ISRCTN84098935 https://doi.org/10.1186/ISRCTN84098935

Standing up for cerebral palsy

Submission date
08/01/2019

Recruitment status
No longer recruiting

Registration date
05/02/2019

Overall study status
Completed

Last Edited
22/10/2021

Condition category
Nervous System Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Young people who are more active tend to have better health and perform stronger academically. These effects last into adulthood, affecting life chances. Young People with Cerebral Palsy (YPwCP) have lower endurance and greater muscular weakness than their non-disabled peers, which can be made worse by sedentary (inactive) behaviours and lack of physical activity. There is research evidence that YPwCP often develop secondary conditions such as chronic pain, fatigue, and osteoporosis (bone weakness) as a result of low physical activity levels. Allowing YPwCP to engage in brief structured physical activity breaks in schools could potentially enhance their physical, cognitive, academic, social and economic performance. Children who sit a lot and are less active are more likely to become overweight, insulin resistant and perform less well in academic subjects. School-based activities enable all children to benefit, including those with disabilities. Physiotherapists have the skills to help support teachers to enable these young people to increase activity and reduce inactivity in school and thus support a key stated priority for young people with cerebral palsy and their families, which is to reduce inactivity and increase physical activity. The aim of this study is to determine the feasibility and possible effects on cognitive function of interrupting sitting time in school to inform a follow-on trial using the most appropriate intervention.

Who can participate?
Young people with cerebral palsy aged 10- 18

What does the study involve?
The study includes four sessions and lasts at least four weeks: a baseline visit (1 hour) and three intervention sessions (2 hours each). There is a one-week break in between sessions. The intervention sessions consist of a 2-hour period of either: 1) Interrupted sitting using the 5-minute brief interventions every 30 minutes for 4 times (using support devices if required) whilst performing moderate to vigorous physical activity (MVPA); 2) Interrupted sitting using the 20-minute MVPA single intervention in the middle of the period whilst performing moderate MVPA; 3) Uninterrupted sitting. MVPA includes cycling and some active exercises which include upper and lower body workout infusing moderate dynamic actions. Executive functioning is measured at the start and the end of the sessions.

What are the possible benefits and risks of participating?
Not provided at time of registration

Where is the study run from?
This study is run by the Centre for Movement, Occupational and Rehabilitation Sciences (MOReS) (UK)

When is the study starting and how long is it expected to run for?
March 2018 to November 2020

Who is funding the study?
Action Medical Research (UK)

Who is the main contact?
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Contact information

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Scientific

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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
39556

Study information

Scientific Title
Standing up for cerebral palsy: evaluation of a standing physical activity intervention

Study objectives
The main study hypothesis is that interrupted sitting by moderate to vigorous physical activity could affect executive functioning in Young People with Cerebral Palsy (YPwCP).

Ethics approval required
Old ethics approval format

Ethics approval(s)
South West - Cornwall & Plymouth Research Ethics Committee, Chair: Canon Ian Ainsworth-Smith, Level 3 Block B, Whitefriars, Lewins Mead, Bristol, BS1 2NT , Tel: +44 (0)207 104 8028, Email: Email:nrescommittee.southwest-cornwall-plymouth@nhs.net, 25/09/2018, ref: 18/SW/0200

Study design
Randomised; Interventional; Design type: Treatment, Rehabilitation

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Cerebral palsy

Interventions
Design: A cross over randomised exposure response experimental study with embedded process evaluation.

Setting: Testing will take place at Oxford Brookes University (OBU), Thames Valley.

Recruitment: Considering a prevalence of 0.2% of YPwCP (~250 in stated age range in Oxfordshire Community Paediatric Physiotherapy Team caseload in schools), assuming a recruitment period of 14 months, and planned recruitment through paediatric clinics and the physiotherapy team the trialists are confident 36 YPwCP can be recruited. They will primarily recruit through NHS clinics at the Nuffield Orthopaedic Centre, Oxford. Clinical staff and the

Community Physiotherapy Team will distribute the PIS to the potential participants and their parents/carers who may be eligible and interested in taking part in the study.

