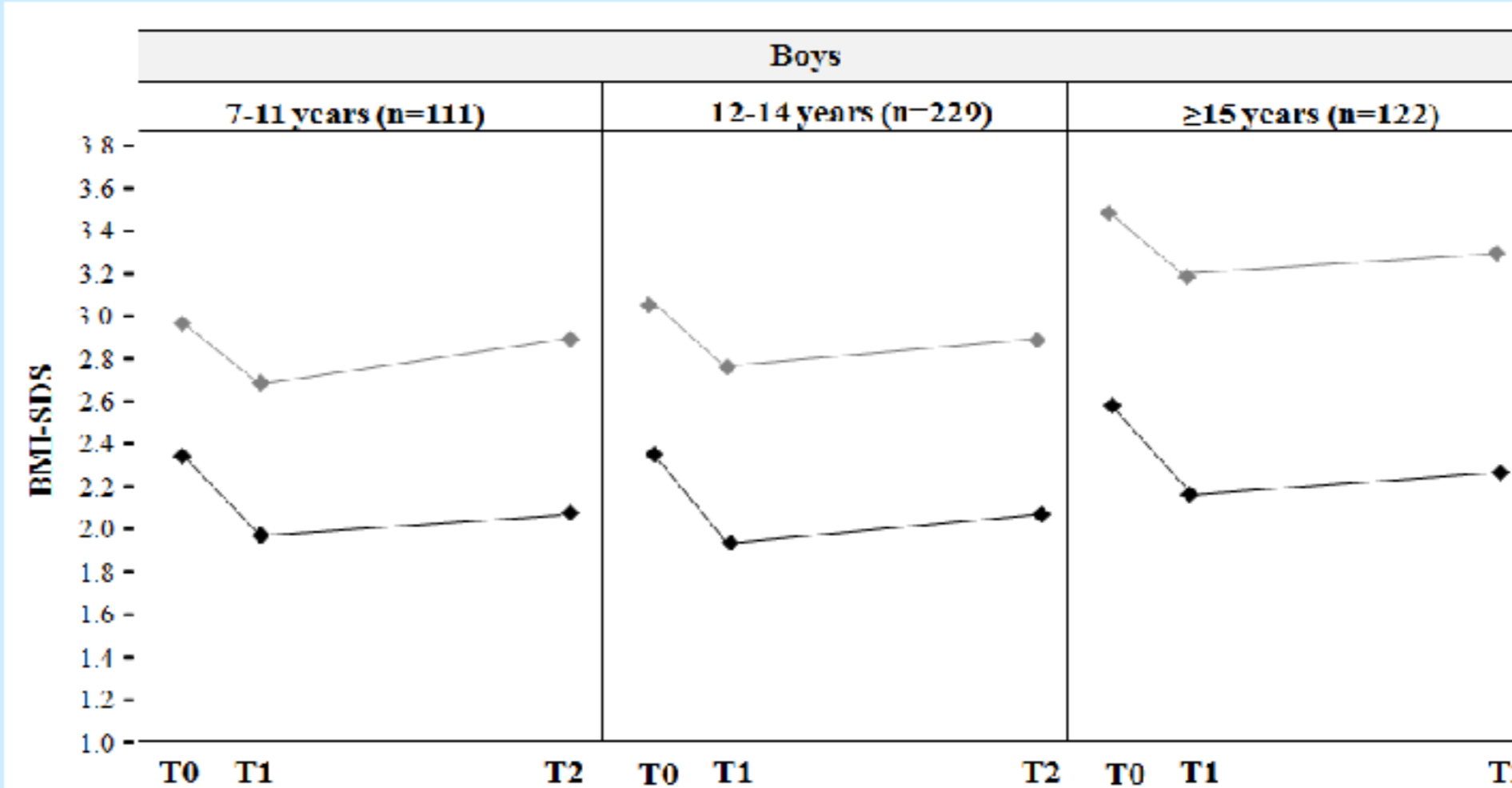
## Results

**Table 1.** Linear mixed effects model – Test for the effect of degree of overweight at T0 on BMI-SDS trajectories in boys (n=462) and in girls (n=548)

