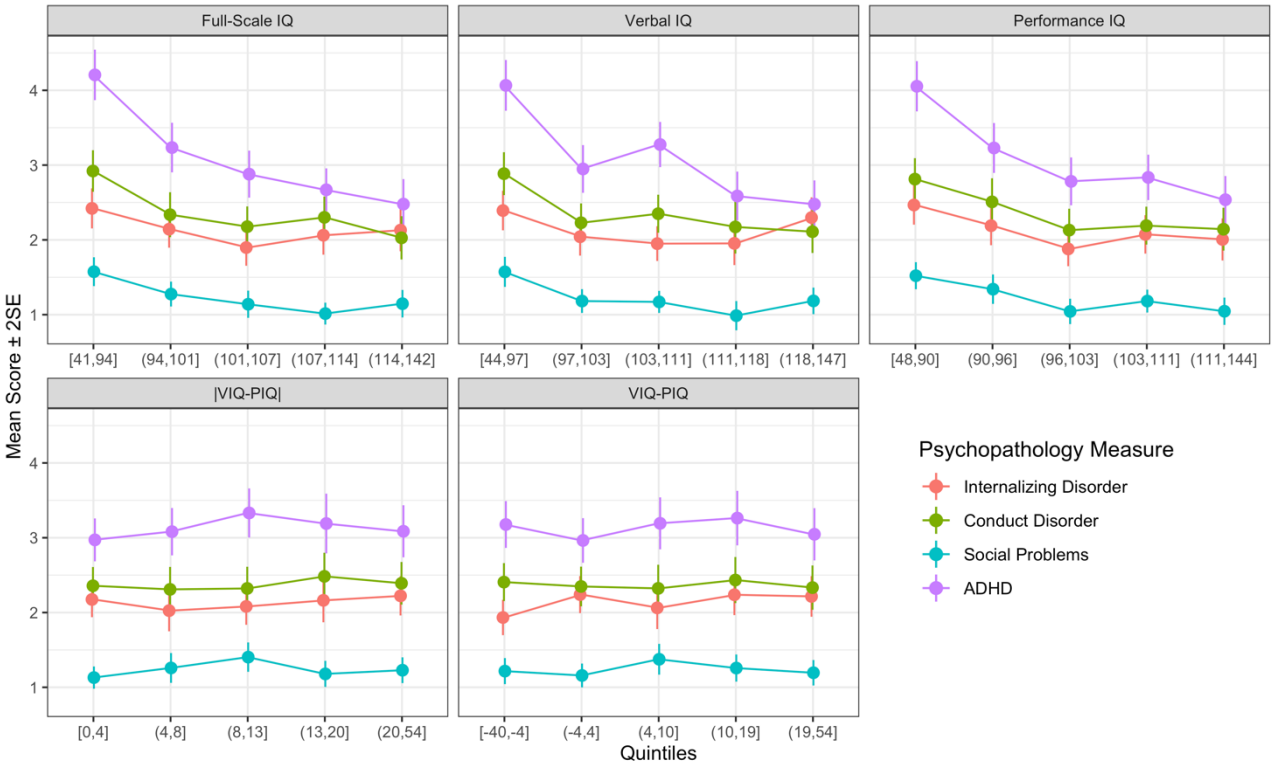
Supplementary material for “Relations between intelligence index score discrepancies and psychopathology symptoms in the EDEN Mother-child birth cohort”

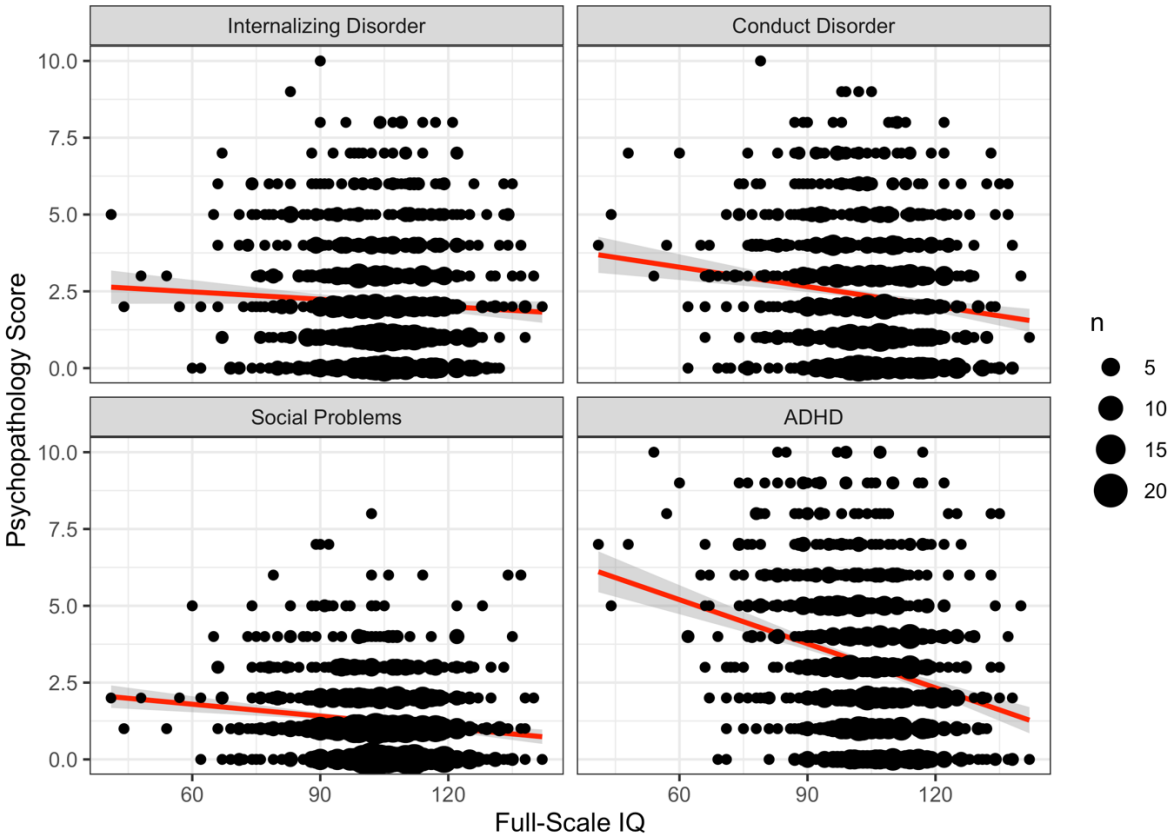
Supplement 1: Graphs for relations between IQ index scores and psychopathology scales at 5.5 years old

Graphs by quintile of IQ index scores

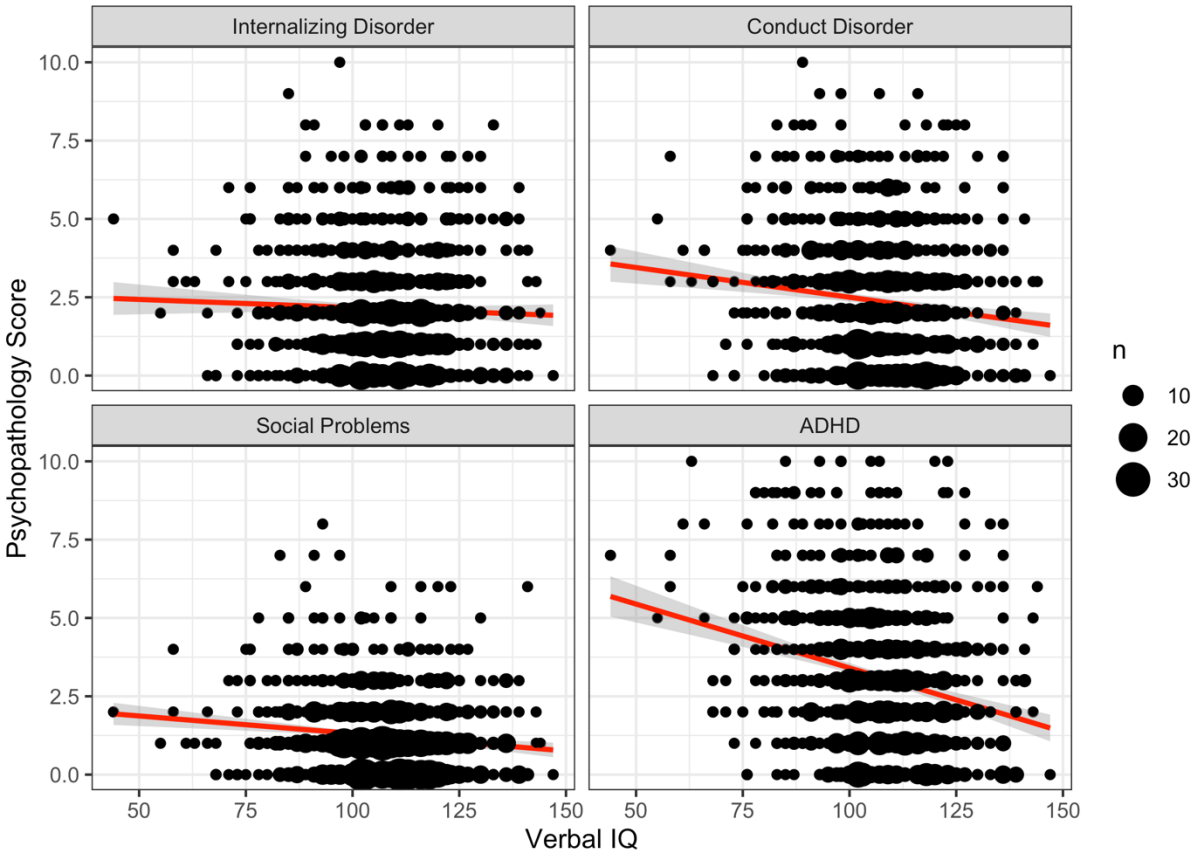


Supplementary figure 1.1. *Psychopathology scale scores (mean ± SE) as a function of IQ index score quintile, at 5.5 years old.*