The direct care team will identify potential participants through the PIC sites and distribute the PIS to them. Potential participants will then be asked by the direct care team to give verbal consent to be contacted by Oxford Brookes University (OBU) researchers. If interested to participate in the study, the participants will be required to visit the OBU laboratory on four separate occasions, lasting no more than 3 hours each time. Travel and time cost will be reimbursed. They will also be made aware that the study is entirely voluntary and they can opt out anytime from the screening process to the intervention period. Medical records will only be assessed by clinicians/ physiotherapy team. OBU research team will not be involved in accessing any medical record of the participants.

Randomisation: Order of intervention session will be randomised (control, frequent, single) following baseline assessment using a computer-generated randomisation list drawn up by a statistician (blocks sequence generation). Due to the small sample size we will randomise and minimise so a minimum number of people with GMFCS level ≤III, and age ≤ 16 are randomised to each group first. To operationalize this, stratification by severity and age will be conducted and a minimum of 6 persons in the most sparse strata will be recruited.

The research program:
A randomised cross over exposure response experimental study over a period of 2 hours:
1. Interrupted sitting using four, five-minute brief MVPA every 30 minutes interval
2. Interrupted sitting using a 20-minute MVPA
3. Uninterrupted sitting

MVPA will be set from heart rate (HR) for each child at 50-85% age predicted maximal HR. A screening visit separate from the intervention sessions may be required, equating to a maximum of four visits.

Measures:

Baseline/screening assessment: age, sitting height, medication and medical history, CP Gross motor capacity as evaluated with the Gross Motor Function Measure-66 (GMFM-66) item set, Modified English version of PA levels with Physical Activity Questionnaire for Adolescents (PAQ – A), symptoms-limited incremental exercise test, wellbeing Quality of Life – child Health Utility 9D (CHU9D), strength grip and leg strength, walking speed over 10 metres using mobility aids as required if ambulatory, body composition (BMI, fat free mass), blood pressure.

At the screening assessment: The Manual Ability Classification System for Children with Cerebral Palsy (MACS) and the Communication Function Classification System (CFCS) will be used to determine level of hand mobility and communication level. This will be done by the research team from OBU.

Biological maturity level: Will be determined by the ratio of sitting height to standing height

Outcome measures:
At sessions the main outcome will be to measure the change in executive functioning from the start to the end of the session, the trialists will also measure oral glucose tolerance, and perform a process evaluation at the final assessment.

Speed and executive function - Inhibitory control: modified Eriksen Flanker Task and snap task (reaction times and accuracy) and modified a test that targets on working memory/attention task. Tasks will be performed before and at the end of the session intervention periods. A full block of practice during baseline assessment (screening day) will be in place to protect against the learning effects, as learning effect on both the flanker as well as n-back will be expected. The children will need to get their performance accuracy to a criterion first.

Oral Glucose Tolerance Test (OGTT): On arrival an OGTT, simulating insulin and glucose response comparable to that following a meal will be given. Children will follow an identical protocol for OGTT during all conditions. Children will be asked to fast the night before, for at least 10 hours prior to the test. They will arrive fasted, have baseline saliva insulin sample collected and will be given the OGTT, followed by sit only or sit in addition to PA breaks regimens. For the OGTT the stimulus is 1.75g/kg body weight of glucose (dissolved in water). Freestyle libre glucose monitoring system will be placed on the participants' arm and glucose readings will be monitored at timed intervals. Four saliva insulin samples will be collected from the participants at timed intervals per visit. They will need to rinse their mouths for samples 2-4 as the glucose drink will affect and usually people are fasted for salivary measures.

Insulin samples will be centrifuged after the test visit and stored for no more than 8 months as to do a batch analysis towards the end of the trial.

Fidelity, feasibility and acceptability of the exercise intervention:
Determined by the experience of: sessions attended, session content, possible effects including engagement, enjoyment, quality of sleep and daytime alertness (Process evaluation form: parent and child).

Physical activity levels – accelerometry will be monitored over the study period of four weeks using a wrist-worn activity monitor. During the intervention, the trialists will also use activPALs (a small lightweight device that is worn discretely on participants' thighs) to monitor transitions from sit to stand alongside wrist accelerometers to measure physical activity.

Gait - will be measured during the 10 meters walking test, with DataGait. Datagait consists of an inertial measurement unit (IMU; Pi-node, Philips, The Netherlands) and analysis software (Esser et al., 2009). The IMU, similar in size to a small match box, will be attached to the skin over the lower spine using double sided tape. DataGait measures biomechanical characteristics of gait such as step time and length, cadence (rhythm), walking speed and symmetry and efficiency/

Cost: The trialists will calculate resource use of the intervention and clinician time. Data will be valued using NHS reference.

