

Background:

Low birth-weight (bw), unfavourable intrauterine conditions, and post-natal catch-up growth are associated with a subsequent impact on growth, pubertal maturation and metabolic disturbances later in life. However, very little is known about the impact on thyroid function.

Objective:

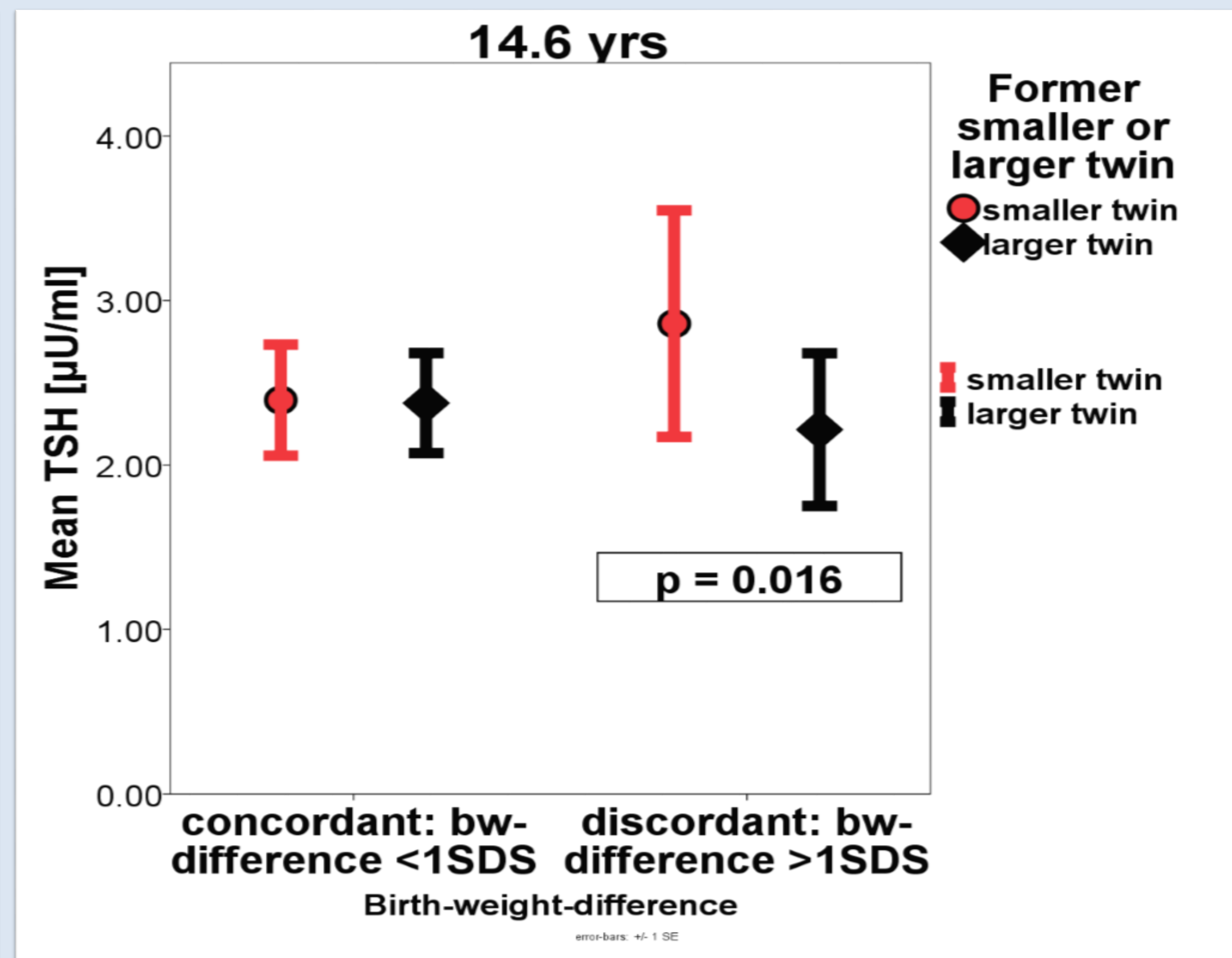
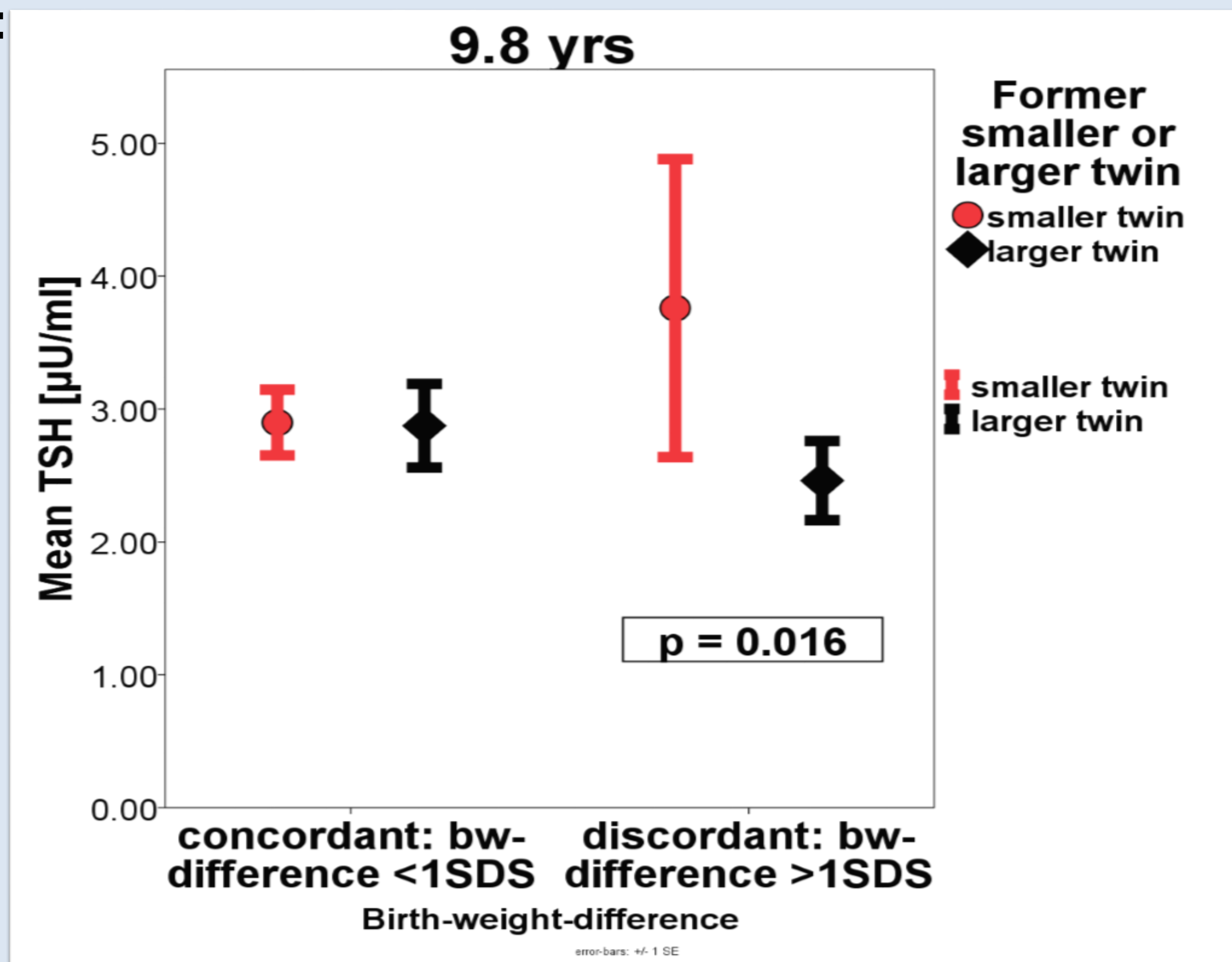
In a longitudinal study we observed 30 genetically identical twins with intra-twin birth-weight-differences from birth until adolescence to objectify the impact of a lower birth-weight on development and health in later life.

