Exploration of implicit and explicit learning of a handwriting task in children born very preterm

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Ethical review	Approved WMO
Status	Will not start
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON40639

Source
ToetsingOnline

Brief title
Implicit and explicit learning of writing in preterms

Condition

- Other condition

Synonym
children born preterm, preterms

Health condition

prematuriteit

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: motor learning, pediatric rehabilitation, preterms, working memory

Outcome measures

Primary outcome

For the experimental task, movement time, number of errors, distance and fluency (jerk) will be assessed. For three of the background tests (WNV-NL, AWMA, MABC-NL), standard scores will be used for analysis. For the attention test (Bourdon-Vos), speed and accuracy will be used.

For the questionnaires, total (standard) scores and possibly subscale score will be used in analysis.

Repeated Measures ANOVA*s and/or SEM analyses will be used to test for learning effects and the effects of the covariates.

Secondary outcome

not applicable

Study description

Background summary

Motor skills can be learned implicitly and explicitly. Implicit learning is the ability to acquire a new skill by doing it unaware of the regularities governing the task. The procedural knowledge gained is difficult or even impossible to access consciously and has been shown to be relatively independent of both age (Meulemans et al., 1998) and IQ (Reber et al., 1991). In explicit learning, on the other hand, declarative knowledge is used to build up a set of performance rules that guides motor output. Berry and Broadbent

(1988) demonstrated that the application of declarative knowledge requires the availability of working memory, whereas, the application of procedural knowledge does not.
Ample studies on implicit and explicit learning in neurologically intact individuals have assumed that explicit learning may only proceed with intact working memory (Maxwell et al., 2003). In the proposed project, we will examine motor learning in preterm children. There are only few studies on motor learning in preterm born babies (Jongbloed-Pereboom et al., 2012). At school age, this has not been investigated yet, while we know that these children are highly at risk to develop motor performance and learning problems (De Kieviet et al., 2009; De Kleine et al., 2006). These children are also likely to develop working memory deficits, despite the absence of known neurological disorders (Aarnoudse-Moens et al., 2009; Jongbloed-Pereboom et al., 2012).
Our previous study, is the first study in which motor learning is tested at school age in children born very preterm, and in which the influence of working memory on motor learning is tested directly (Jongbloed-Pereboom et al., in prep). In our previous study, we examined implicit and explicit learning of a simple motor task. We did not find differences between groups (children born very preterm and controls) in learning, although working memory scores were significantly lower in children born very preterm. We did found a more general positive relation between working memory and learning, although this was not different for implicit and explicit learning. In our previous study, we included children based on the motor performance score. This made it difficult to include enough children. Furthermore, at the moment children do not com to the follow-up clinic at the age of 5 years. Data of motor performance are therefore not available. In this new study, we have chosen to not use their motor performance score as an inclusion, but take motor performance into account as a covariate in the analysis. In other, similar, studies, we found that attention also is an important covariate in the learning process, in the present study we therefore also want to examine the role of attention.
In this study, we want to investigate if children born very preterm do differ form controls when learning a fine motor relevant in childrens' daily life, a writing task. It is known that children born preterm have difficulties in writing (e.g. Feder et al., 2005, Guarini et al. 2012). We expect that the writing task will be more sensitive for differences in implicit and explicit learning, and that effects of working memory and attention will be more pronounced. This task could give us more insight in the learning mechanisms, and in time these insights can be used to develop therapies or educational methods.

Study objective

The first aim of this study is to examine differences in implicit and explicit learning in children born very preterm.

The second aim is to test the alleged role of working memory and attention on (explicit) motor skill learning in preterm children examine the relation

between implicit and explicit learning in preterms. This is especially relevant, as the potential mediating role of explicit working memory for this interaction can be unveiled. Specifically, if working memory is indeed an important factor mediating the (as facilitator or inhibitor) interaction effects found in previous studies, we do not expect such effects in the group preterms with profound working memory deficits. Finding such an absence of interference in preterms with deficits in working memory allows us to draw more specific inferences related to cognitive substructure of motor learning.

