# The impact of methylphenidate reward sensitivity and learning processes in children with ADHD.

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Mapping the impact of MPH on reward sensitivity and learningprocesses in children with ADHD (attention deficit hyperactivity disorder).

Ethical review	Approved WMO
Status	Pending
Health condition type	Psychiatric disorders
Study type	Observational non invasive

# Summary

### ID

NL-OMON32501

**Source** ToetsingOnline

Brief title Impact of methylfenidate on reward sensitivity in ADHD

# Condition

• Psychiatric disorders

**Synonym** Attention deficit hyperactivity disorder (ADHD)

**Research involving** Human

# **Sponsors and support**

#### Primary sponsor: Vrije Universiteit

**Source(s) of monetary or material Support:** Aamenwerking Bascule/VU in kader van CCCS verband (Centre for Clinical Child Studies voor kosten junior onderzoeker)

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### Intervention

Keyword: ADHD, Learning processes, Methylphenidate, Reward

### **Outcome measures**

#### **Primary outcome**

Mapping the impact of MPH on reward sensitivity and learning processes in children with ADHD.

Effect measures:

- Impact of MPH on the score of the three computerized tasks that measure reward sensitivity and learning and changes in heart rate response to reward in a group of children with ADHD. The scores will be compared to the score of a group of healthy (medication free) controls to investigate whether MPH can normalize performance in the ADHD group.

#### Secondary outcome

# **Study description**

#### **Background summary**

The department of Clinical Neuropsychology of the VU University in Amsterdam holds an international research program into disruptive problem behaviour, with the main focus on ADHD (prof. dr. Oosterlaan, prof. dr. Sergeant, dr. M. Luman). The research group studies neurocognitive dysfunctions by the use of highly sensitive computer tasks and brain imaging techniques. One of the recent findings is that children with ADHD are more dependent on rewards to perform optimally. An underlying shortage of dopamine (DA) in the fronto-striatal system has been offered as a potential explanation.

Activity in the striatum is highly important for learning processes in the

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presence of reward cues. Receiving a reward results in an increase in DA in the fronto-striatal system, which enhances stimulus-response (S-R) learning in the face of reward cues?

Findings in recent studies by dr. Luman are in line with fronto-striatal abnormalities in ADHD: (1) children with ADHD need more reward and penalties than controls in order to perform optimally, and (2) children with ADHD show impaired S-R learning.

Strikingly, not much is known about the impact of methylphenidate (MPH, the most prescribed drugs to treat ADHD) on the sensitivity to reinforcement such as reward. MF blocks the reuptake of AD and possibly MPH can normalize activity in the fronto-striatal system. This would result in an increase in DA reactivity in response to reward and possible enhanced S-R learning. This has never been investigated and therefore the impact of MPH on reward sensitivity and S-R learning will be studied.

During the tasks, the heartrate of children will be measured by three electrodes attached to the ribs. Heartrate measures are sensitive to receiving rewards. A larger sensitivity to reward when children with ADHD are taking MF would be visible in an increased heartrate response to reward.

#### Hypothesis

- Can MPH normalize S-R learning and is this effect mediated by an enhanced sensitivity to contingencies.

#### **Study objective**

Mapping the impact of MPH on reward sensitivity and learningprocesses in children with ADHD (attention deficit hyperactivity disorder).

#### Study design

In 33 children with a DSM-IV diagnosis of ADHD (age 8 to 12), the impact of MPH on reward sensitivity and learning processes will be investigated. This study will be embedded in the outpatient clinic for children with ADHD at the Bascule, academic centre for child and adolescent psychiatry in Duivendrecht during the medication trial (four weeks), a standardised procedure to set children to the correct doses of MPH. To investigate the impact of MPH on reward sensitivity and learning, during each week of the trial the child will be asked to perform three computerized tasks, which score is compared to a baseline score preceding the trial. The baseline score of the ADHD group will be compared to the score of a group of 33 healthy control children (1 measurement without medication, age 8 to 12) to determine whether children with ADHD show an abnormal reinforcement sensitivity and abnormal S-R learning, which may (or may not) be normalized by the effect of MPH.

#### Study burden and risks

There are no risks associated with this study.

# Contacts

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# **Trial sites**

### **Listed location countries**

Netherlands

# **Eligibility criteria**

**Age** Children (2-11 years)

# **Inclusion criteria**

Children between 8 and 12 years Diagnosis of ADHD

### **Exclusion criteria**

Any psychiatric disorder other than ADHD

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Learning disorder such as dyslexia Brain damage or neurological impairment Epilepsy

# Study design

### Design

Study type:	Observational non invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Other

### Recruitment

NL	
Recruitment status:	Pending
Start date (anticipated):	01-09-2008
Enrollment:	66
Туре:	Anticipated

# **Ethics review**

Approved WMO	
Date:	03-12-2008
Application type:	First submission
Review commission:	METC Amsterdam UMC

# **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 CCMO ID NL24109.029.08