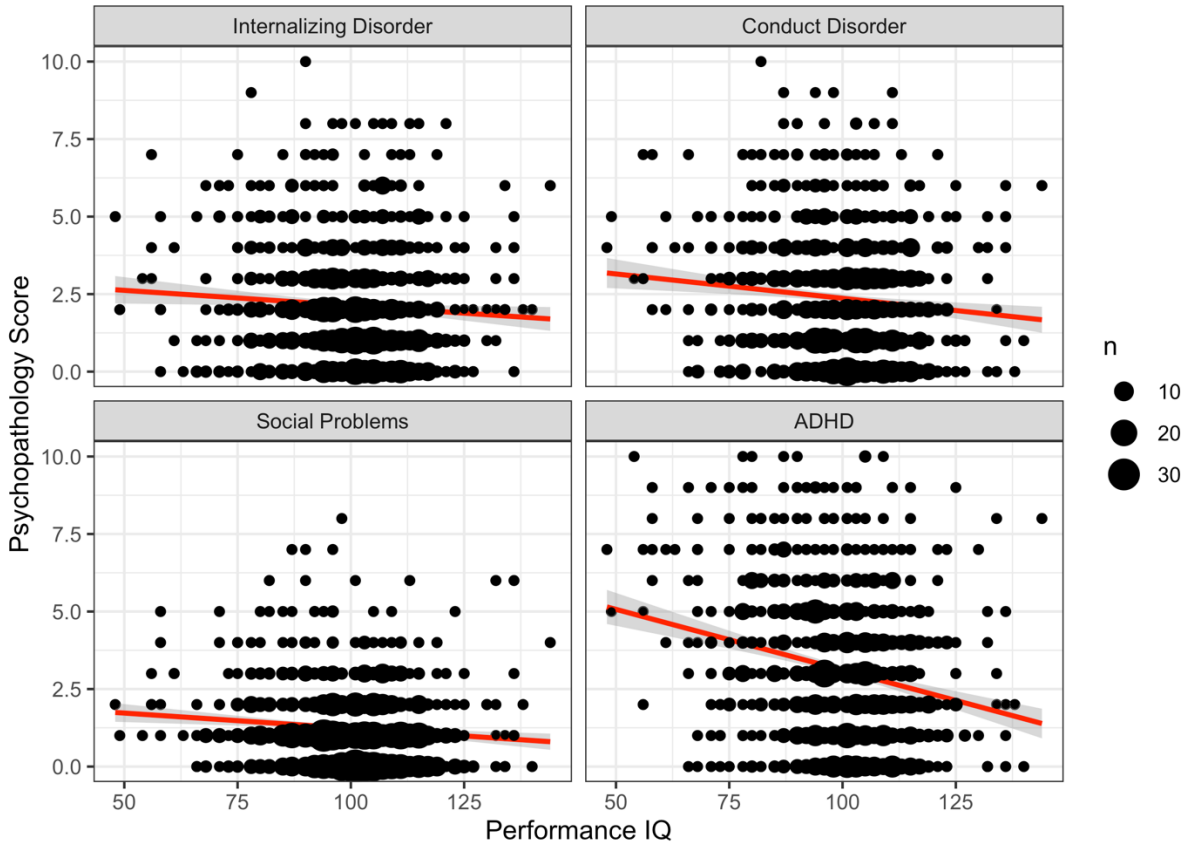
Scatterplots



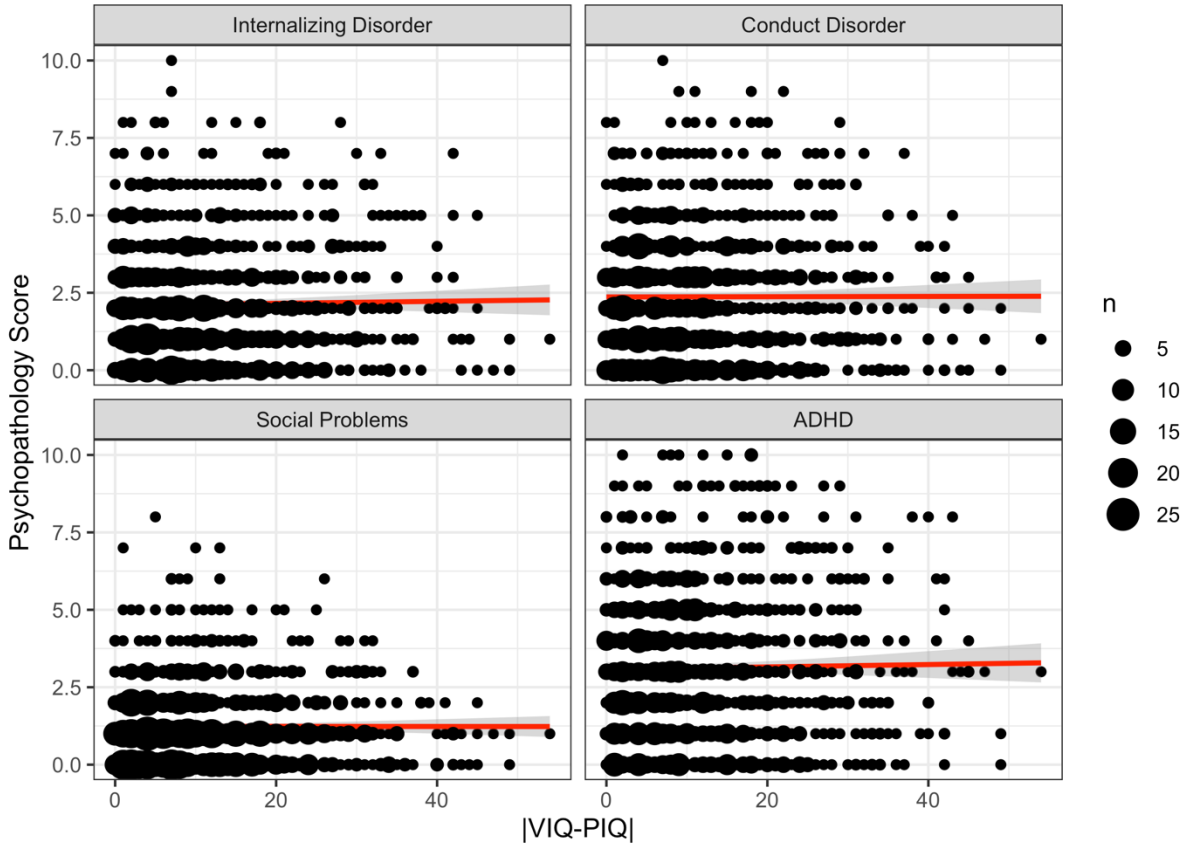
Supplementary figure 2. *Psychopathology scale scores as a function of full-scale IQ at 5.5 years old.*



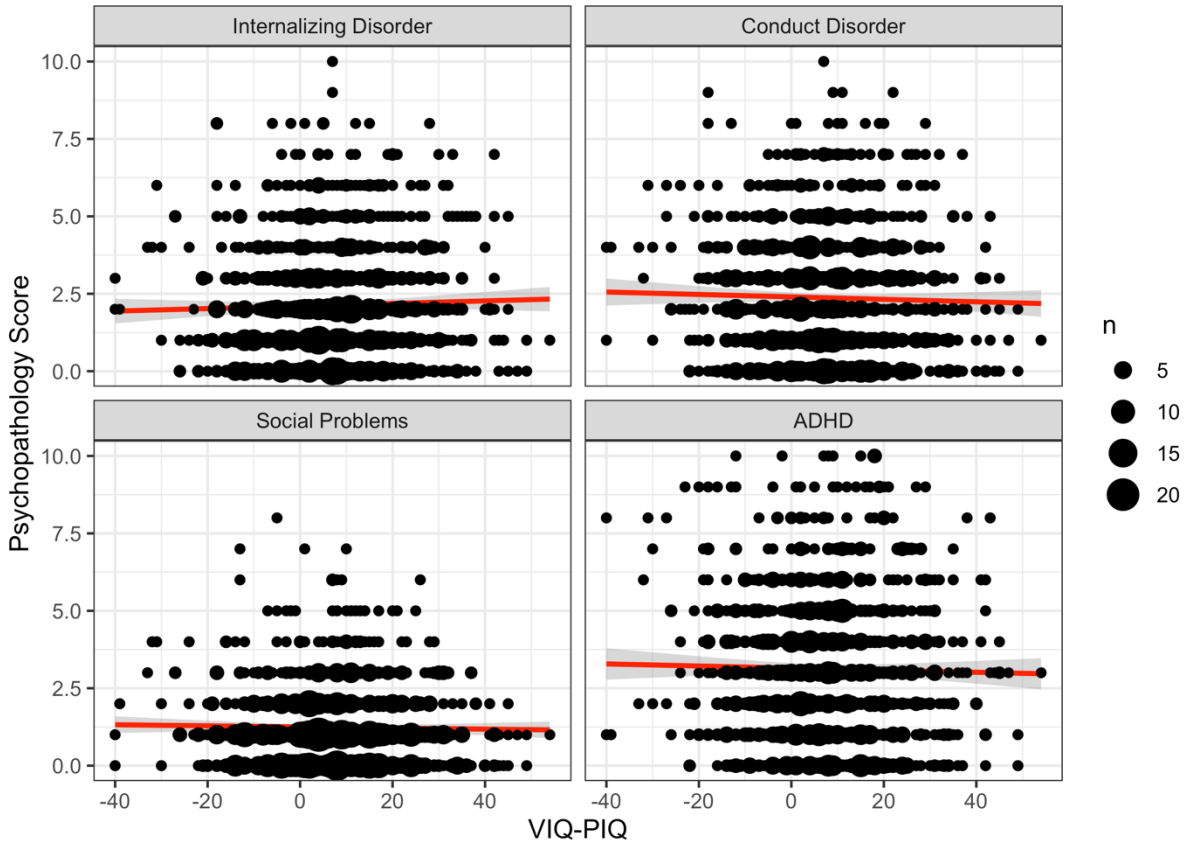
Supplementary figure 1.3. *Psychopathology scale scores as a function of verbal IQ at 5.5 years old.*



Supplementary figure 1.4. *Psychopathology scale scores as a function of performance IQ at 5.5 years old.*



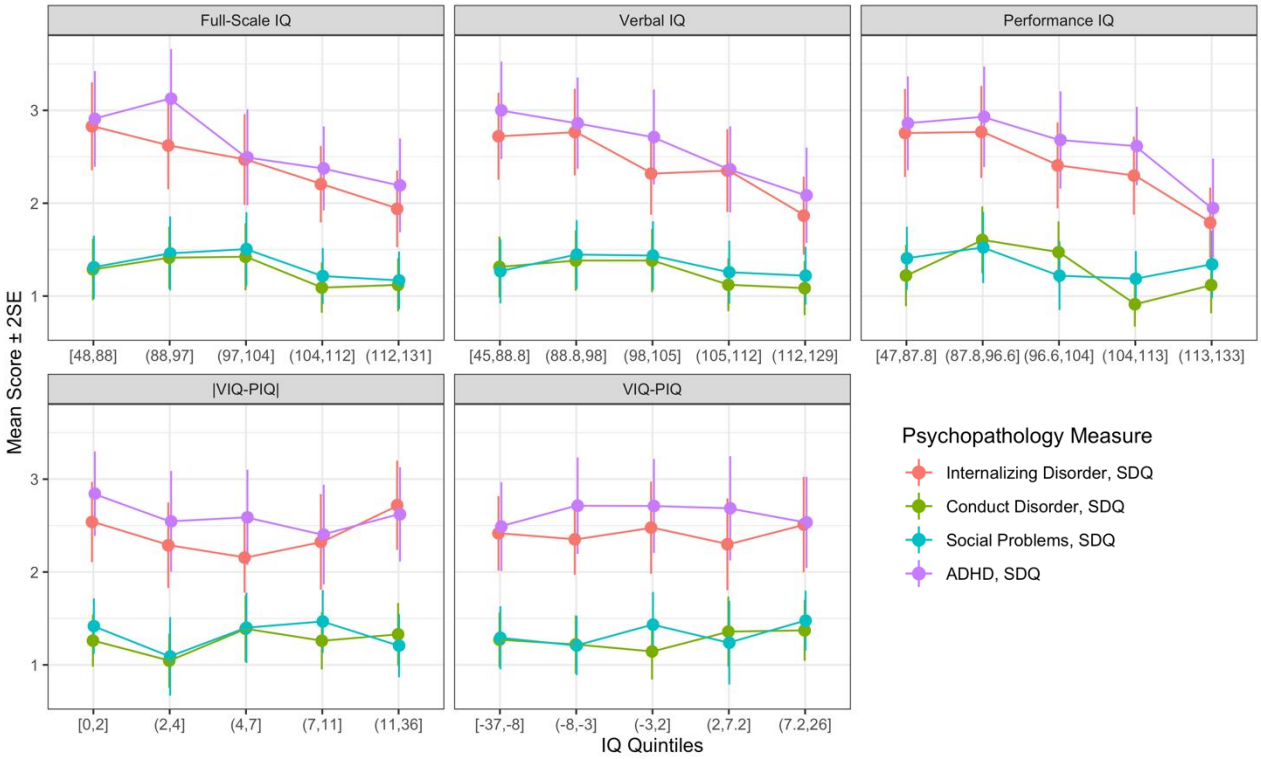
Supplementary figure 1.5. *Psychopathology scale scores as a function of absolute verbal- performance IQ discrepancy at 5.5 years old.*



