Early predictors of inhibitory control in adolescence: A longitudinal ERP study on boys at familial risk for ADHD

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Background

- An inhibitory control (IC) deficit in ADHD was repeatedly found to be associated with a reduced amplitude of the ERP component N2 on inhibition trials (e.g., Liotti et al., 2010, Janssen et al., 2018).
- Within a prospective high-risk longitudinal study, we examined how early childhood predictors of ADHD contributed to the development of this electrophysiological signature in adolescence.

Method

- 63 adolescent (*M* = 17.37 years, *SD* = 0.41) who have been followed since birth as part of a prospective longitudinal study.

Parental ADHD

Conners Adult ADHD Rating Scale (Conners et al., 1999). Parents completed the questionnaire regarding themselves and their spouses.

Early Self-regulation

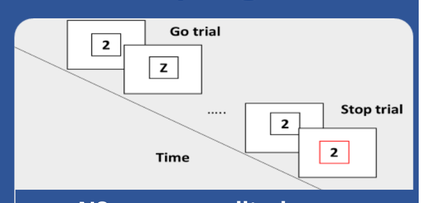
Children's Behavior Questionnaire (CBQ; Rothbart et al., 2001). We used the effortful control factor to assess child self-regulation.

ADHD Symptoms throughout development

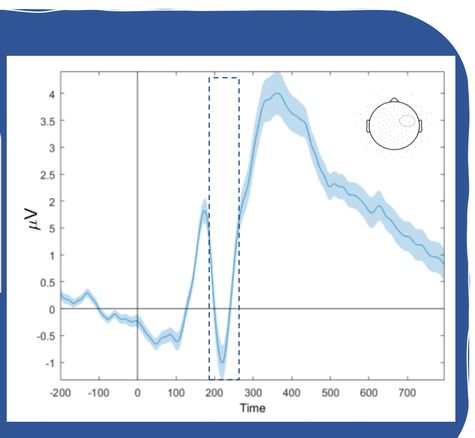
ADHD symptoms were assessed by:
The ADHD Rating Scale–IV (DuPaul et al., 1998) – 4.5 years.
The Conners' Rating Scales-Revised (CPRS-R, CASS:S ; Conners, 1997) – 7 and 17 years

Electrophysiological IC

The Stop Signal Task



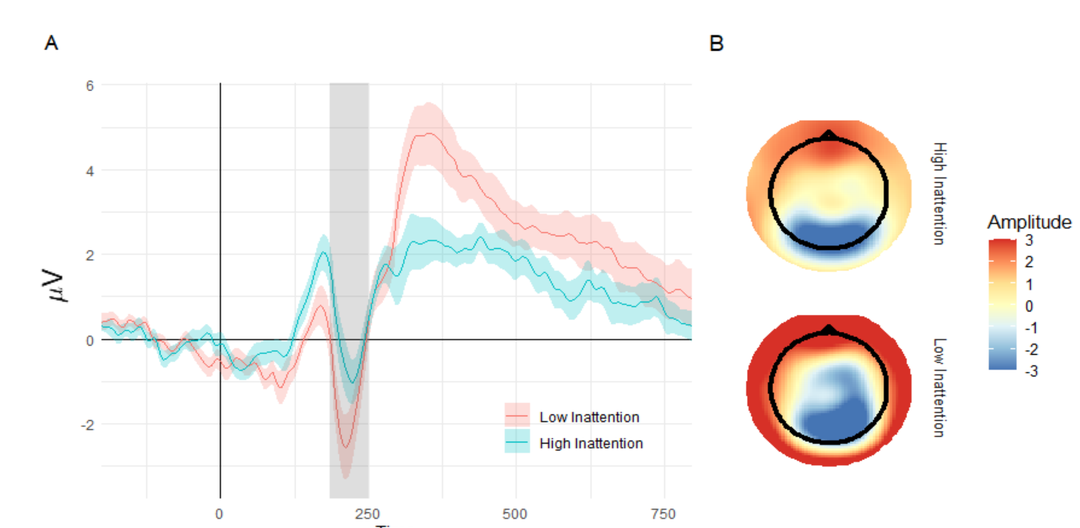
N2 mean amplitude was calculated within a time window of 180-250 ms at right anterior frontal region



