

Long-term effects of differences in fetal environment: endocrine influences on cognitive function and personality in teen monozygotic twins

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Conclusion

Endocrine parameters are closely linked to differences in personality and quality of life in adolescent monozygotic twins. Results also suggest an impact on cognitive function. Birth-weight differences did not result in intra-twin differences regarding cognitive function and hormone levels during/ after puberty.

Background

Low birth-weight (bw) and unfavourable intrauterine are associated with long-term effects on life. While influencing longitudinal growth and weight development, psychiatric and metabolic difficulties in later life have also been reported.

Objective and Hypotheses

In a longitudinal study we followed genetically identical twins with intra-twin bw differences due to twin-twin transfusion syndrome (tts) from birth until after puberty. We propose that differences in bw lead to differences in hormone levels with effects on personality and cognitive function.

Methods

46 pairs (21 female) of monozygotic twins with intra-twin bw-differences (birth data available for all)

- differentiation between donators (lower birth weight) and acceptors (higher birth weight)

42 pairs during/ post puberty 15.0 years (SD 1.0)

- endocrine parameters (fasting blood draw) – 37 pairs
- psychological questionnaires – 38 pairs

28 pairs after puberty 17.0 years (SD 1.0)

- cognitive function – 24 pairs
- psychological questionnaires – 28 pairs

Psychological questionnaires

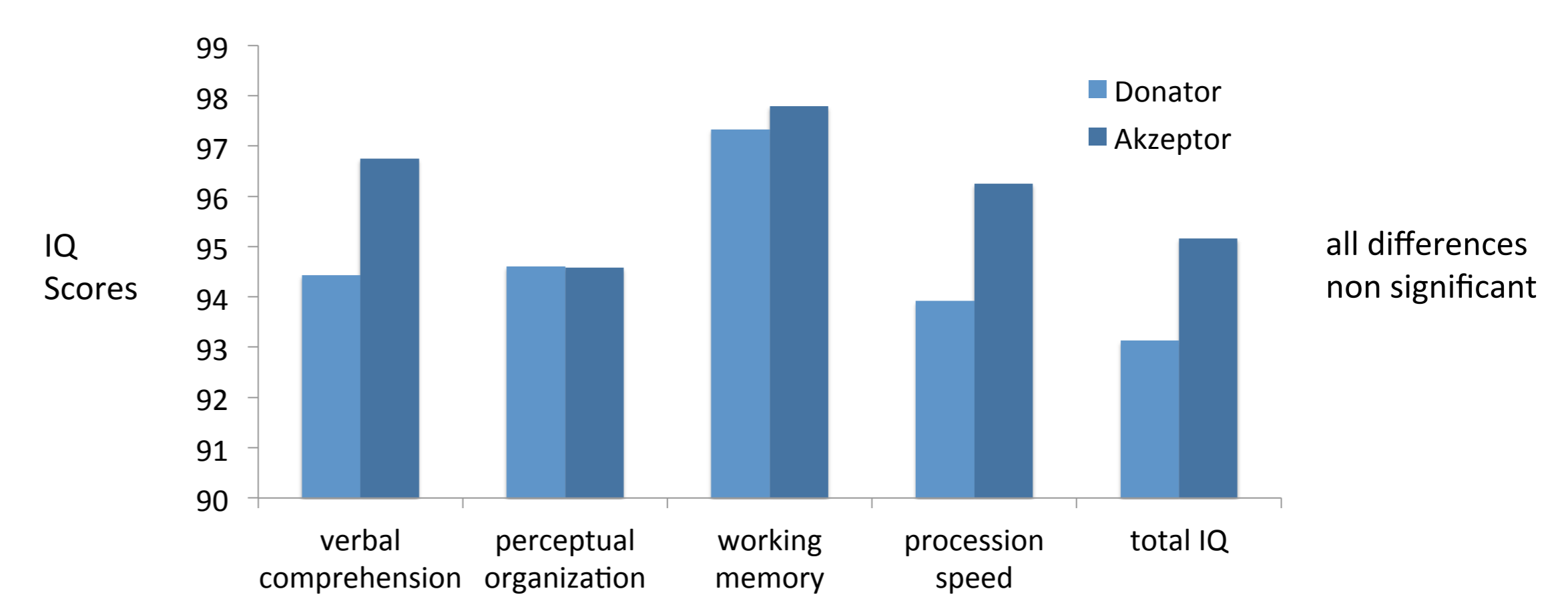
- Strength and Difficulties Questionnaire¹ (self- and parent-version)
- Kidscreen-52 – Health Related Quality of Life² (QoL)
- Cognitive function – Wechsler Adult Intelligence Scale³