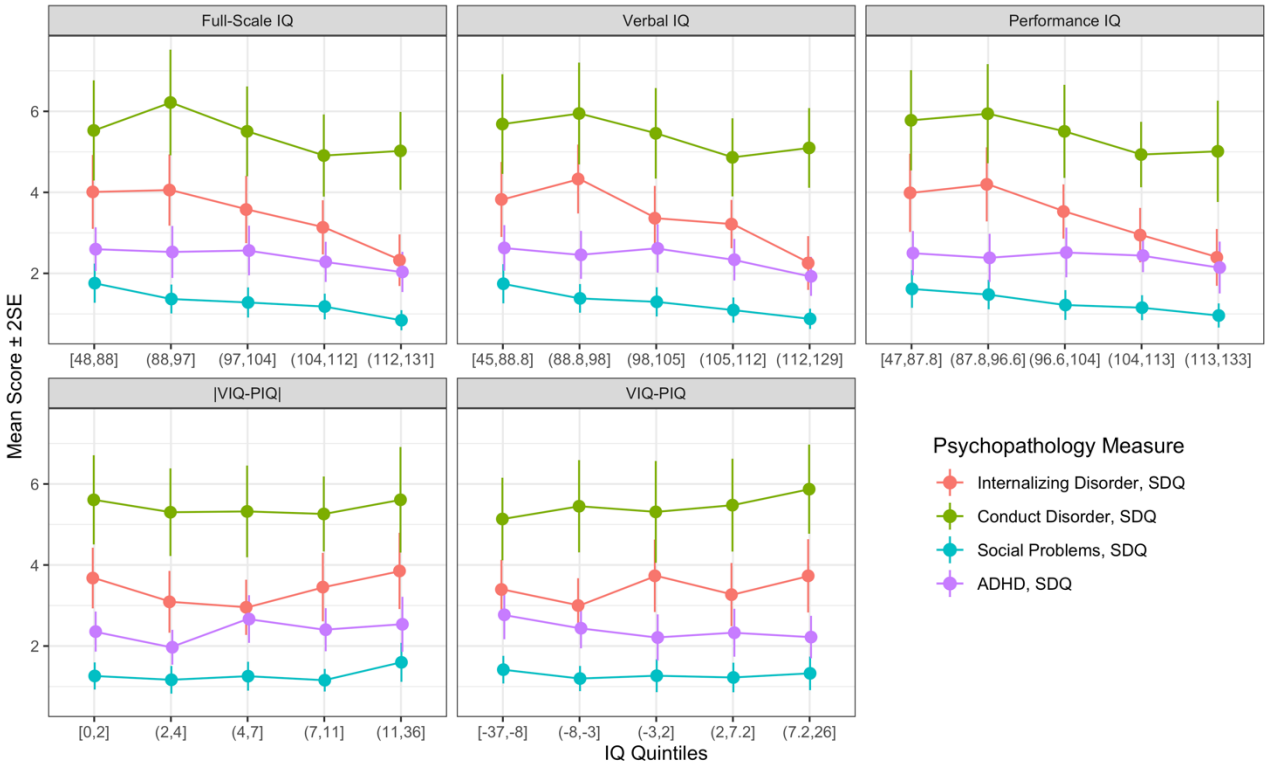
Supplementary figure 1.6. *Psychopathology scale scores as a function of relative verbal- performance IQ discrepancy at 5.5 years old.*

Supplement 2: Graphs for relations between IQ index scores and psychopathology scales at 11.5 years old

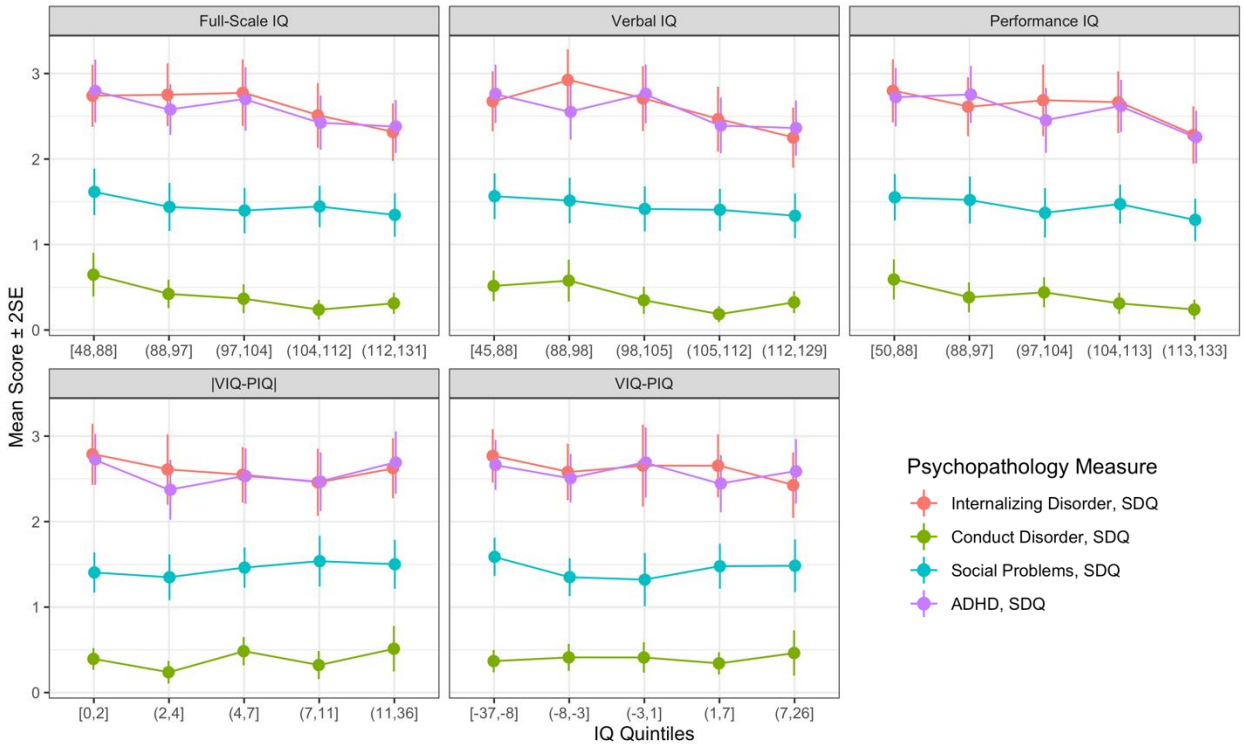
Graphs by quintile of IQ index scores.



Supplementary figure 2.1. *Psychopathology scores (mean ± SE) yielded by SDQ as a function of IQ index score quintile, at 11.5 years old. SDQ: Strength and difficulties questionnaire. N=430 participants.*

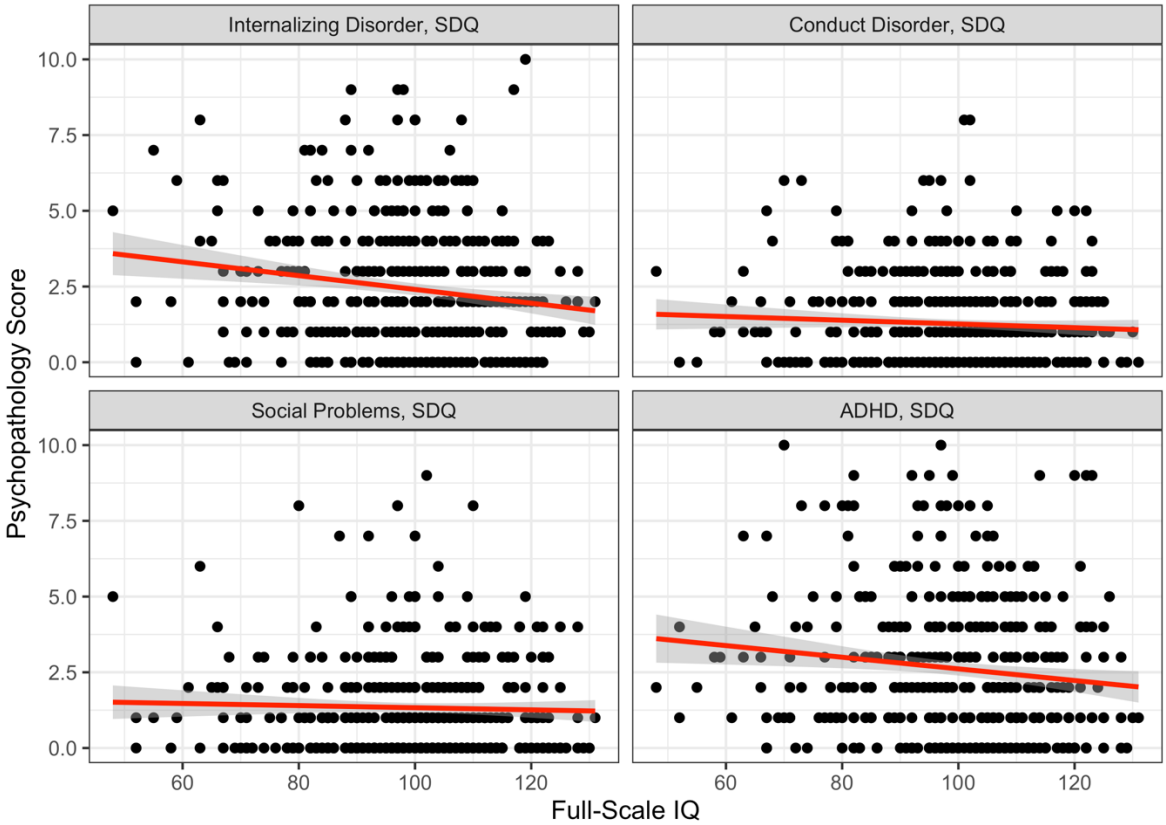


Supplementary figure 2.2. *Psychopathology scores (mean ± SE) yielded by CBCL as a function of IQ index score quintile, at 11.5 years old. CBCL: Child behavior checklist. N=430 participants.*

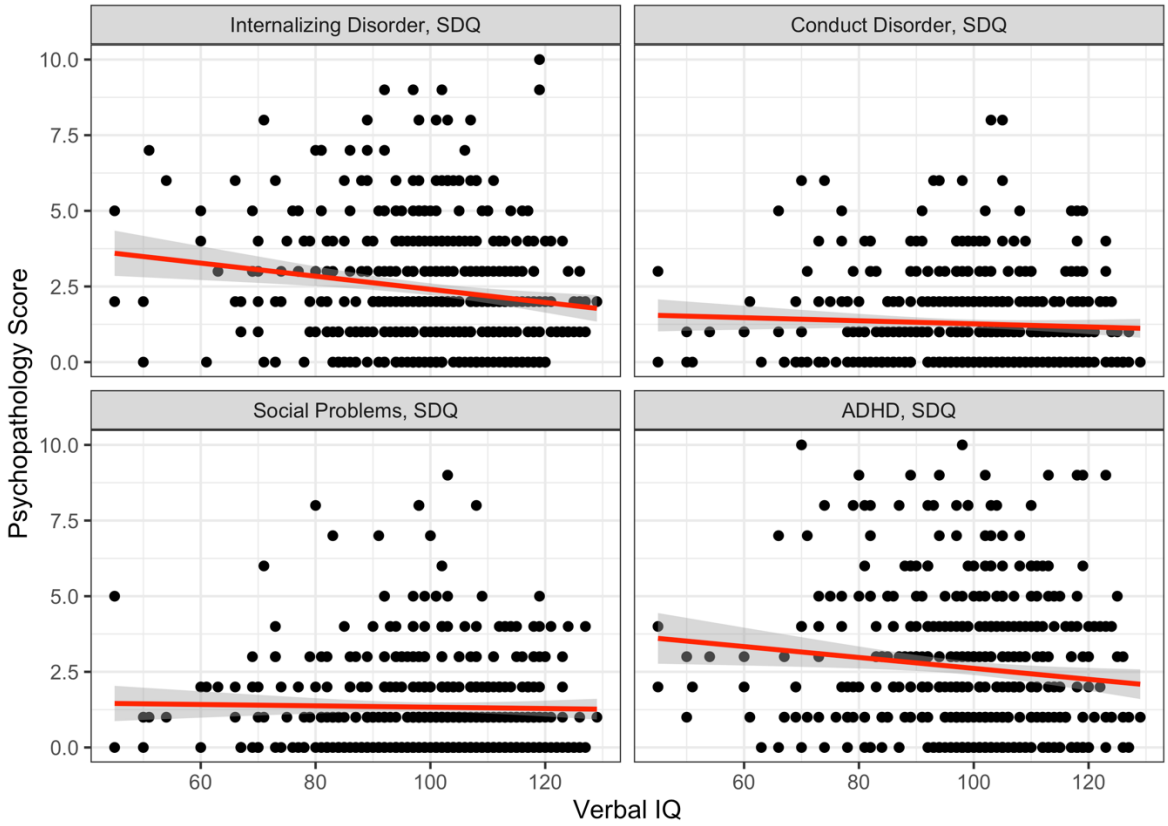


Supplementary figure 2.3. *Psychopathology scores (mean ± SE) yielded by MIA as a function of IQ index score quintile, at 11.5 years old.*