2-6 m | **36 m** | **4.5, 7, 17 y** | **17 y**

Results

IC in Adolescence and Concurrent ADHD Symptoms

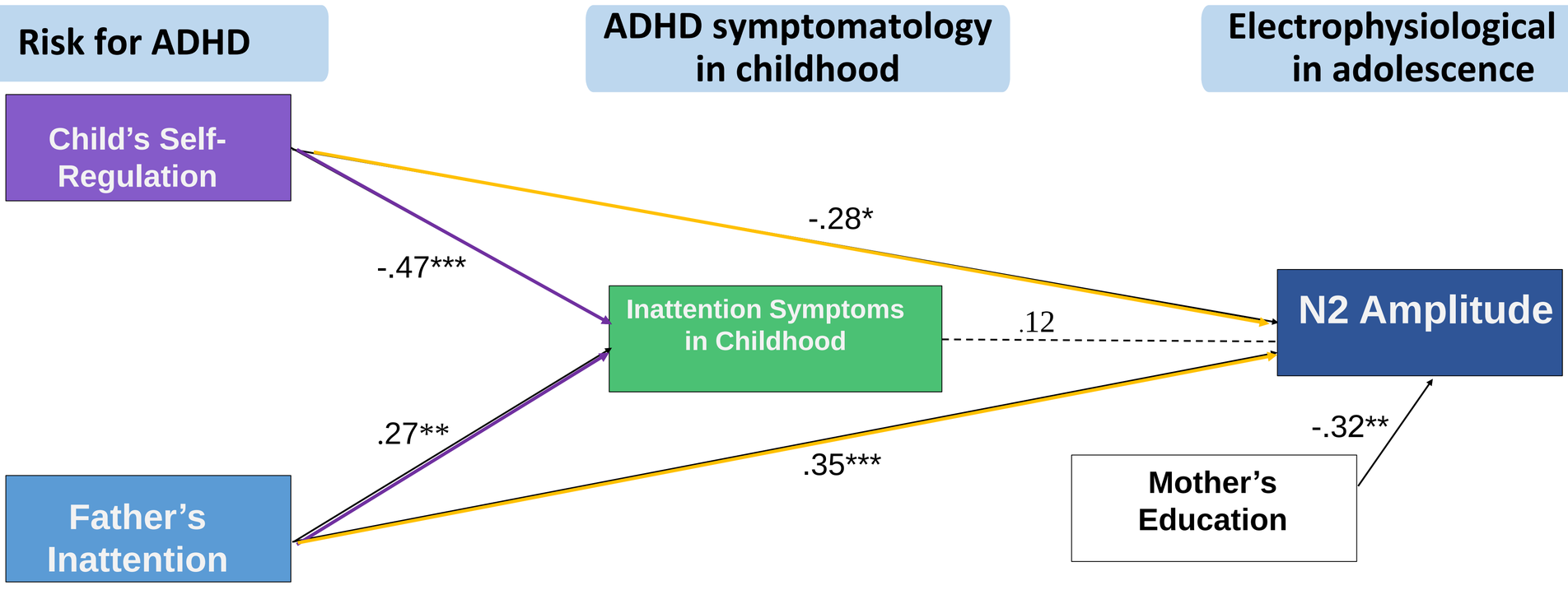


Participants in the lower quartile of inattention symptoms showed larger negative amplitudes than those in the other three quartiles together, $F(1, 52) = 7.94$, $MSE = 3.65$, $p < 0.01$

Longitudinal Correlations between Study Variables

	N2 amplitude (17y)	Inattention symptoms (17y)	H/I symptoms (17y)
ADHD symptomatology in childhood - 4.5 & 7 y			
Inattention symptoms	.28*	.50**	.44**
H/I symptoms	.20+	.24*	.40**
Child risk for ADHD			
Father's inattention symptoms	.25*	.12	.00
Father's H/I symptoms	.17	.01	-.20
Mother's inattention symptoms	.20+	.17+	.10
Mother's H/I symptoms	.21+	-.06	.02
Child self-regulation – 36 m	-.32*	-.34**	-.38**

A Longitudinal Pathway from Early Risk to Electrophysiological IC in Adolescence



Conclusions

- Individual differences in brain activity of adolescents during inhibition were predicted by early temperamental self-regulation and father inattention symptoms.
- These factors were involved in the development of child inattention symptoms, but their prediction to his brain activity was direct.
- These factors may represent an enduring biological risk, which could be related to the brain mechanism involved in inhibition

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