Subjects/Methods:

Birth-weight-difference of <1SDS was defined **concordant**, Birth-weight-difference >1SDS was defined **discordant**.

Blood sampling was performed at a mean age of 9.8 yrs (12 concordant, 13 discordant) and 14.6 yrs (14 concordant, 11 discordant).

Results:

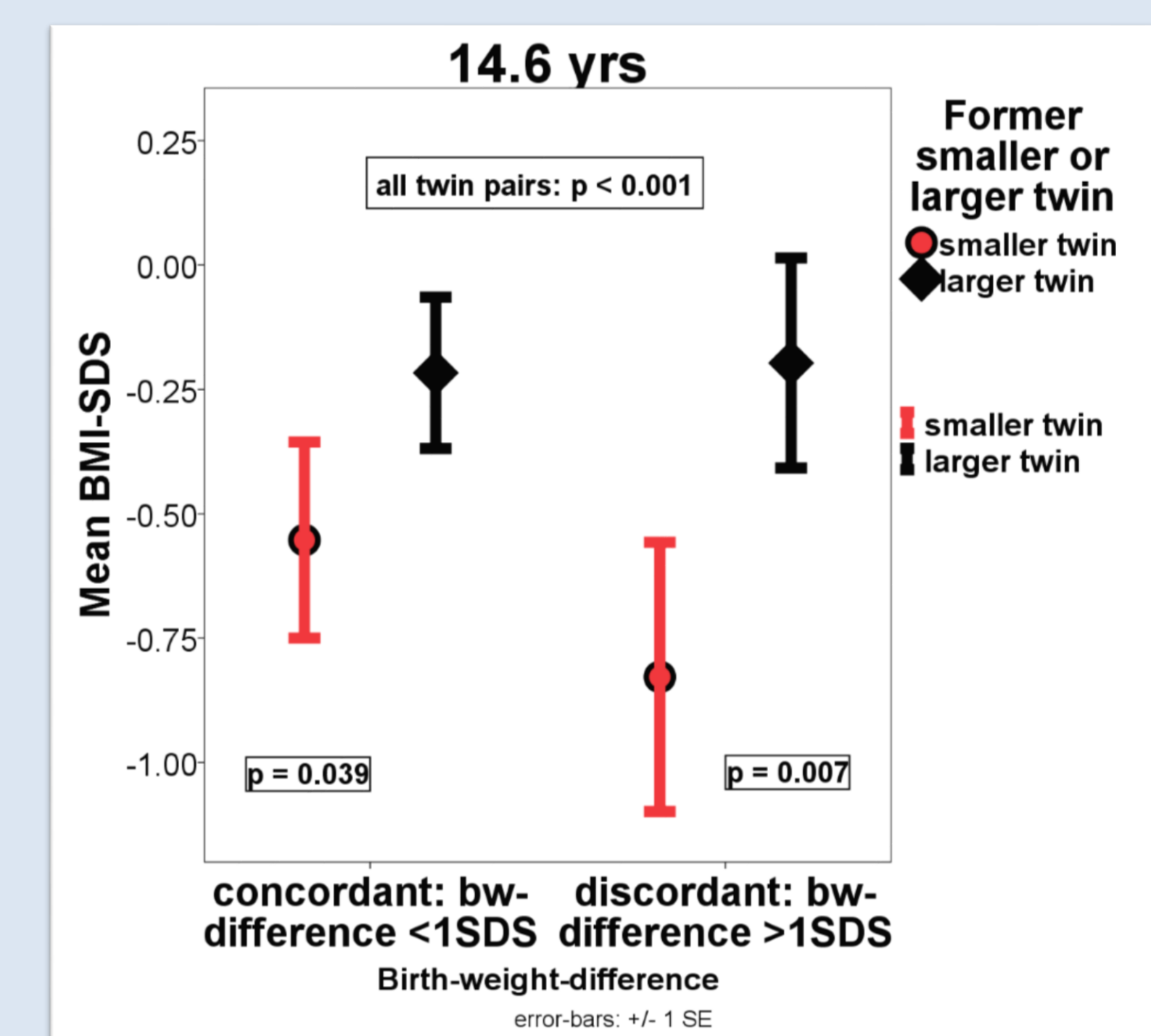
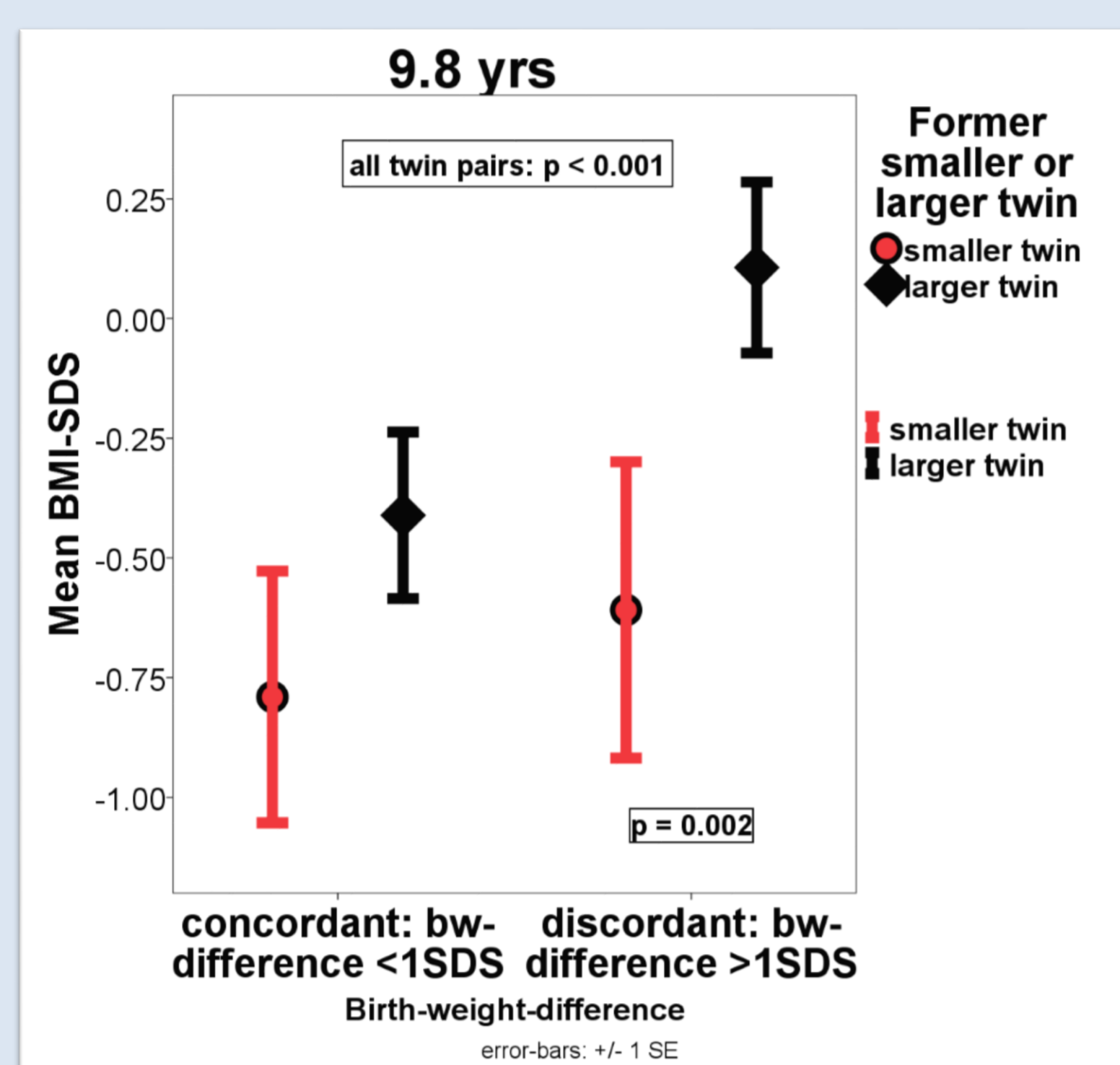