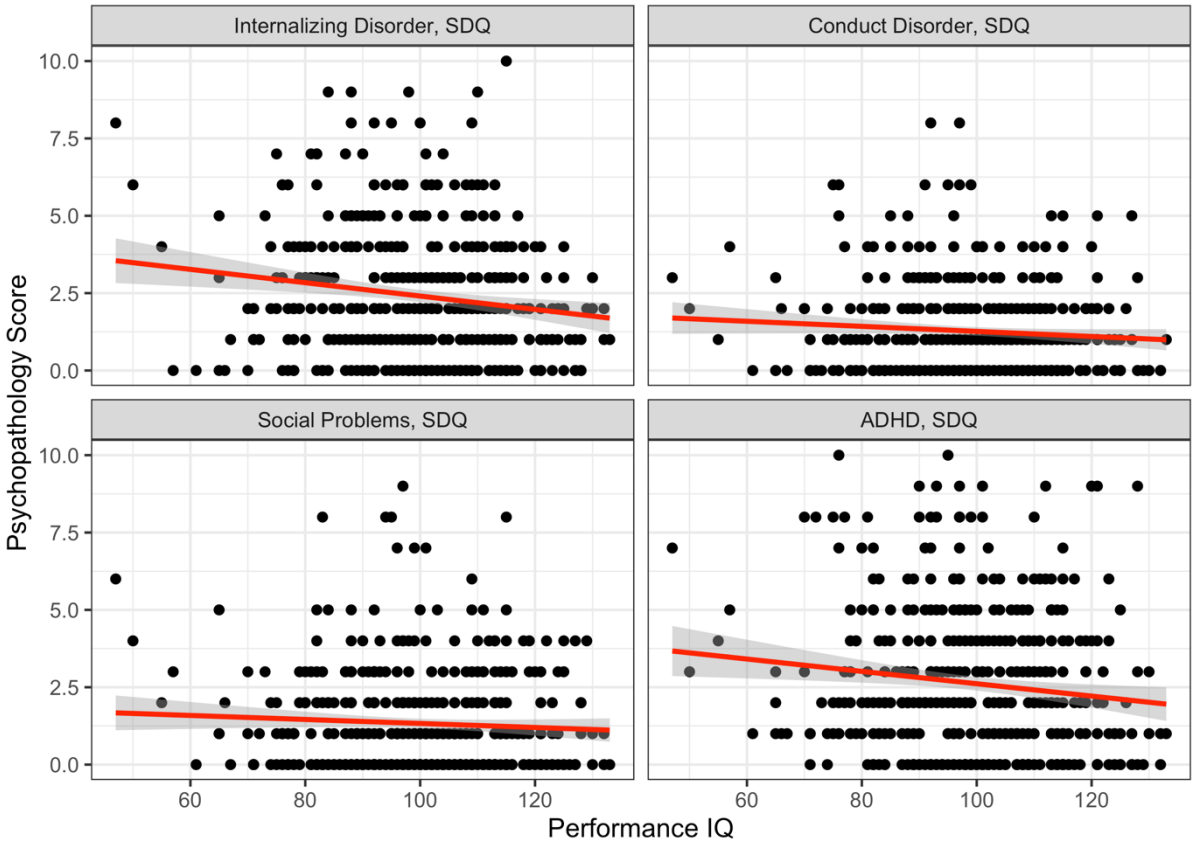
Scatterplots: SDQ



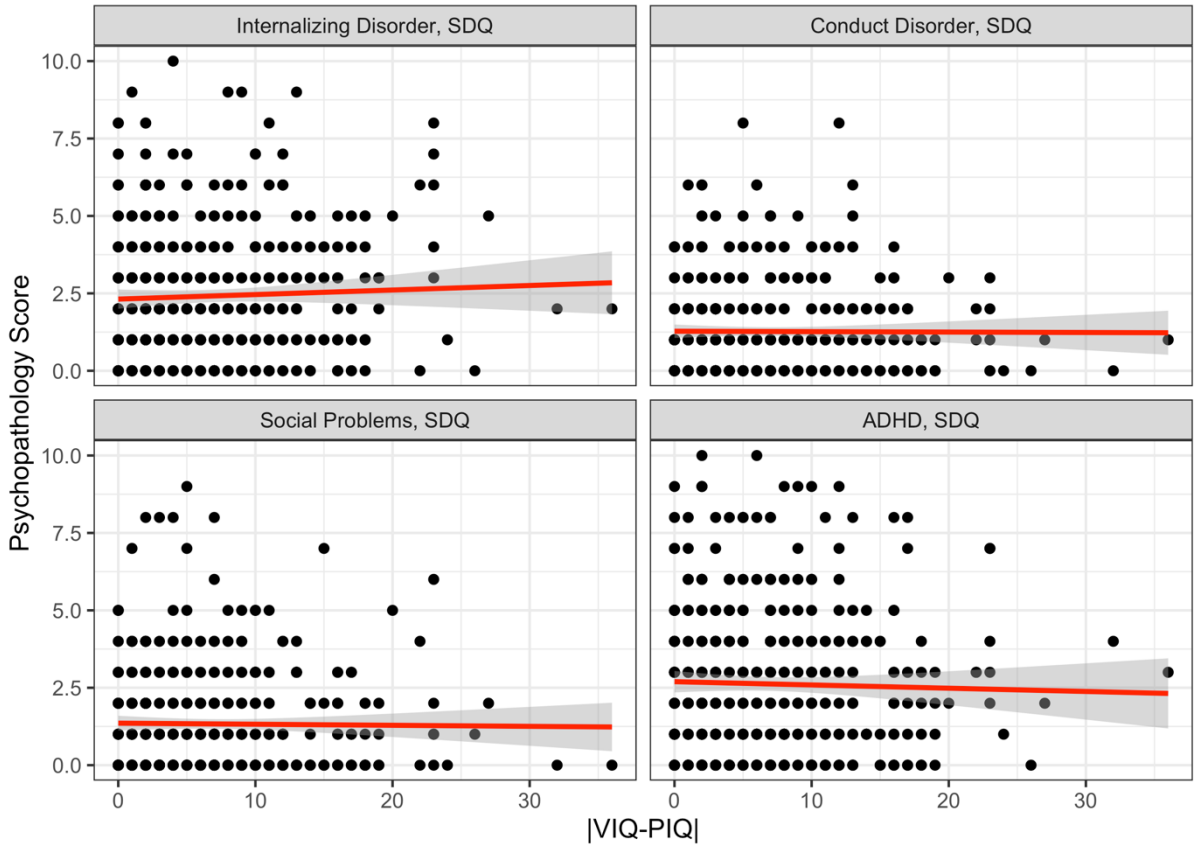
Supplementary figure 2.4. *Psychopathology scale scores as assessed by SDQ as a function of full-scale IQ at 11.5 years old. SDQ: Strength and difficulties questionnaire. N=430 participants.*



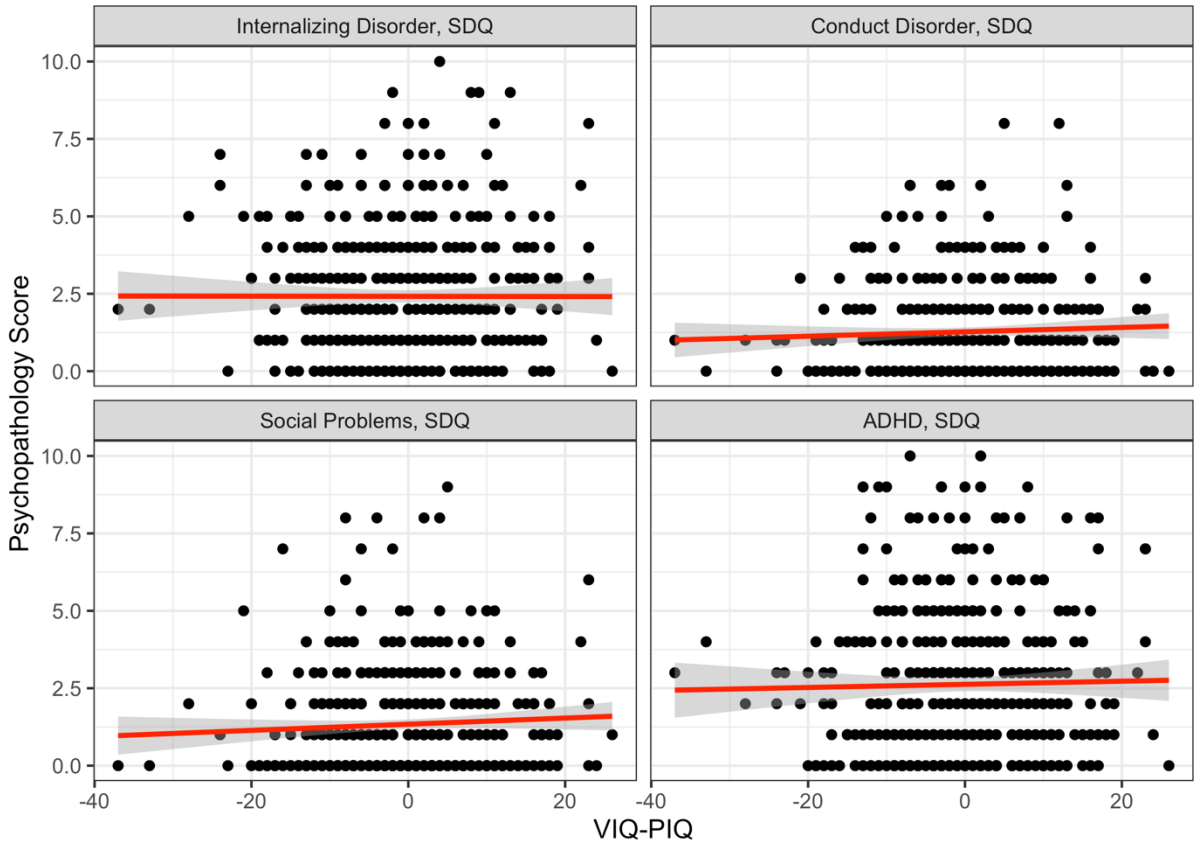
Supplementary figure 2.5. *Psychopathology scale scores as assessed by SDQ as a function of verbal IQ at 11.5 years old. SDQ: Strength and difficulties questionnaire. N=430 participants.*



Supplementary figure 2.6. *Psychopathology scale scores as assessed by SDQ as a function of performance IQ at 11.5 years old. SDQ: Strength and difficulties questionnaire. N=430 participants.*