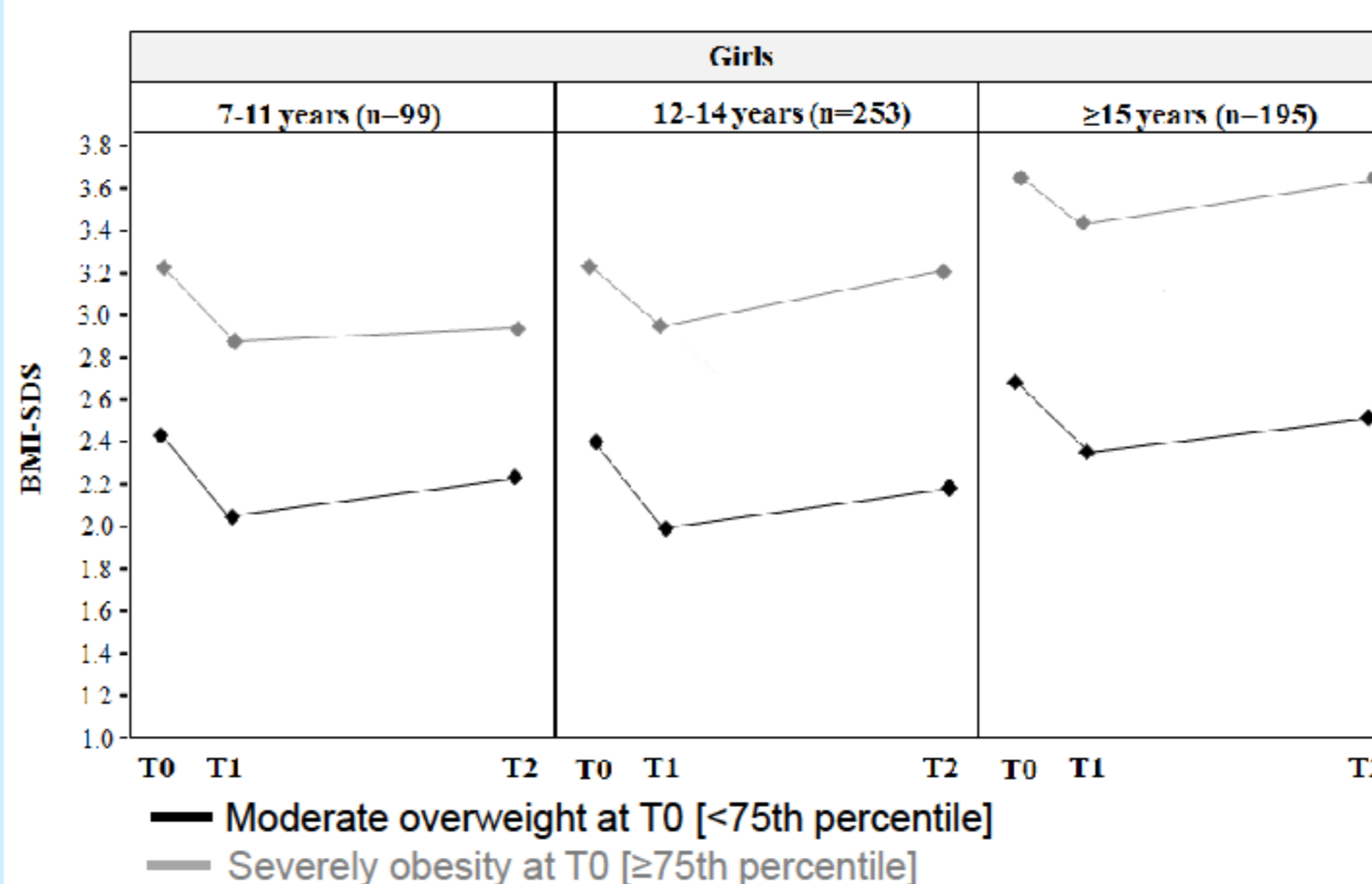
|                                | Boys [N=462] |         |         | Girls [N=548] |         |         |
|--------------------------------|--------------|---------|---------|---------------|---------|---------|
|                                | Estimate     | SD      | p-value | Estimate      | SD      | p-value |
| BMI-SDS at T0 (Intercept)      | 2.4246       | 0.00718 | <0.0001 | 2.5385        | 0.00777 | <0.0001 |
| Moderate overweight at T0      | Ref          |         |         | Ref           |         |         |
| Severely obesity at T0         | 0.7308       | 0.01459 | <0.0001 | 0.9139        | 0.01579 | <0.0001 |
| Time (T0-T1)                   | -0.01151     | 0.00027 | <0.0001 | -0.01041      | 0.00029 | <0.0001 |
| Time_1 (T1-T2)                 | 0.01193      | 0.00029 | <0.0001 | 0.01097       | 0.00031 | <0.0001 |
| Severely obesity at T0 *Time   | 0.003421     | 0.00054 | <0.0001 | 0.002314      | 0.00058 | <0.0001 |
| Severely obesity at T0 *Time_1 | -0.00339     | 0.00058 | <0.0001 | -0.00228      | 0.00062 | 0.0003  |