9.8 yrs:

- **concordant twins:**
 - no significant differences in TSH, T3, T4 and TBG levels
- **discordant twins:**
 - significant difference in TSH levels ($p = 0.016$), the former smaller twins had higher TSH mean concentrations than their former larger co-twins (3.76 vs 2.46 µU/ml)
 - no significant differences in T3, T4 and TBG levels
- **all twin-pairs:** the former smaller twins still had a significant lower BMI-SDS than their larger co-twins ($p < 0.001$)

14.6 yrs:

- **concordant twins:**
 - no significant differences in TSH, T3, fT4, T4 and TBG levels
- **discordant twins:**
 - significant difference in TSH concentration ($p = 0.016$), the former smaller twins revealed higher TSH mean levels than their former larger co-twins (2.86 vs 2.22 µU/ml)
 - no significant differences were observed in T3, fT4, T4 and TBG levels
- **all twin-pairs:** the former smaller twins still had a significant lower BMI-SDS than their larger co-twins ($p < 0.001$).



Discussion:

At the age of 14.6 yrs we excluded two of our 13 discordant twin pairs due to thyroid pathology and L-thyroxine-treatment in one or both twins. In the discordant twin pairs, one female former smaller twin presented notable outliers in TSH concentration (9.8 yrs: 16,8 µU/ml, 14.6 yrs: 8,98 µU/ml). Because of this elevation, the girl had been regularly controlled by her treating paediatrician. She had no clinical symptoms of hypothyroidism, no sonographic thyroid pathology, no thyroid antibodies and never showed low peripheral hormones. Because of this and because her results were consistent with the mean trend, we decided not to exclude this pair solely due to statistical reasons.

Conclusion:

In this special group of monozygotic twins with intra-twin bw-differences, we could show that bw has a long-lasting impact on thyroid function. The significantly higher TSH concentrations at 9.8 and 14.6 yrs in the former smaller twins who were born with a greater bw-difference indicate the possibility of a TSH-set-point-alteration in low-bw-children.