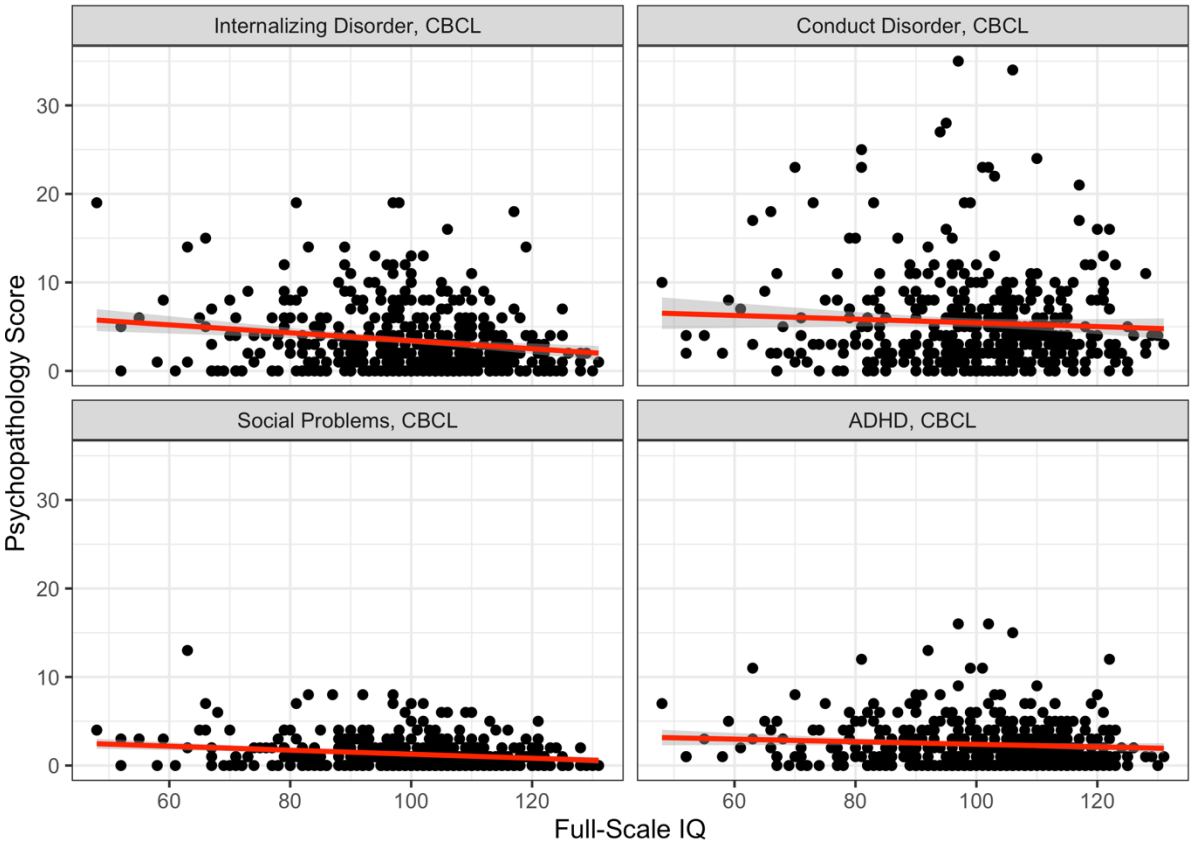


Supplementary figure 2.7. *Psychopathology scale scores as assessed by SDQ as a function of performance IQ at 11.5 years old. SDQ: Strength and difficulties questionnaire. N=430 participants.*

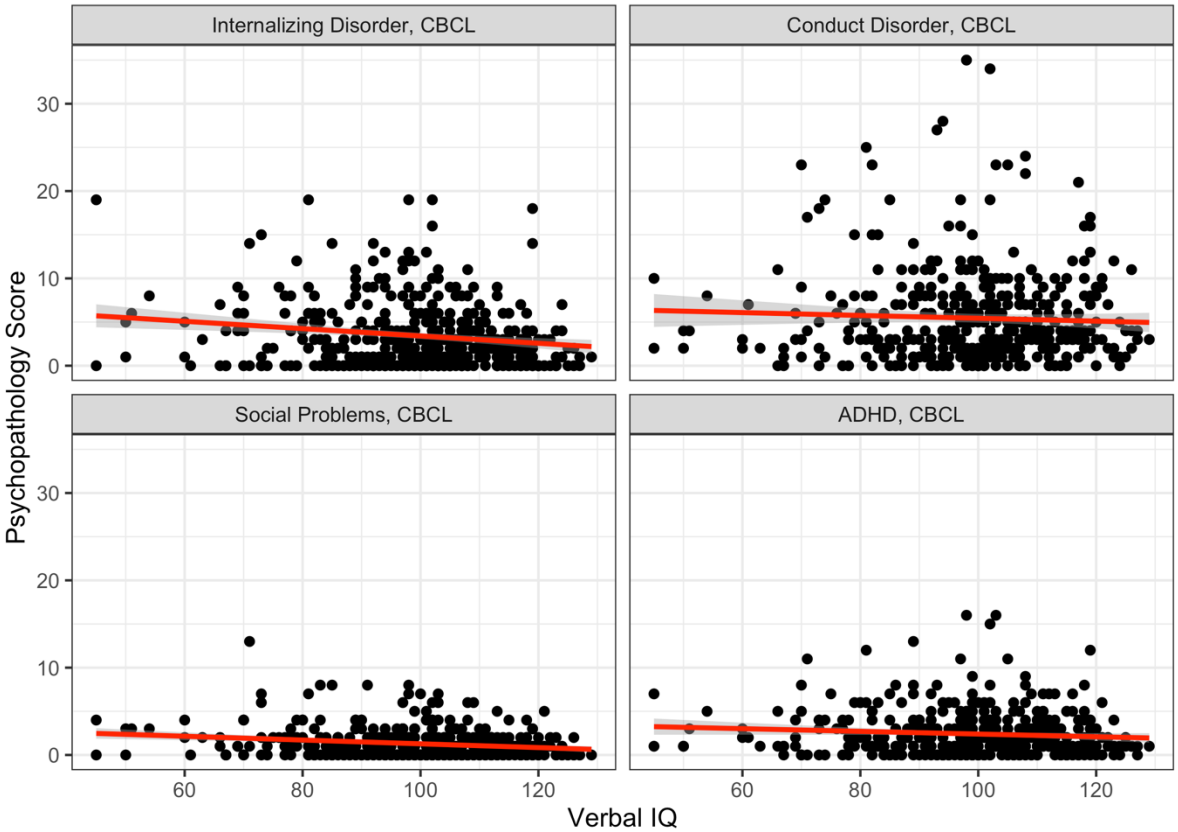


Supplementary figure 2.8. *Psychopathology scale scores as assessed by SDQ as a function of relative verbal-performance IQ at 11.5 years old. SDQ: Strength and difficulties questionnaire. N=430 participants.*

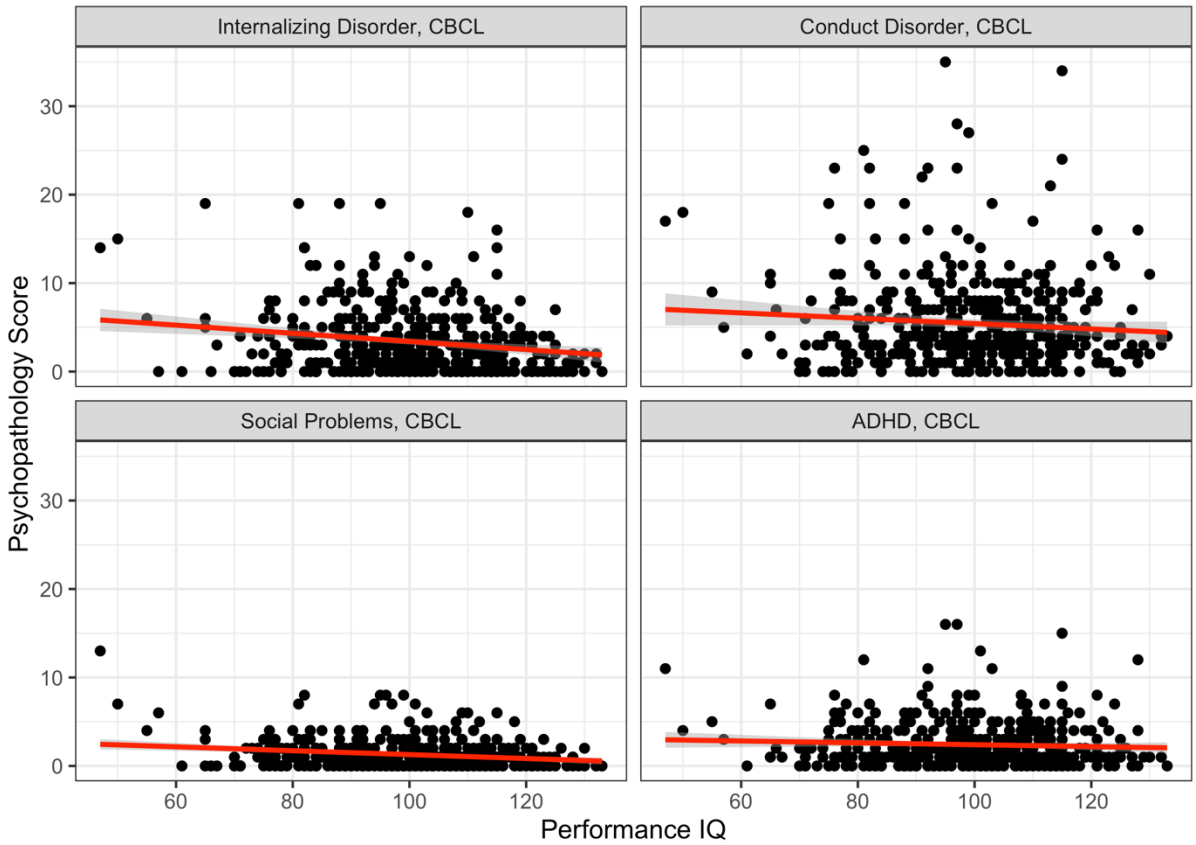
Scatterplots: CBCL



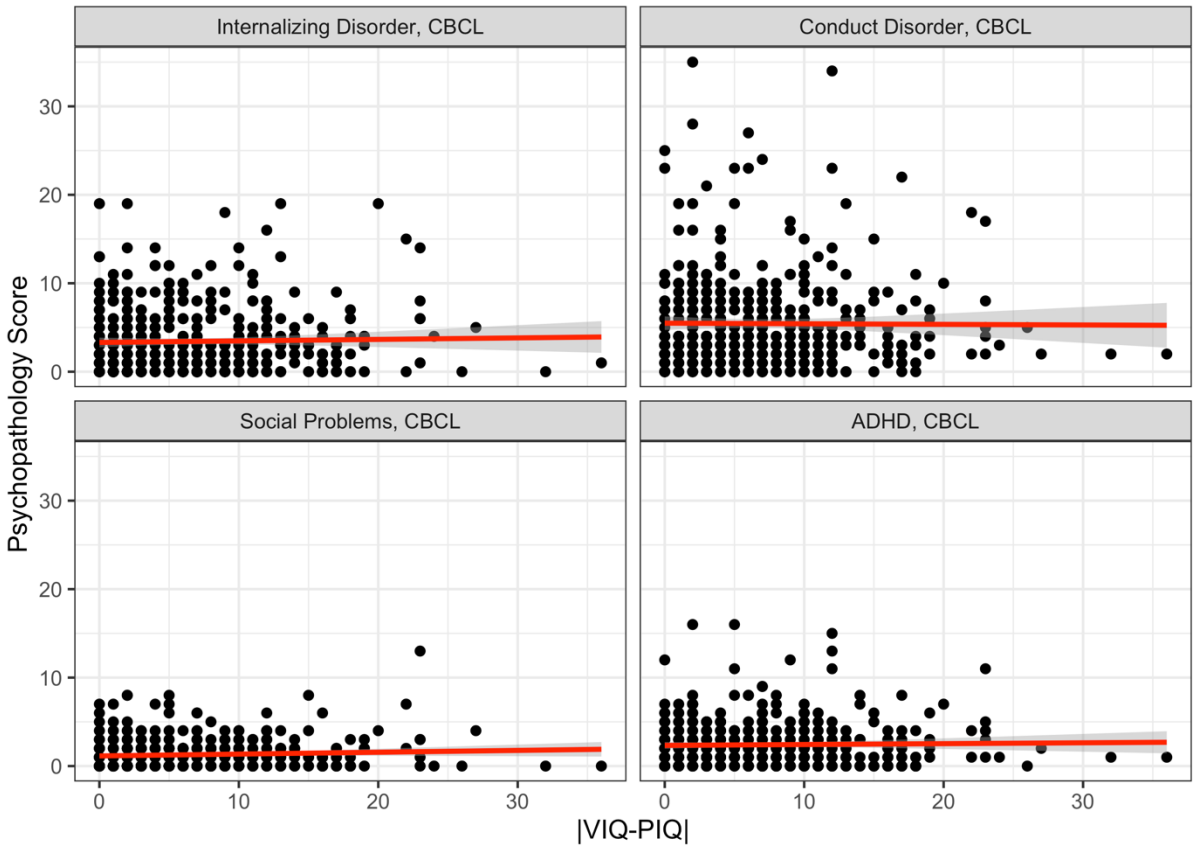
Supplementary figure 2.9. *Psychopathology scale scores as assessed by CBCL as a function of full-scale IQ at 11.5 years old. CBCL: Child behavior checklist. N=430 participants.*



