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Acute effects of three types of physical exercise on cognitive performance of children aged 10-13 years

Submission date
12/05/2015

Recruitment status
No longer recruiting

Registration date
20/05/2015

Overall study status
Completed

Last Edited
24/01/2019

Condition category
Other

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Recent studies have shown that in addition to physical and mental health benefits, participation in PA can improve cognitive functioning as well as scholastic performance. Cognitive functions, such as attention, concentration, processing speed and working memory have been shown to improve after single exercise sessions. Above-mentioned cognitive functions are important for learning and classroom behaviour, contributing to scholastic performance. Therefore, conducting exercise sessions in the school setting may yield immediate positive effects for academic learning.
Although there is emerging evidence of positive effects of acute exercise on cognition (e.g. attention, information processing speed, working memory), the characteristics of exercise needed to optimally improve cognitive functioning in children remain largely unknown. For example, little is known regarding the optimal type of acute exercise that benefits cognition most. In this study we will examine the acute effects of three types of exercise on selective attention and information processing speed in children (10-13 years). In addition, we examine the feasibility of conducting 12-minute exercise sessions in the classroom.

Who can participate?
All students in 5th and 6th grade (age 10-13 years).

What does the study involve?
All children participate in 2 experimental days: one exercise day and one control day and therefore acting as their own control. Each class is randomly allocated into one of three exercise sessions (i.e. aerobic, coordination, strength exercises). All exercise sessions take 12 minutes to complete. During each exercise session, a movie clip is shown to all the students in the class. All children are asked to follow and imitate the instructor in the movie, while standing behind their desk. During the control session, students are seated for 12 minutes and listen to an educational lesson about exercise and movement. Before and after the exercise and control session, students are asked to complete two cognitive tasks that measured selective attention and information processing speed.

What are the possible benefits and risks of participating?
There is very little risk to participating in this study. The intensity, duration and content of the exercise sessions are comparable with students physical education lessons and their movement behavior during school-breaks.

Where is the study run from?
Department of Public and Occupational Health, VU University Medical Centre, Amsterdam (Netherlands)

When is the study starting and how long is it expected to run for?
January 2014 to June 2014

Who is funding the study?
NWO (Netherlands Organisation for Scientific Research)

Who is the main contact?
Dr Amika Singh
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Contact information

Type(s)
Scientific

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Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
WC2014-020; METc VUmc 2014.363

Study information

Scientific Title

Acute effects of three types of physical exercise on cognitive performance of children aged 10-13 years: a randomized cross over trial

Study objectives
Our aim is to examine:
1. The acute effects of 12 minute exercise sessions on selective attention and information processing speed
2. Moderating effects of exercise type, i.e. aerobic, coordination or strength exercise sessions
Hypothesis: we hypothesize to find similar acute effects of different types of exercise on measures of information processing speed and selective attention in 10-13 year olds

Ethics approval required
Old ethics approval format

Ethics approval(s)
Ethics Committee of the Faculty of Human Movement Science, VU University Amsterdam [2014-19] (The Netherlands)

Study design
Experiment; double baseline, within-between subjects design
(within: exercise, control condition, pre- and post-test; between: exercise type)

Primary study design
Interventional

Secondary study design
Randomised cross over trial

Study setting(s)
School

Study type(s)
Other

Participant information sheet
Not available in web format, please use contact details to request a participant information sheet

Health condition(s) or problem(s) studied
Physical exercise and cognitive performance

Interventions
Students participated in one of three exercise sessions (12 minutes in duration)
1. Aerobic exercises; well-known, easy and repetitive movements
2. Coordination exercises; more complex movements that stressed coordinative skills
3. Strength exercises; body-weight exercises

In the control condition, students were seated during 12 minutes and listened to an educational lesson about exercise and movement

Intervention Type
Other

Primary outcome measure
1. Selective attention (d2 Test of Attention)
2. Information processing speed (Letter Digit Substitution Test)

The cognitive tests were administered four times: before the exercise session (pre-test), after the exercise session (post-test), before the control session (pre-test), after the control session (post-test)

Secondary outcome measures
Heart rate was measured during the exercise sessions (Polar heart rate monitor) in order to determine the exercise intensity.

Overall study start date
01/01/2014

Completion date
01/06/2014

Eligibility

Key inclusion criteria
All children in 5th and/or 6th grade (10-13 years old) in the selected schools were eligible to participate.

Participant type(s)
Healthy volunteer

Age group
Child

Lower age limit
10 Years

Upper age limit
13 Years

Sex
Both

Target number of participants
200

Key exclusion criteria
Parents/legal guardians could withdraw their child from the study by signing and returing the objection form. These children were excluded from the study.

Date of first enrolment

01/01/2014

Date of final enrolment
01/03/2014

Locations

Countries of recruitment
Netherlands

Study participating centre
VU University Medical Center
van der Boechorststraat 7
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Sponsor information

Organisation
EMGO Institute for Health and Care Research

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Sponsor type
University/education

ROR
https://ror.org/0258apj61

Funder(s)

Funder type
Not defined

Funder Name
Nederlandse Organisatie voor Wetenschappelijk Onderzoek

Alternative Name(s)
Netherlands Organisation for Scientific Research, Dutch National Scientific Foundation, Dutch National Science Foundation, Dutch Research Council (Nederlandse Organisatie voor Wetenschappelijk Onderzoek), NWO:Nederlandse Organisatie voor Wetenschappelijk Onderzoek, Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO), Dutch Research Council, Dutch Research Council, Netherlands, NWO

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
Netherlands

Results and Publications

Publication and dissemination plan
To be confirmed at a later date.

Intention to publish date

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Other

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	17/05/2016	24/01/2019	Yes	No