The neuronal correlates of reward and executive function interactions in adolescents with ADHD

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Cognitive and attention disorders and disturbances
Study type	Observational invasive

Summary

ID

NL-OMON37254

Source
ToetsingOnline

Brief title
Reward and executive functions in adolescents with ADHD

Condition

- Cognitive and attention disorders and disturbances

Synonym
Attention deficit/hyperactivity disorder (ADHD)

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: NWO

Intervention

Keyword: ADHD, Executive control, fMRI, Motivation

Outcome measures

Primary outcome

- Behavioural performance on both cognitive tasks (response inhibition and cognitive flexibility) during monetary motivation compared to no external motivation.

- Brain activation during response inhibition and cognitive flexibility during monetary motivation compared to no external motivation.

- DAT genotype

Secondary outcome

IQ (abbreviated IQ test)

Symptom severity (measured with questionnaires and screening interview)

Study description

Background summary

Single causal pathway models of Attention-Deficit/Hyperactivity Disorder (AD/HD) have emphasized deficits in executive function, primarily inhibitory control. A substantial number of fMRI studies have focused on the neural basis of inhibitory control in AD/HD and to lesser extent cognitive flexibility. These studies show that AD/HD is associated with inefficient recruitment of areas in prefrontal cortex, basal ganglia, and cerebellum during inhibitory control tasks. However, accumulating evidence of considerable inter-individual differences in executive function deficits in this disorder challenges this view. In addition, fMRI studies on the neural basis of reward processing in AD/HD have only just begun and generally show decreased ventral striatum activation during reward processing in AD/HD. The neurotransmitter Dopamine has been shown to play a crucial role in AD/HD. Medication to treat AD/HD symptomes has its effect trough the Dopaminergic system. Dopamine Transporter (DAT) genotype has been shown to determine indivudiual variations in Dopamine

baseline levels and affects the interaction between motivation and executive controle in AD/HD.

Our current understanding of the heterogeneous nature of AD/HD has caused a shift towards identifying multiple causal pathways. One influential example is the dual pathway model which proposes that an executive function pathway and a motivational pathway can each lead to symptoms of AD/HD. Although this model has had a main impact and has prompted AD/HD researchers to study motivational processes in addition to executive functions, there is a relative lack of research that examines the conjunction of these two important pathways and no fMRI research has studied the interaction between inhibitory control or cognitive flexibility and reward/motivation in AD/HD.

Study objective

Here we propose that in order to identify causal mechanisms that explain AD/HD-related heterogeneity, an integrative approach is needed. Therefore, in this project we will study the interaction between motivation and executive function in AD/HD and the role of DAT genotype in these processes. More specifically, we will study the bottom-up effects of motivation on inhibitory control and cognitive flexibility in AD/HD as a function of DAT genotype. This novel integrative approach will provide a more comprehensive account of the mechanisms of this prevalent, complex disorder.

Aolescence is a critical period in life with an imbalance between motivation and executive functioning. By including a substantial age range (12-17), and balancing the AD/HD subtypes, we will be able to compare the developmental trajectory of motivation-executive function interactions between AD/HD and typically developing children.

Study design

controlled non-randomized observational intervention (MRI) study. Gender and age will be balanced within groups.

Study burden and risks

There are no risks directly associated with this study. If applicable, participants will have to discontinue psychostimulant medication. An independent physician can be consulted at any time. Afterwards, participants can continue their medication intake without harmful consequences. Risks involved in MRI scans are neglible. To determine DAT genotype, a saliva sample is taken. Also see reseach protocol for safety measures.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)
Adolescents (16-17 years)

Inclusion criteria

20 typically developing children and adolescents
20 children and adolescents with AD/HD-Combined Type (AD/HD-C).
20 children and adolescents with AD/HD-Inattentive Type (AD/HD-I).
All participants will be between 12-17 years old, and the groups will be matched for age

Exclusion criteria

- Use of psychoactive medication that cannot be discontinued (participants who do take psychostimulant drugs will discontinue at least 24 hours before the experiment)
- Intelligence level < 75
- Learning disabilities

- Neurological conditions
- Comorbid conditions except for Oppositional Defiant Disorder and Conduct Disorder

Study design

Design

Study type: Observational invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	09-09-2013
Enrollment:	60
Type:	Actual

Ethics review

Approved WMO

Date:	30-08-2012
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Approved WMO

Date:	01-06-2015
Application type:	Amendment
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL41020.091.12