**Table 2.** Linear mixed effects model – Test for the effect of age group at T0 on BMI-SDS trajectories in boys (n=462) and in girls (n=548)

|                                  | Boys [N=462] |          |         | Girls [N=568] |          |         |
|----------------------------------|--------------|----------|---------|---------------|----------|---------|
|                                  | Estimate     | SD       | p-value | Estimate      | SD       | p-value |
| BMI-SDS at T0 (Intercept)        | 2.5009       | 0.01602  | <0.0001 | 2.5814        | 0.01996  | <0.0001 |
| Age group 1 (7-11 years)         | Ref          |          |         | Ref           |          |         |
| Age group 2 (12-14 years)        | 0.0147       | 0.01953  | 0.4517  | 0.06854       | 0.02355  | 0.0036  |
| Age group 3 (>15 years)          | 0.3539       | 0.02217  | <0.0001 | 0.3929        | 0.02451  | <0.0001 |
| Time (T0-T1)                     | -0.01048     | 0.000614 | <0.0001 | -0.00857      | 0.000764 | <0.0001 |
| Time_1 (T1-T2)                   | 0.01096      | 0.000657 | <0.0001 | 0.008999      | 0.000817 | <0.0001 |
| Age group 2 (12-14 years)*Time   | 0.000325     | 0.000741 | 0.6609  | -0.00065      | 0.000891 | 0.2878  |
| Age group 2 (12-14 years)*Time_1 | -0.00039     | 0.000792 | 0.6225  | 0.001043      | 0.000953 | 0.2741  |
| Age group 3 (>15 years)*Time     | -0.00139     | 0.000836 | 0.0967  | -0.00126      | 0.000937 | 0.1787  |
| Age group 3 (>15 years)*Time_1   | 0.001313     | 0.000892 | 0.1411  | 0.001453      | 0.001003 | 0.1474  |



**Figure 1.** BMI-SDS trajectories under treatment (T0-T1) and after termination of treatment (T1-T2) in boys in dependence on age and degree of overweight at start of treatment



**Figure 2.** BMI-SDS trajectories under treatment (T0-T1) and after termination of treatment (T1-T2) in girls in dependence on age and degree of overweight at start of treatment

1. Moderately overweight participants showed a significantly stronger decrease in BMI-SDS under treatment and a less stronger increase after termination of treatment than severely obese participants (boys and girls)
2. There was no significant effect of age group at start of treatment on BMI-SDS trajectories under treatment and after termination of treatment

## Disclosure Statement

The authors have nothing to disclose.

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