The third aim of this study is to measure how often motor problems co occur with working memory problems.

The fourth aim of the proposed project is to examine the relation between implicit and explicit learning in preterm born children compared to term born healthy peers. These peers have already been tested as part of a bigger project on implicit and explicit motor learning in children (project approved by the ethical committee of the faculty of Social Sciences).

Study design

An experimental design with 5-10 year old children born very preterm. Implicit and explicit motor learning will both be tested with a modified version of a serial response time task (SRTT). In this writing task, children will learn to write abstract patterns that have characteristics of letter writing (making loops, stopping). This task will be assessed with a digitizer and is based on a task by Overvelde and Hulstijn (2011). The SRT task is probably the most robust paradigm to study implicit and explicit learning, and is already successfully applied in typically developing children and clinical groups.
In the basic set-up of the SRT tasks the participant is required to react as quickly as possible to stimuli that are displayed on the computer monitor by moving the pen to the corresponding location on the digitizing tablet. In the implicit learning trials, children are instructed to follow a yellow moving target with their pen (their pen is visualized on the screen by a small blue dot). This yellow moving target moves along the abstract pattern, the pattern itself is not shown, neither is the pen trace shown on screen.

For the explicit trials, the pattern is shown on screen. Participants are instructed to write the pattern as good and as quickly as possible. As soon as the children start to write, the pattern disappears. During writing, participants see their pen position and pen trace. At the end of a trial, the written pattern will be shown above the example. This way, children receive feedback on their results.
The implicit and explicit conditions both have 25 training trials. After training, there is a short break, in which children play a game with the assessor. After the break there is for each condition a 10 trial posttest and a 10 trial transfer test. In the posttest, children only see the start and end position in each trial, when writing they see their pen position and pen trace.

Children are instructed to write the learned pattern as good and as quickly as possible. The instructions for the transfer test are similar to the posttest, but children will write with their non dominant hand. Half of the children will start in the implicit condition, and half of the children will start in the explicit condition. Different patterns are used per condition with similar characteristics and length (counterbalanced design).

Several background measures will be assessed, including a short intelligence test (Wechsler Non Verbal NL)(Wechsler & Naglieri, 2008). Working memory will be assessed with two subtest of the Automated Working Memory Assessment (AWMA)(Alloway, 2007), one to test verbal working memory and one to test visual working memory. Attention will be tested with the Bourdon-Vos Test (Vos, 1998). Motor skills will be tested with the Movement Assessment Battery for Children (MABC 2-NL)(Henderson et al., 2010).

Parents fill in some questionnaires. For executive functioning of the children, parents fill in the questions of the working memory subscale of the Dutch version of the Behavior Rating inventory of Executive Functioning (BRIEF)(Huizinga & Smidts, 2012). For motor problems in daily life, a screening questionnaire for developmental coordination disorder (DCD) is assessed, the DCD Q (Schoemaker et al., 2006). Parents also fill in a questionnaire about general health of their child and school functioning.

Study burden and risks

The tasks are not burdensome and are not risk associated, task are age appropriate and children like to learn such computer tasks. All tasks can be assessed in one session. This session will be maximally 2.5 hours, in which time is reserved for breaks between tasks.
For the parents of the children some burden is present because at this age they have to transport them or to reserve time in their own time schedule for the visits. Parents are also asked to fill in questionnaires (max. duration 30 minutes). However, insight in learning processes in this group of children is of great importance to build up a body of knowledge in the rehabilitation programs. An advantage for paqrents is that their children are evaluated one time extra. Results of the study will be shared with parents, and if necessary , accompanied by an advice.

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Children (2-11 years)

Inclusion criteria

age 5-10 years, Intelligence score within the normal range (>=85), born before 32 weeks of gestation.
Children are included if they have no severe handicaps: normal vision with or without glasses, normal hearing and no severe motor handicaps.

Exclusion criteria

severe behavioral problems, severe motor problems, no parental informed consent.

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:	Basic science

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	64
Type:	Anticipated

Ethics review

Approved WMO Date:	04-02-2016
Application type:	First submission
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	NL49964.091.14