The Development of Advanced Reading Skills: Normalization and Compensation Effects among Children with a Familial Risk of Dyslexia - an fMRI study

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Observational invasive

Summary

ID

NL-OMON40707

Source
ToetsingOnline

Brief title
Normalization and Compensation in Dyslexia - an fMRI study

Condition

- Other condition

Synonym
specific reading disability, wordblindness

Health condition

Dyslexie

Research involving

Human

Sponsors and support

Primary sponsor: Rijksuniversiteit Groningen
Source(s) of monetary or material Support: NWO

Intervention

Keyword: Dyslexia, English, fMRI, Reading

Outcome measures

Primary outcome

- Performance (speed and accuracy) on behavioural tests investigating among others: second language reading comprehension, text reading, word reading, vocabulary, spelling and phonemic awareness.

- Patterns of blood-oxygen level dependent (BOLD) activation related to the different language tasks that participants will execute while being scanned, compared between groups (control group, at-risk group without dyslexia, at-risk group with dyslexia), taking performance on the tasks into account.

- Patterns of brain structural connectivity (localized fractional anisotropy (FA)) as obtained from DTI.

Secondary outcome

not applicable

Study description

Background summary

In our modern society reading is a very important skill. However, for a small subgroup of about 5 percent of the population reading is a skill that is very hard to acquire. This group of children is often diagnosed with dyslexia. They

show persistent difficulties with the decoding of words from letters to sounds despite a normal intelligence and adequate schooling. Dyslexia is partially hereditary; children with a parent with dyslexia have a risk of 30-60% to develop dyslexia themselves. It has been shown that children and adults with dyslexia show different patterns of brain activity during reading tasks in comparison to control groups.

By the end of primary school, some but not all children with dyslexia have problems with more advanced reading skills, resulting in text comprehension difficulties, as well as problems with reading and spelling in a second language. Furthermore, the final reading level that children with dyslexia achieve is highly variable. There is relatively little research that has investigated the different outcomes of dyslexia. The present study aims to change this by linking patterns of brain activity as obtained with functional Magnetic Resonance Imaging (fMRI) and brain structural connectivity as obtained with Diffusion Tensor Imaging (DTI) to advanced reading skills, and to data collected in a longitudinal study of dyslexia. This study follows up on an electroencephalography (EEG) study in the same population to investigate the neural generators underlying differences in reading skills between control children and children with dyslexia.

Study objective

Our main objective is to investigate if and how advanced reading and writing skills as well as reading and spelling in a second language, develop among children who have a familial risk of dyslexia in comparison to a control group. Here, we would like to investigate how at-risk children with and without dyslexia differ at the behavioural level, and relate such differences to measures of brain function and brain structural connectivity as obtained with fMRI during reading tasks, and DTI. This will allow us to determine whether normalisation or compensation (in comparison to the control group) takes place in the brain among the better at-risk readers.

Study design

A quasi-experimental approach will be used. Children with a familial risk for dyslexia will be compared with a control group, and within the at-risk group a comparison will be made between children with and without dyslexia.

Study burden and risks

The children and their parents will be invited to the NeuroImaging Center (NIC) for two half-day visits with preferably maximum 4 weeks in between. On the first visit, during an (approximately) 90 minute session the behavioural tests will be administered, and on the same day, the child will be familiarized with the scanner environment using a practice (dummy) scanner that is available at

the NIC. This part will last approximately 30 minutes, such that in combination with breaks, the first visit will last approximately 2.5-3 hours. On the second visit, the child will participate in the MRI-experiment which will consist of two fMRI scans (two tasks), a standard anatomical scan (needed for analysis) and a DTI scan. The child will be in the scanner for maximum 45-60 minutes, and including preparation and debriefing, this visit will last approximately 1.5-2 hours. Participants will be scanned using a 3 Tesla scanner. There is ample experience with this scanner using similar paradigms at the NIC in adults. So far, no negative effects of scanning are known, as long as standard precautions for MRI research are taken (particularly exclusion of participants with metal implants or that are (possibly) pregnant).

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

- Children who have participated in EEG study (METc 2012/076)
- Parental informed consent for participation
- Child*s informed consent for participation
- Agreeing that any abnormal findings with medical consequences will be communicated to the parents and the child*s general practitioner

Exclusion criteria

- Uncorrected abnormal vision
- Hearing problems
- Brain damage as a result of head trauma or a medical condition
- Serious health or psychiatric problems as reported by the parents
- MR-related exclusion criteria:
o Presence of metal implants (including some non-removable braces)
o Presence of electronic implants (e.g., heart pacemakers) and connectors of electronic devices (e.g., implanted electrodes)
o (possible) pregnancy
o claustrophobia

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	01-05-2014
Enrollment:	43

Type:	Actual

Ethics review

Approved WMO Date:	25-04-2014
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

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	NL48140.042.14