Verb processing and word learning in DLD: Diagnostic tests and neural correlates

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The objectives of the proposed research are: (1) to characterize the neural correlates of verbal learning abilities (both for nouns and verbs) in typically developing (TD) children compared to children with DLD, aged 8-12 years old. (2) to...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON53457

Source
ToetsingOnline

Brief title
Language and brain development in children with DLD

Condition

- Other condition

Synonym
'developmental language disorder' and 'specific language impairment'

Health condition

taalontwikkelingsstoornissen

Research involving
Human

Sponsors and support

Primary sponsor: Rijksuniversiteit Groningen
Source(s) of monetary or material Support: NWO (Vidi subsidie Vânia de Aguiar),subsidie stichting KinderNeuroPsychologie Noord-Nederland

Intervention

Keyword: assessment, developmental language disorder, neural structure, verbal learning

Outcome measures

Primary outcome

For the primary objective 1, the main MRI parameters are cortical thickness and white matter integrity (mean diffusivity, radial diffusivity, and fractional anisotropy). The main behavioral parameters are the scores on the verbal learning tasks. For objectives 2 and 3, the main parameters are the scores on the newly developed tasks of the verb battery.

Secondary outcome

Demographic information (age, gender, parental educational level, mono/bi/multilingual language background) and general language or cognitive information (nonverbal IQ, auditory discrimination, word reading with Eén Minuut Test (EMT) and non-word reading with Klepel test) will be summarized and reported using descriptive statistics.

Furthermore, scores in the CCC-2-NL questionnaire will be used to signal if any of the children recruited for the TD group presents with a profile indicative of language impairment. If so, or if the nonverbal IQ scores are outside the normal range, those children*s data will not be included in the study.

Study description

Background summary

Children's vocabulary knowledge is an important predictor of educational level and socioeconomic status. About 7% of children present with a Developmental Language Disorder (DLD) which is a neurodevelopmental disorder. Auditory verbal learning, the auditory encoding of speech in phonological short-term memory, its storage, and retrieval, is a key skill in vocabulary development and is often impaired in children with DLD. Nonetheless, the neuroanatomical correlates of verbal learning in this clinical population have not been investigated. These could help us understand the nature of the verbal learning problems and could lead to new treatment possibilities. The few studies in this field were conducted with elderly individuals, individuals with amyotrophic lateral sclerosis, children or adults with traumatic brain injury. None of those studies had a focus on learning of verbs, all using nouns as experimental stimuli. Children and adults with DLD present with atypical brain structure in several cortical and subcortical regions, and prominent impairments in auditory verbal learning. These two properties render individuals with DLD an ideal population to study the neural correlates of verbal learning with both nouns and verbs.

There is no standardized test available, however, which studies verbal learning ability using verbs. Also, the language ability of these children is typically evaluated using standard assessment batteries, all of which predominantly use tasks with nouns, and not with verbs, even though children with DLD have greater difficulties with verbs. understanding the processing nature of those difficulties is essential to characterize the nature of language impairments at the sentence level.

Study objective

The objectives of the proposed research are:
(1) to characterize the neural correlates of verbal learning abilities (both for nouns and verbs) in typically developing (TD) children compared to children with DLD, aged 8-12 years old.
(2) to standardize a novel diagnostic verb processing test battery including a verb learning test for children aged 8-12;
(3) to describe the differences between auditory verbal learning, verb processing, and verb learning in TD children compared to children with DLD aged 8-12

Study design

This is an observational study. TD children (n=60) and children with DLD (n=40)

aged 8 to 12 will be recruited from regular and special education (cluster 2) schools. All children will participate in 3 testing sessions. In these sessions, the developed language tests as well as already existing standardized tests will be administered. In addition, 25 TD children and 25 children with DLD will be invited for one magnetic resonance imaging (MRI) session within 1 month of testing session 2. Children that participate in the MRI session, will complete an MRI scan and language tasks during testing session 3.

Study burden and risks

MRI has no known negative effects on health, and it is a standard brain imaging technique. There is a risk for individuals with any metal devices in their body, and these will not be allowed to participate. MRI involves lying still in a confined environment, which is difficult for children. During acquisition the scanner makes loud noises. Ear plugs will be provided, but noise is still audible and can be burdensome. For these reasons, the MRI acquisition will not be longer than 30 minutes with the session extending up to 1h (including 30 minutes of preparation time). Children and parents will be able to view an animated cartoon illustrating the procedures of the MRI session and children will go through a planned playful preparation to minimize any potential worries related to taking part in MRI acquisition. To minimize boredom, participants will be allowed to watch a movie during MRI acquisition, since no language tasks will be administered.

For the behavioral assessments, participants will be required to participate in 2 testing sessions of approximately 1 hour and 1 testing session of 30 to 45 minutes, taking place across three weeks. These sessions will be planned in schools (in which case the child is taken out of the classroom for that period of time). Testing may also be planned at the parents* home or a lab at the university, in case the parents prefer this or the school is unavailable for on-site testing due to the pandemic. There are no expected risks of administering these pen-and-paper or computer-based tests. For children that participate in the MRI session, testing session 3 will take place at the UMCG and will last approximately 1 hour.

Although conducting this research with adults would be easier, the newly developed tools are designed for language assessment in this younger age group. Furthermore, the documentation of neuroanatomical correlates of verbal learning in this population can be of key importance to understanding why children fall behind on vocabulary development and it may stimulate the development of treatment approaches, including neuromodulation to relevant brain regions. Findings based on research with adults would not be directly transferable for these purposes.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)
Children (2-11 years)

Inclusion criteria

Children with a developmental language disorder (DLD):
- 8 to 12 years of age
- Attend special education (cluster 2 education) permanently or remotely
- Diagnosed with DLD by a licensed professional

Typically developing children:
- 8 to 12 years of age
- Attending regular education

Exclusion criteria

Children with DLD:
- History of neurodevelopmental disorders
- History of psychiatric illness
- Recent use (within 1 week) of any psychopharmaceutic drug
- Intellectual disability
- Severe articulatory difficulties
- Uncorrected vision or hearing impairment

Typically developing children:
- A diagnosis of DLD or suspected DLD
- History of neurodevelopmental disorders
- History of psychiatric illness
- Recent use (within 1 week) of any psychopharmaceutic drug
- Intellectual disability
- Severe articulatory difficulties
- Uncorrected vision or hearing impairment

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:	Diagnostic

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	03-03-2023
Enrollment:	100
Type:	Actual

Ethics review

Approved WMO

Date:	30-01-2023
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)
Approved WMO Date:	10-08-2023
Application type:	Amendment
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	NL81216.042.22