Intervention:
The intervention sessions will consist of: 3 hour period with 2 hour exercise frame (random order); 1) Interrupted sitting using the 5-minute brief interventions every 30 minutes for 4 times (using support devices if required) whilst performing MVPA; 2) Interrupted sitting using the 20-minute MVPA single intervention in the middle of the period whilst performing moderate MVPA; 3) Uninterrupted sitting. Toilet breaks will be allowed as necessary. The trialists will use chest-worn heart rate (HR) monitors and a wrist-worn accelerometer to monitor the intensity of PA during activity and breaks. They will also use activPALs (a small lightweight device that is worn discretely on participants' thighs) to monitor transitions from sit to stand alongside wrist accelerometers to measure physical activity. Gait will be measured during the 10 meters walking test, with DataGait. Datagait consists of an inertial measurement unit (IMU; Pi-node, Philips, The Netherlands) and analysis software (Esser et al., 2009). The IMU, similar in size to a small match

box, will be attached to the skin over the lower spine using double sided tape. DataGait measures biomechanical characteristics of gait such as step time and length, cadence (rhythm), walking speed and symmetry and efficiency.

Speed and executive function - Inhibitory control: modified Eriksen Flanker Task (reaction times and accuracy) and modified a test that targets on working memory/attention task. Tasks will be performed before and at the end of the session intervention periods. On arrival an OGTT, simulating insulin and glucose response comparable to that following a meal will be given. Children will follow an identical protocol for OGTT during all conditions. They will arrive fasted for at least 10 hours, have baseline saliva insulin samples collected and will be given the OGTT, followed by sit only or sit plus PA breaks regimens. For the OGTT the stimulus is 1.75g/kg body weight of glucose (dissolved in water). Four saliva insulin samples will be taken per visit and freestyle libre glucose monitoring system will be placed on the participants' arm to monitor glucose readings at timed intervals. Saliva insulin samples will be labelled and frozen immediately for future analysis following SOPs for storage of tissue samples at OBU.

Wrist accelerometers will be worn by every participant during the intervention period (sampling rate at 100 hertz). This will provide a summary of activity levels and will be calculated by averaging the data across the days. Activity will be classified into sedentary, light, moderate and vigorous activities. Participants will be reminded to initiate wearing the accelerometers by the lead researcher. The acceptance and adherence to wearing the accelerometers during this time will be assessed. A 24-hour dietary recall and a habitual diet questionnaire will be administered to ensure fasting and diet record the day before each intervention. A series of questions as stated in table 1 will also be performed throughout the trial.

Analysis:

The trialists will evaluate baseline descriptive and demographic data. In line with consort guidelines for feasibility and pilot studies they will explore efficacy potential and feasibility.

They will use a generalized modelling approach General Estimating Equations (GEE), to compare responses to the two exercise conditions with responses to the control condition, considering the clustering of responses within person.
The magnitude of the regression coefficient divided by the standard error is an estimator of effect size and bootstrapping will be used to derive confidence intervals. Effect size parameters will be used to judge the value of progressing to a follow-on trial. The potential mediator effect of cognitive response through glucose response will be tested using simple concordance as the sample size is too small for regression based approaches. A potential mediator effect would be identified if a high proportion of cognitive responders also made a glucose response.

Correlation methods will be used to identify any potential explanatory variables from among demographic and clinical measures on both cognitive and glucose response. Exploratory analyses will investigate the impact of individual demographic factors as well as theoretical mediators on the intervention effect. Process evaluation: The trialists will include participant, parent, teacher and physiotherapist experiences, frequencies for recruitment, adhering to the intervention, session content fidelity. Qualitative analysis of the process data will be analysed thematically using a framework analysis approach via QSR NVivo® software.