Results I - Influence of birth weight differences

no significant correlation b/w bw SDS and cognitive function

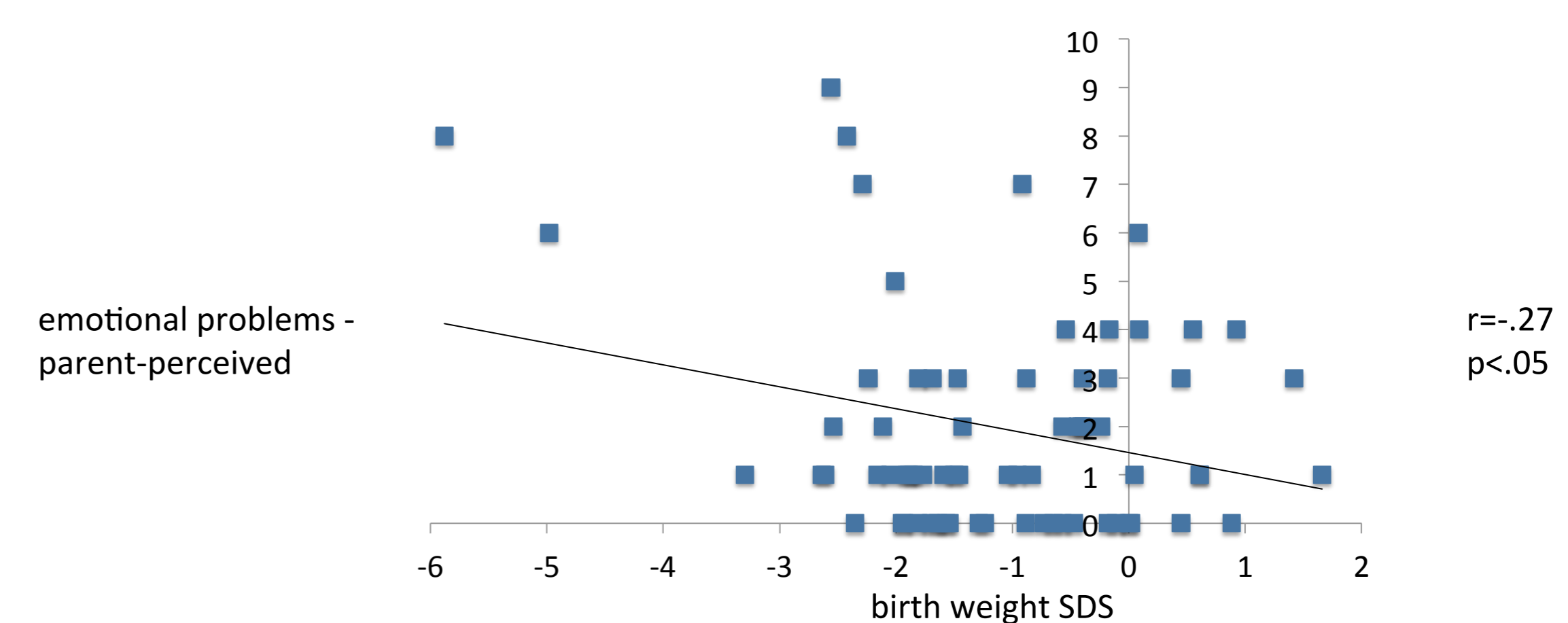
no significant differences b/w donators and acceptors (paired t-tests) regarding

- cognitive function - descriptively slightly better scores for acceptors
- endocrine parameters
- psychological questionnaires (self- and parent-evaluation)