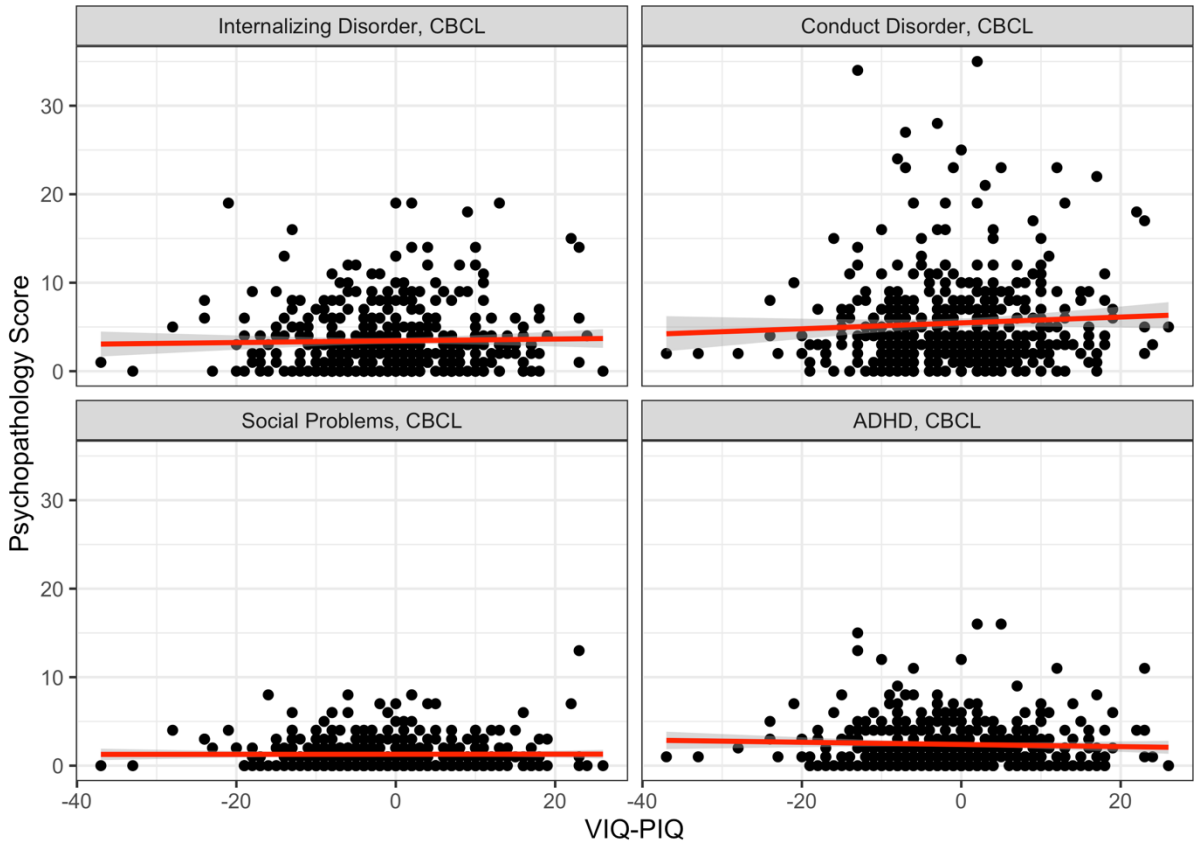
Supplementary figure 2.10. *Psychopathology scale scores as assessed by CBCL as a function of verbal IQ at 11.5 years old. Child behavior checklist. N=430 participants.*



Supplementary figure 2.11. *Psychopathology scale scores as assessed by CBCL as a function of performance IQ at 11.5 years old. Child behavior checklist. N=430 participants.*

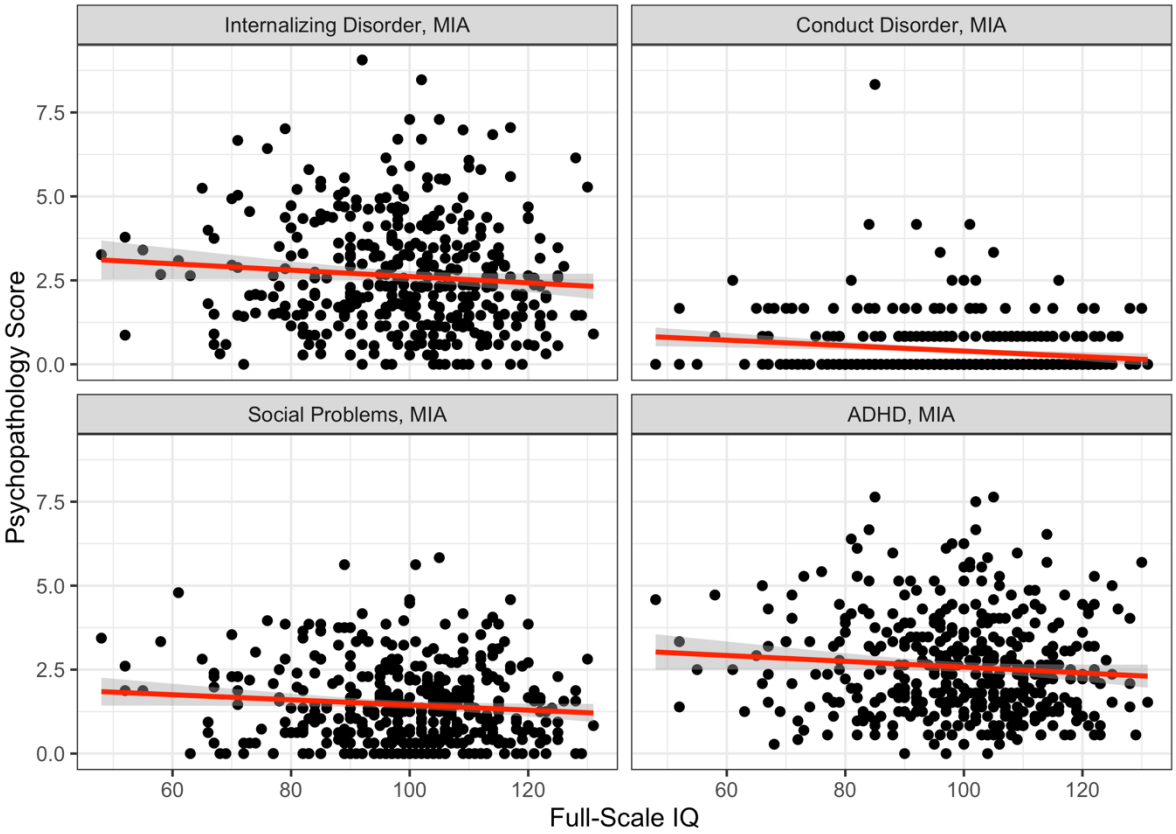


Supplementary figure 2.12. *Psychopathology scale scores as assessed by CBCL as a function of absolute verbal-performance discrepancy at 11.5 years old. Child behavior checklist. N=430 participants.*

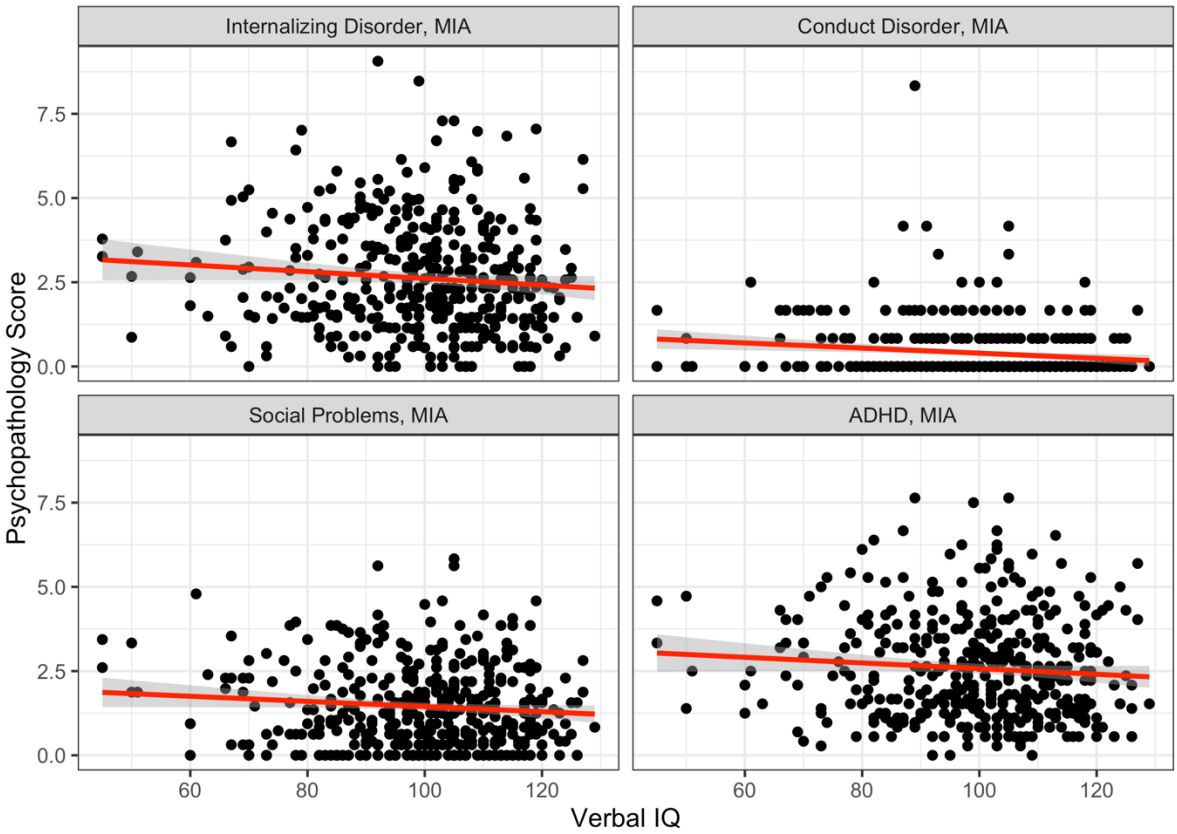


Supplementary figure 2.13. *Psychopathology scale scores as assessed by CBCL as a function of relative verbal-performance discrepancy at 11.5 years old. Child behavior checklist. N=430 participants.*