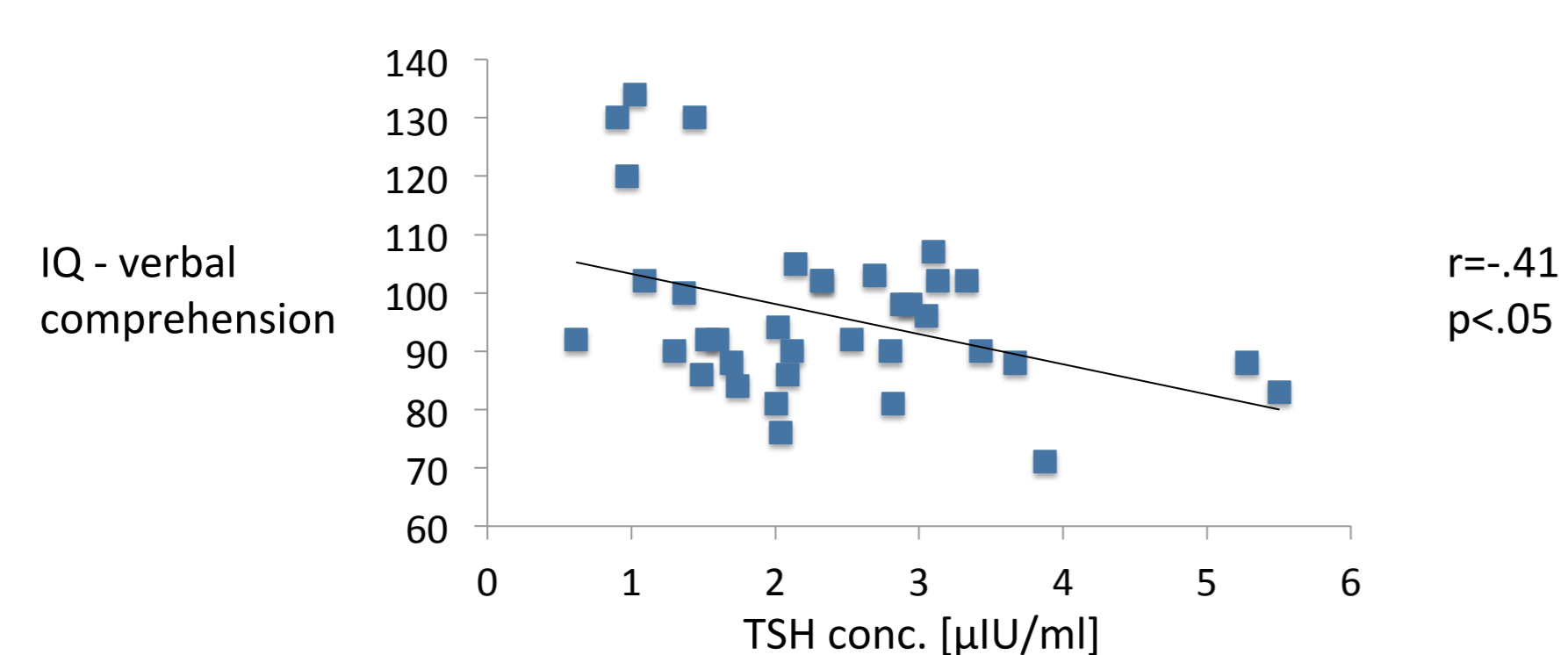
negative correlation b/w bw SDS and parent-perceived emotional problems at 15.0y

negative correlation b/w bw SDS and QoL regarding bullying at 17.0y, $r=-.34$, $p<.05$, lower bw → greater QoL regarding bullying