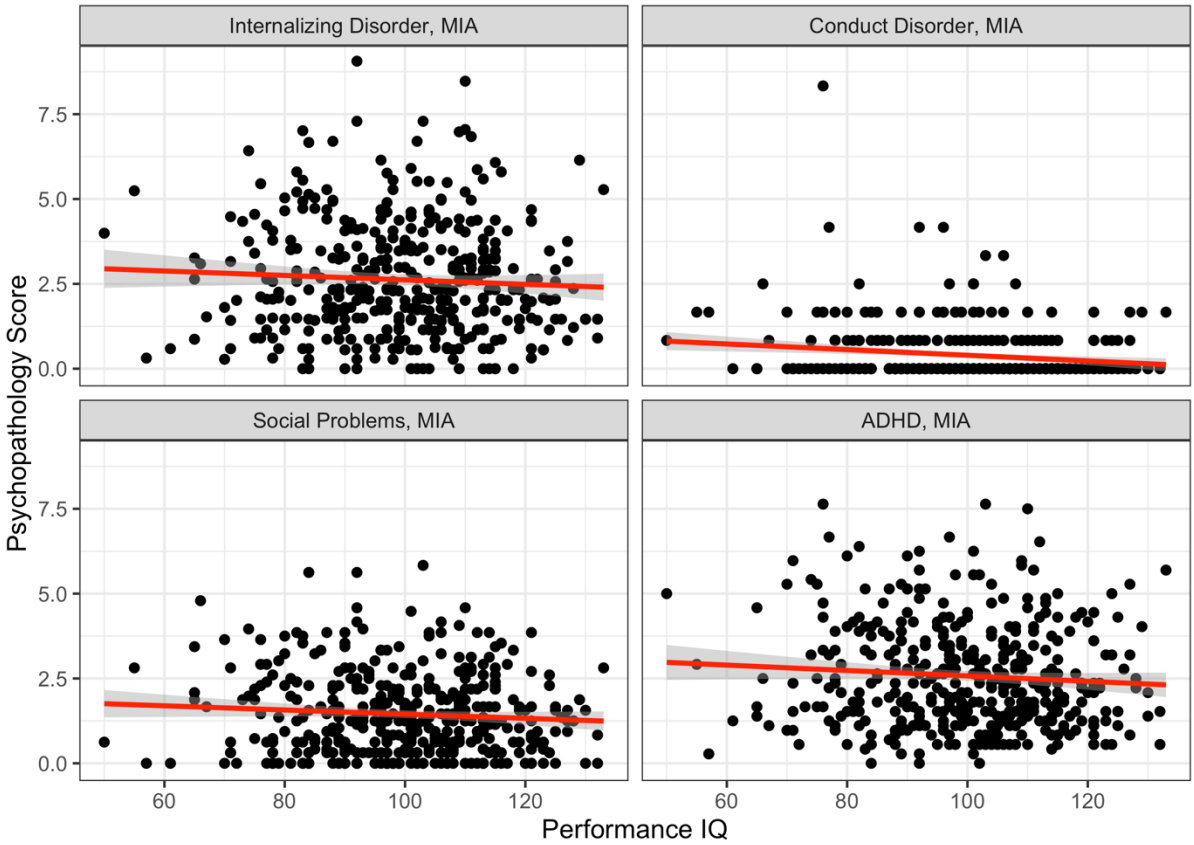
Scatterplots: MIA



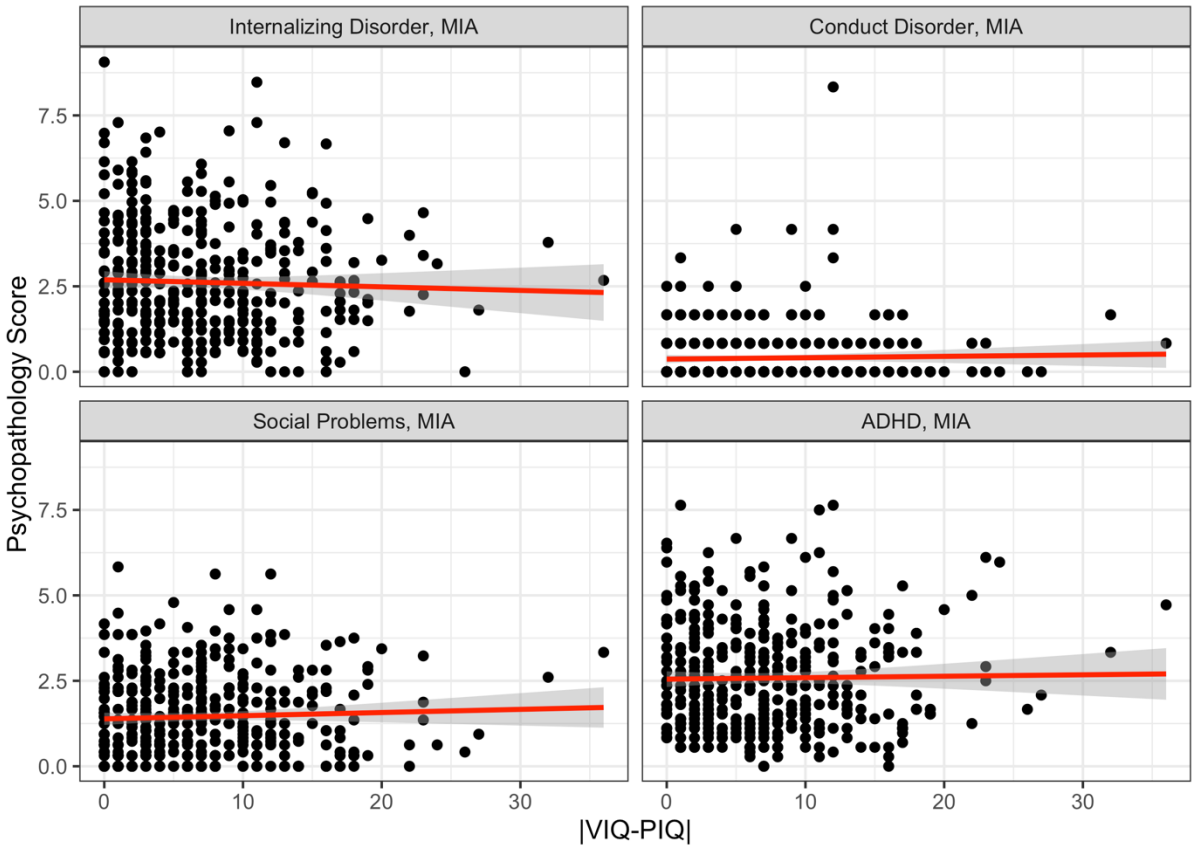
Supplementary figure 2.14. *Psychopathology scale scores as assessed by MIA as a function of full-scale IQ at 11.5 years old. MIA: Mental Health and Social Inadaptation Assessment for Adolescents, N = 412 participants.*



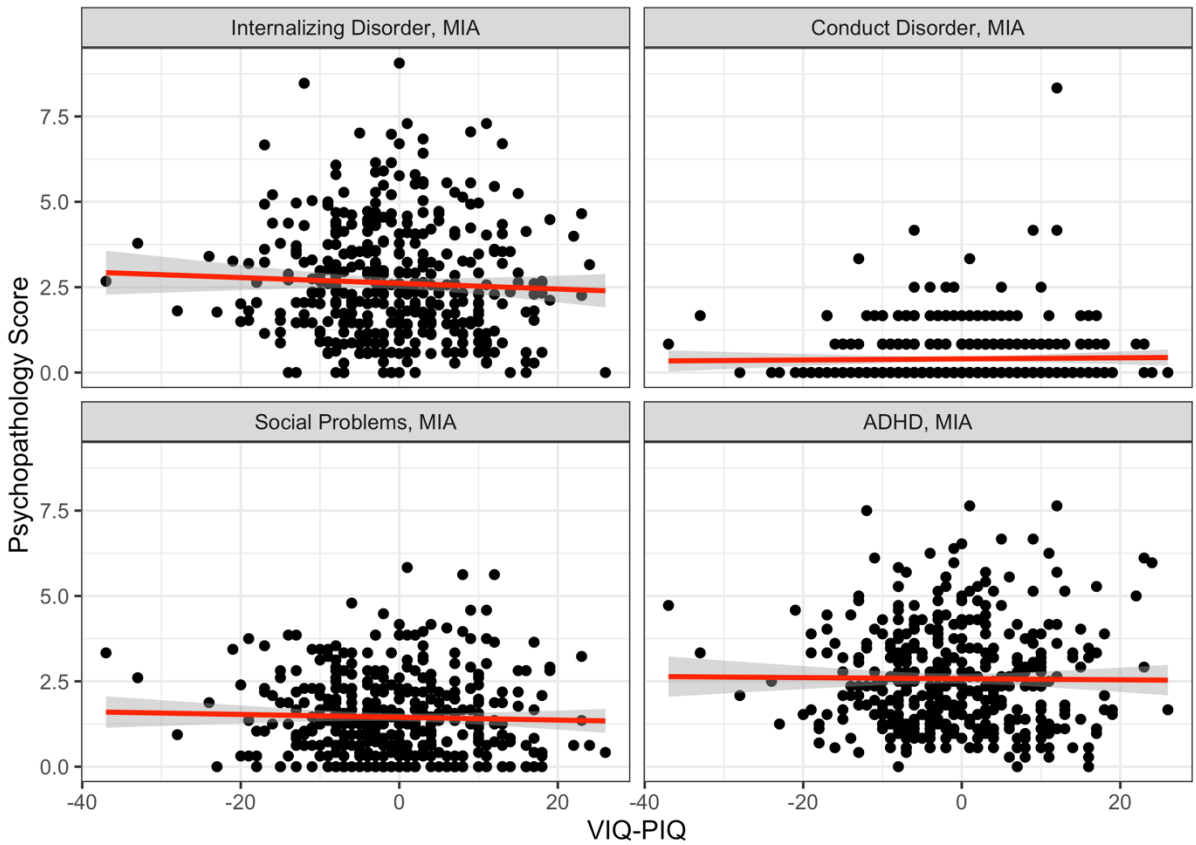
Supplementary figure 2.15. *Psychopathology scale scores as assessed by MIA as a function of verbal IQ at 11.5 years old. MIA: Mental Health and Social Inadaptation Assessment for Adolescents, N = 412 participants.*



Supplementary figure 2.16. *Psychopathology scale scores as assessed by MIA as a function of performance IQ at 11.5 years old. MIA: Mental Health and Social Inadaptation Assessment for Adolescents, N = 412 participants.*



Supplementary figure 2.17. *Psychopathology scale scores as assessed by MIA as a function of absolute verbal-performance IQ at 11.5 years old. MIA: Mental Health and Social Inadaptation Assessment for Adolescents, N = 412 participants.*



Supplementary figure 2.18. *Psychopathology scale scores as assessed by MIA as a function of relative verbal-performance IQ at 11.5 years old. MIA: Mental Health and Social Inadaptation Assessment for Adolescents, N = 412 participants.*

Supplement 3: Structural Equation Models Fit on FSIQ, VIQ-PIQ and |VIQ-PIQ|.

To address reviewers' feedback, we implemented a structural equation model for each psychopathology measure. We examined the causal influence of full-scale IQ and absolute and relative verbal-performance discrepancies on psychopathology variables. We limited the analyses to SDQ scores since it is the only consistent measurement tool across ages.