Results II - Endocrine parameters and IQ

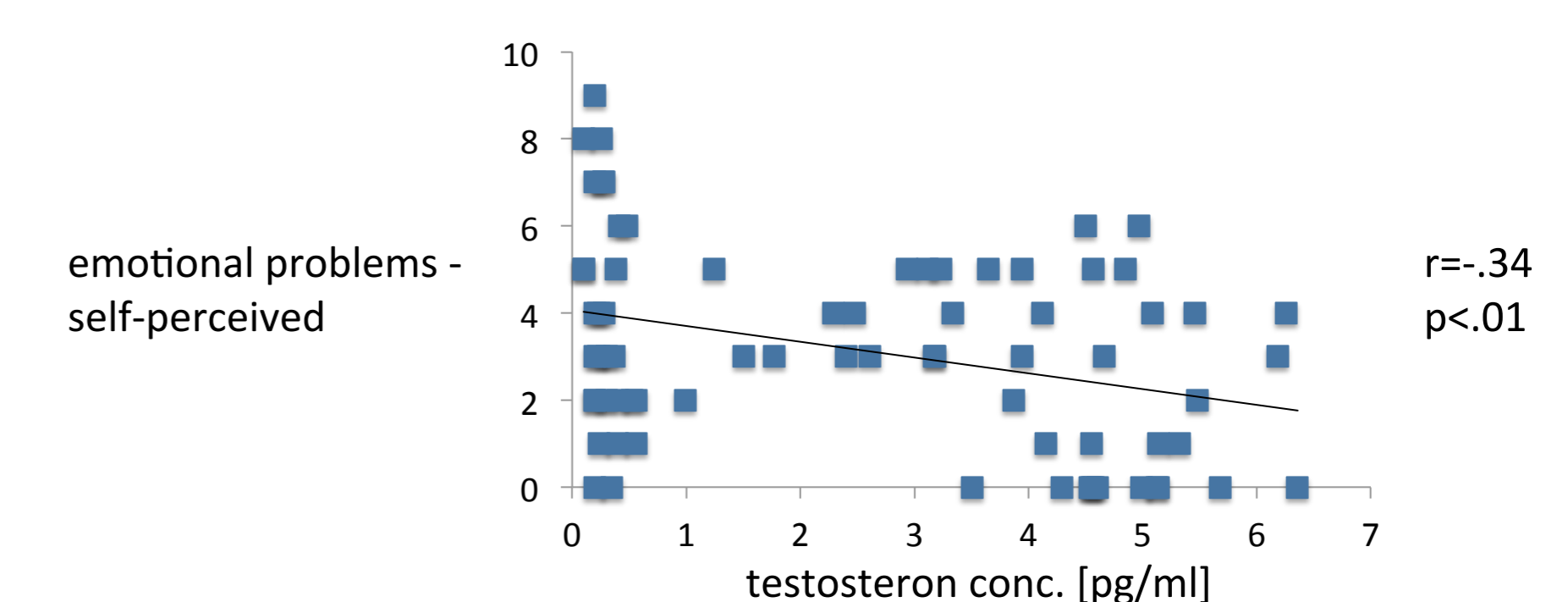
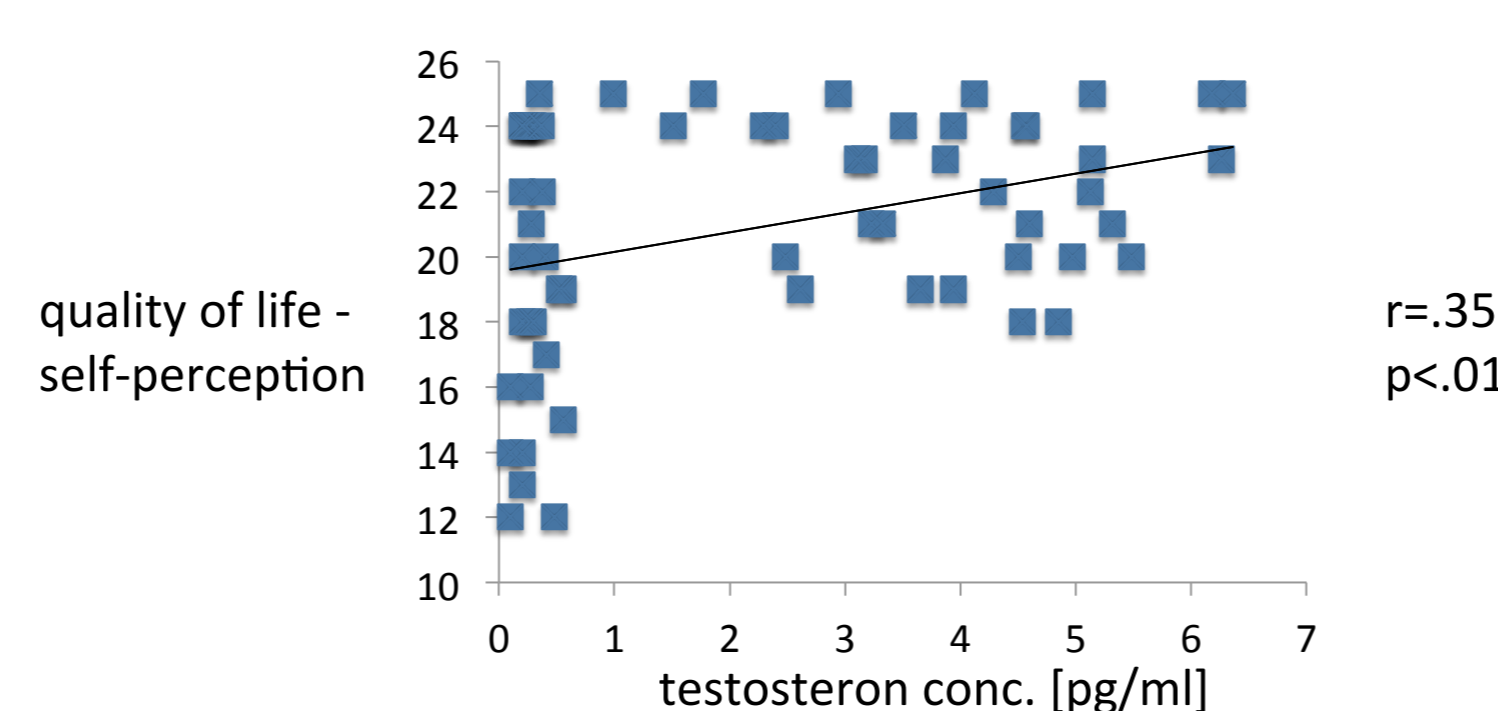
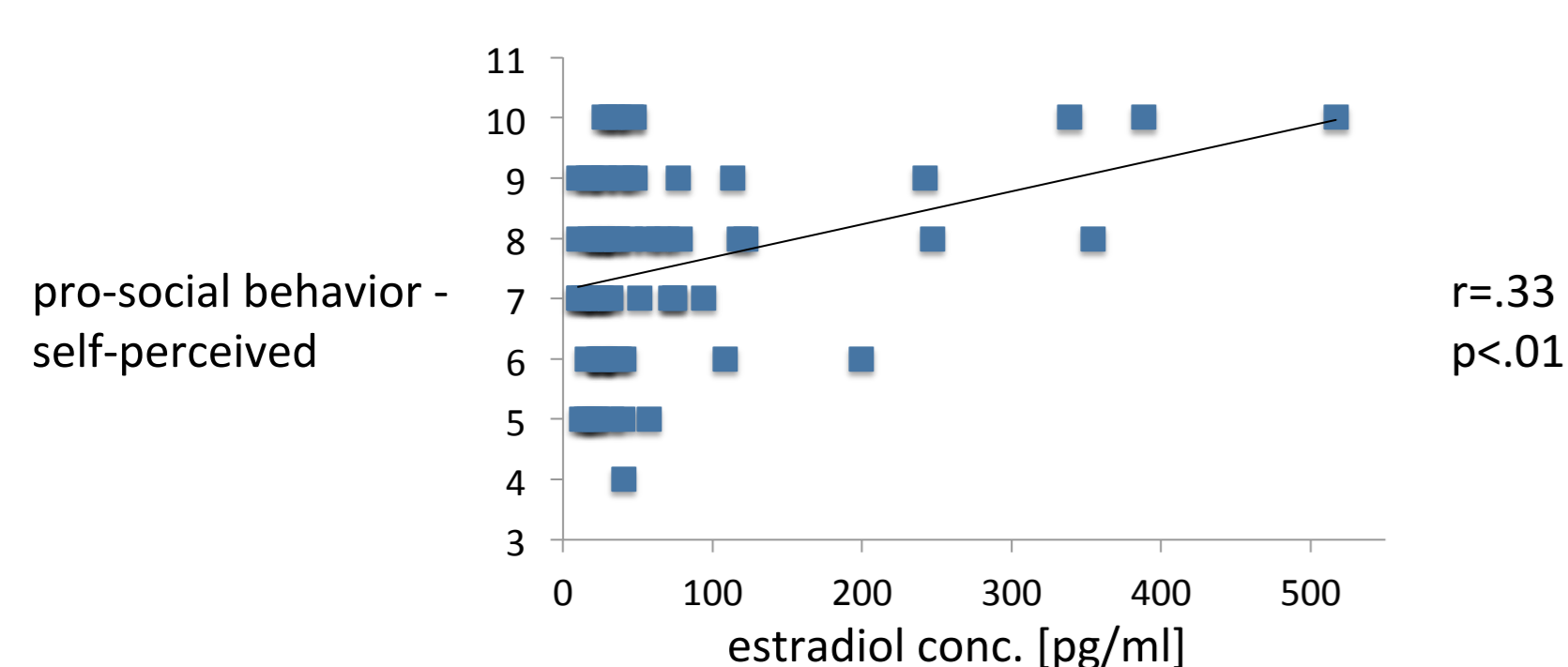
negative correlation b/w TSH conc. and verbal comprehension



Results III - Endocrine parameters and psychological measures

positive correlation b/w estradiol conc. and self-perceived pro-social behavior

positive correlation b/w testosteron conc. and QoL self-perception, negative correlation b/w testosteron conc. and self-perc. emotional problems



¹ Strengths and Difficulties Questionnaire (SDQ-Selbst und Eltern). Goodman R (1997) The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, 38, 581-586.

² Kidscreen-52 (Health Related Quality of Life). Ravens-Sieberer, U & the European KIDSCREEN Group (2006). *The KIDSCREEN Questionnaires - Quality of life questionnaires for children and adolescents - Handbook*. Lengerich: Pabst Science Publisher.

³ Wechsler Adult Intelligence Scale (WAIS-IV). Wechsler, D (2014). *Wechsler Adult Intelligence Scale - Fourth Edition (WAIS-IV)*.

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