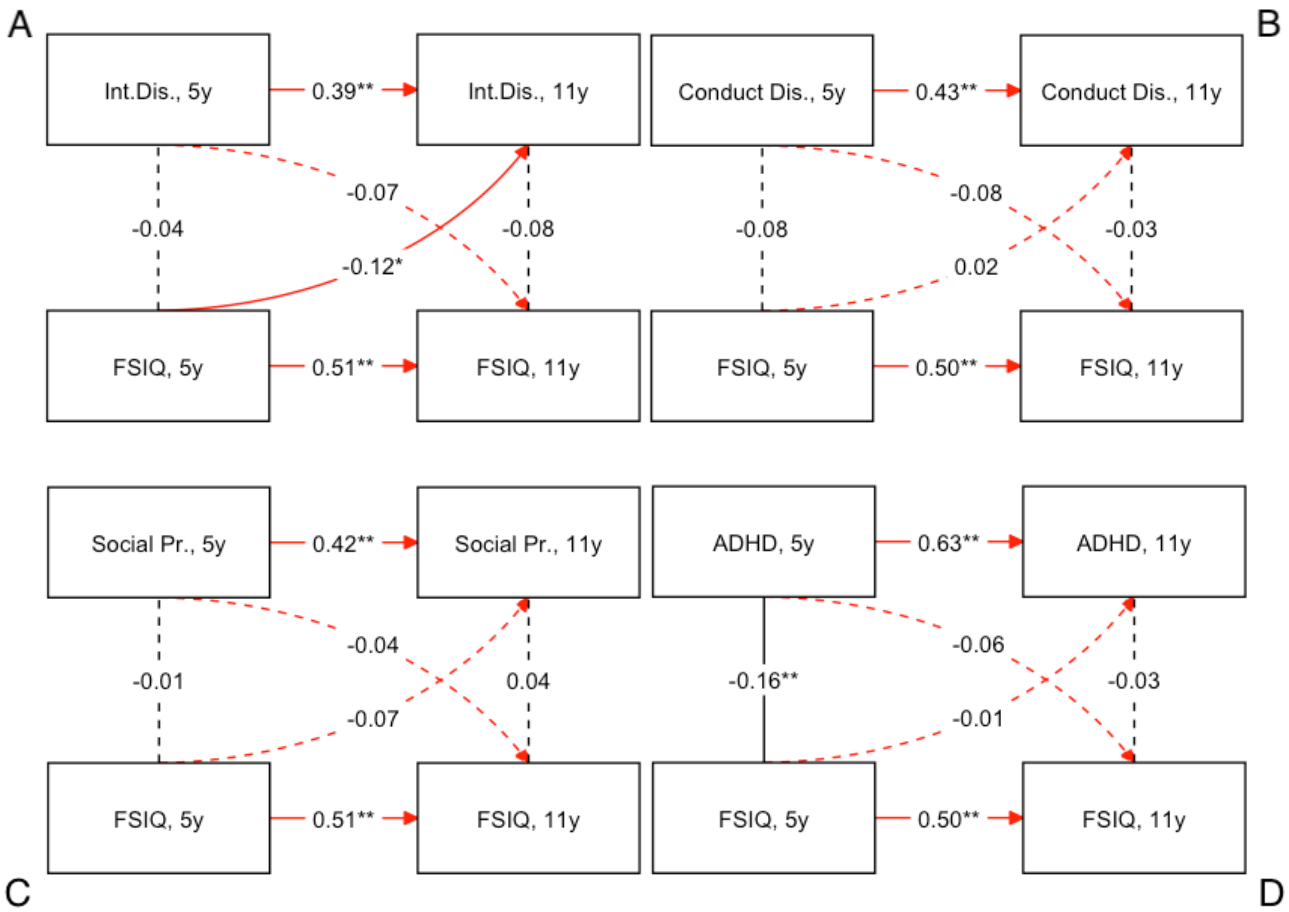
We tested a total of 12 models. We report the results using two levels of stringency: $p < 0.05$ and $p < 0.0004$ (0.05 / [3 * 4]), similar to the principle shown in Table 3. The model structure, effect estimates, and significance levels are reported in Supplementary Figure 3.1 for full-scale IQ, 3.2 for relative verbal-performance discrepancy, and 3.3 for absolute verbal-performance discrepancy.

Generally speaking, auto-regression coefficients for FSIQ, VIQ-PIQ, and psychopathological variables were significant at the most stringent threshold ($p < 0.004$) and were small to medium-sized ($0.24 < \beta < 0.73$) (Supplementary Figures 3.1 and 3.2). However, |VIQ-PIQ| scores were not stable across time (Supplementary Figure 3.3). Cross-lagged coefficients were generally not significant, with the following exceptions:

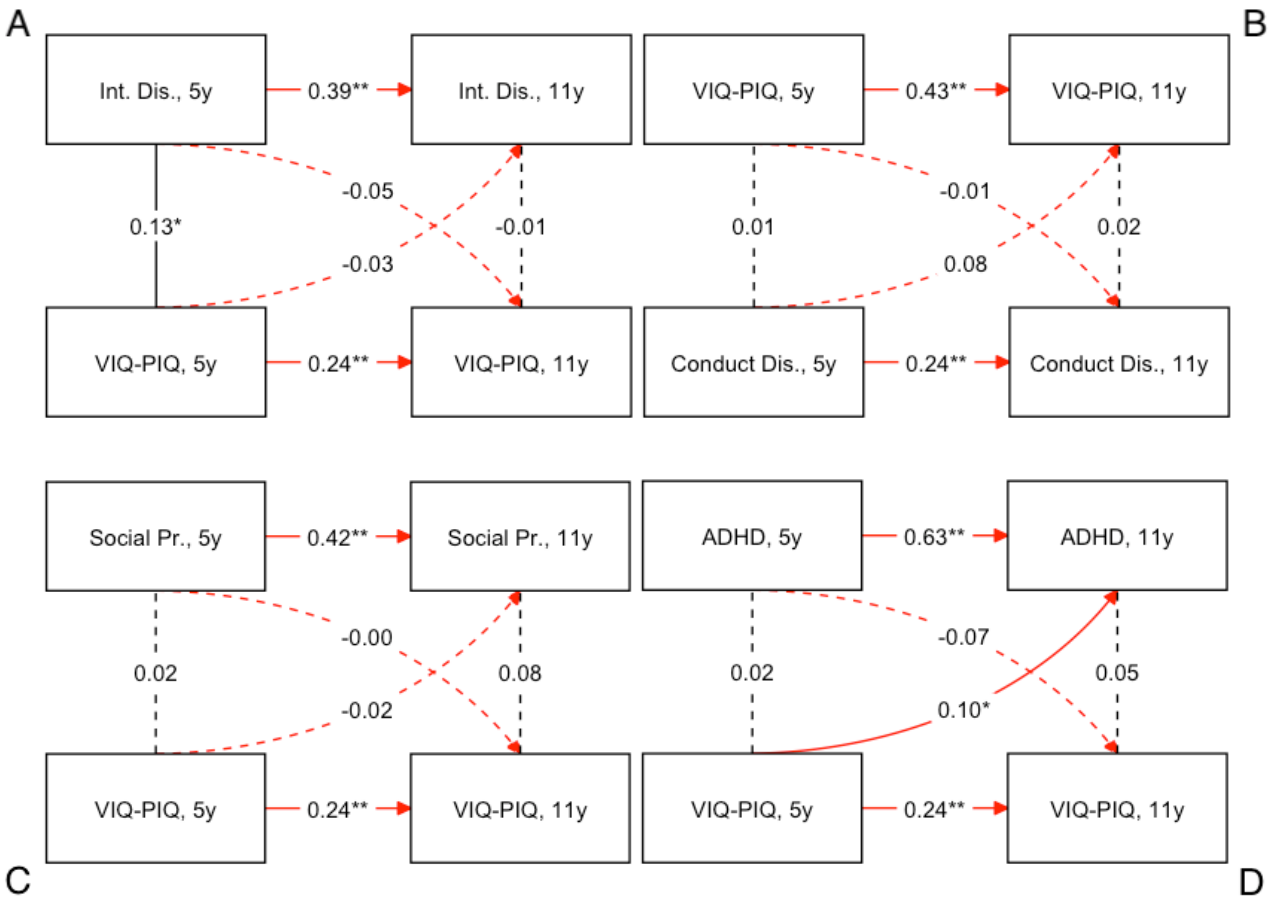
- FSIQ at 5 years was associated with decreased internalizing symptoms at 11 (β=-0.12);

- VIQ-PIQ at 5 was associated with increased ADHD symptoms at 11 (β=0.1);
- Internalizing symptoms at 5 were associated with larger |VIQ-PIQ| at 11 (β=0.11);
- |VIQ-PIQ| at 5 was associated with increased conduct disorder (β=0.11) and ADHD symptoms at 11 (β=0.08).

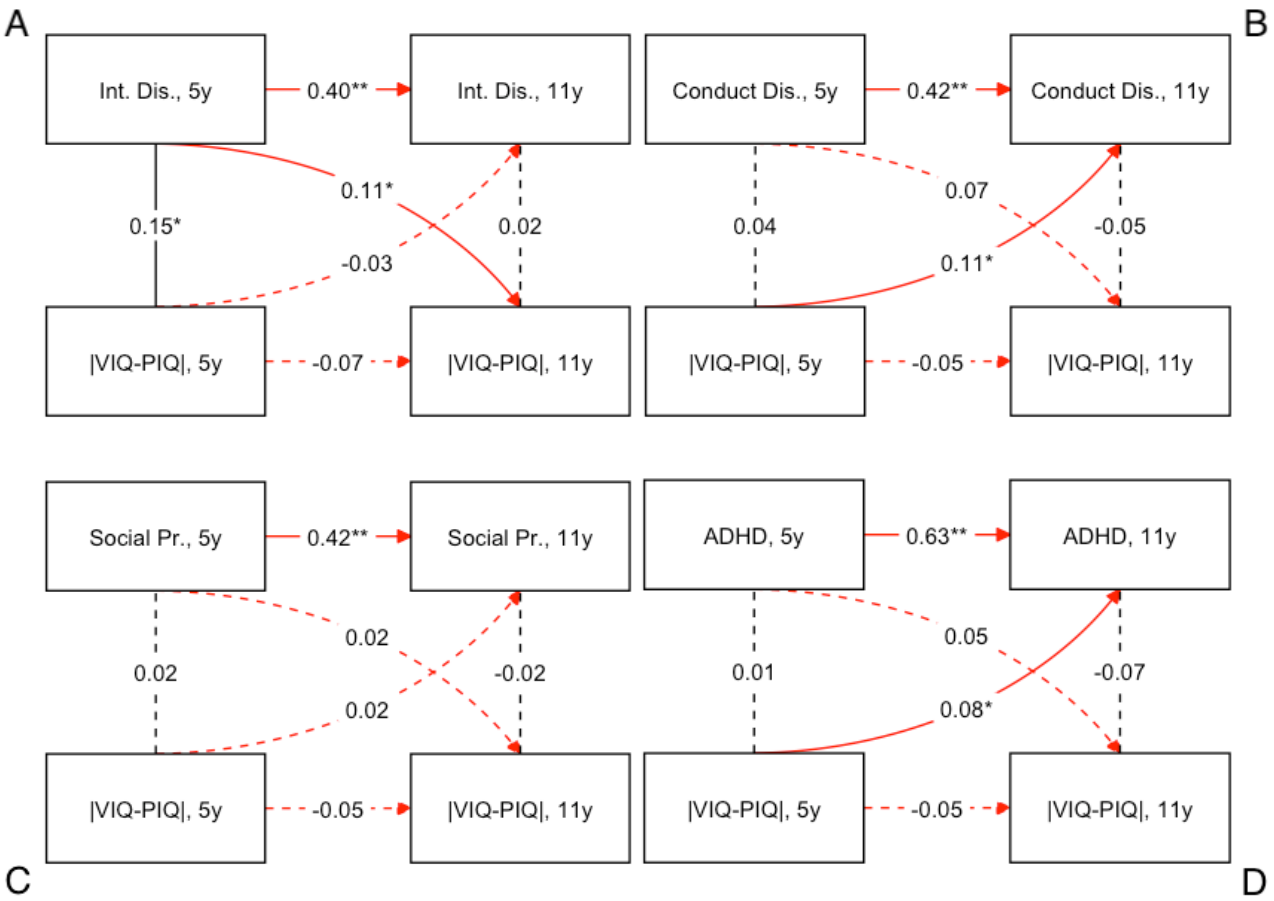
In all cases these cross-lagged associations were nominally significant, but not after correction for multiple tests. These results converge with the analyses reported in the main text in suggesting that IQ indices do not show significant longitudinal associations with psychopathology measures.



Supplementary Figure 3.1. *Results of four structural equation models:* ***FSIQ****. The figure shows the effect estimates (in red) of the independent variables, full-scale IQ at 5 and 11 years, on the dependent variables: Internalizing Disorder (A), Conduct Disorder (B), Social Problems (C), and ADHD (D) as measured with SDQ. Significance thresholds are indicated by * and **.*



Supplementary Figure 3.2. *Results of four structural equation models:* ***VIQ-PIQ****. The figure shows effect estimates (in red) of the independent variables, relative verbal-performance discrepancy at 5 and 11 years, on the dependent variables: Internalizing Disorder (A), Conduct Disorder (B), Social Problems (C), and ADHD (D) as measured with SDQ. Significance thresholds are indicated by * and **.*



Supplementary Figure 3.3. *Results of four structural equation models: |**VIQ-PIQ**|. The figure shows the effect estimates (in red) of the independent variables, absolute verbal-performance gap at 5 and 11 years, on the dependent variables: Internalizing Disorder (A), Conduct Disorder (B), Social Problems (C), and ADHD (D) as measured with SDQ. Significance thresholds are indicated by * and **.*

Supplement 4: Code

The code used to conduct the analyses and generate figures is publicly available on Github (the link will be published after article review).