Intervention Type
Behavioural

Primary outcome(s)

Change in executive functioning from the start to the end of the session. There are two areas of executive functioning the research aims to focus on: inhibitory control which targets speed and accuracy of the participants, and working memory and attention task. Tasks will be performed before and at the end of the session intervention periods. Timepoint(s): Assessed during the 3 (out of 4) sessions (not at baseline)

Key secondary outcome(s))
1. Anthropometrics: height, weight, BMI, sitting height, age, leg length, shoe size plus the GMFCS (gross motor function classification system) level: 1/2/3/4/5 (if needed), measured at baseline visit
2. Blood pressure and heart rate measured at every visit (4 in total)
3. 10 m walk test and Sit to Stand test measured at baseline visit
4. Strength (grip and leg) measured at baseline visit
5. Fitness measured using PAR-Q physical activity readiness questionnaire and V02 exercise performance test at baseline visit
6. Physical activity measured using accelerometry at every visit and for the next 7 days after the visit day
7. Blood glucose monitored by scanning the Freestyle Libre sensor at the three intervention visits (visit 2, 3 and 4)
8. Salivary insulin measured using saliva samples at the three intervention visits (visit 2, 3 and 4)
9. Movement monitored using activity monitor activPAL at the three intervention visits (visit 2, 3 and 4)
10. Questionnaires: Habit Dietary HBSC and 24-hour dietary recall at the three intervention visits (visit 2, 3 and 4) , physical activity questionnaire at one of the intervention visits (visit 2, 3 or 4) , Child Utility 9D questionnaire at one of the intervention visits (visit 2, 3 or 4)
11. Process evaluation questionnaire (Child/Parent) at the last intervention visit

Completion date
30/11/2020

Eligibility

Key inclusion criteria
1. YPwCP aged 10-18 years (primary and secondary special and mainstream schools)
2. Able to participate safely in assessments and brief interrupted sitting MVPA physical activity (with or without support)
3. Gross Motor Function Classification System level I to III
4. Communication Function Classification System level 1 to 3

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
All

Key exclusion criteria
1. Children with uncontrolled epilepsy/seizures (stable epilepsy/on medication > 12 weeks)
2. Type 1 and Type 2 diabetes or other glucose intolerance or on medication for such conditions
3. Surgery in previous 6 months
4. Botulinum toxin treatment in previous 6 weeks
5. Serial casting in previous 3 months (or planned)
6. Contraindications to physical training
7. Participants who are considered too cognitively impaired to participate in the trial, as determined by consultants
8. Children with spinal instability or other spinal problems that could inhibit them from participating safely
9. Children who are on any form of steroids, anti anxiety/depression drugs, birth control, beta-blockers, statin, adrenaline, HIV or Hepatitis C medications will be excluded from the intervention as these medications can affect the readings during the OGTT

Date of first enrolment
01/11/2018

Date of final enrolment
31/03/2020

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Oxford University Hospitals NHS Foundation Trust
John Radcliffe Hospital
Headley Way
Headington
Oxford
United Kingdom
OX3 9DU

Study participating centre
Oxford Health NHS Foundation Trust
Warneford Hospital
Warneford Lane
Headington

Oxford
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OX3 7JX

Study participating centre
Oxford Brookes University
Headington Campus
Gipsy Lane
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Sponsor information

Organisation
Oxford Brookes University

ROR
https://ror.org/04v2twj65

Funder(s)

Funder type
Charity

Funder Name
Action Medical Research; Grant Codes: GN2597

Alternative Name(s)
action medical research for children, actionmedres, The National Fund for Research into Crippling Diseases, AMR

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan

All work undertaken as part of this trial will comply with the Research Governance Framework for Health and Social Care UK and the OBU Research Governance Framework. All participant identification and referral procedures as well as procedures for data storage, processing and management will comply with the Data Protection Act 1998. All assessment data will be collected face-to-face using paper data collection forms. Assessment data will be recorded on paper CRFs at the time of assessment. Intervention data will be collected in paper form at OBU. The original hard copies of data collection forms will be kept securely locked away at sites for the duration of the study. All essential documents generated by the trial will be kept in the Trial Master File. All essential documents generated by the trial will be kept in the Trial Master File. AEs forms will be collected in person by one of the research team at OBU named in the delegation log. The retention period complies with Guidelines set out by the OBU Research Governance Framework.
The Chief Investigator and the research team will preserve the confidentiality of participants in accordance with the Data Protection Act 1998. All participants will be allocated a unique identifier and all trial data collected will be held in a linked anonymised form. Identifiable information will be stored separately from trial data. The randomisation will be held by a member of the research team who will oversee the trial but will not be involved in data collection. Group allocation will be referred by the same researcher. (The PIS includes Health Research Authority's recommended wording in order to fulfil transparency requirements under the GDPR for health and care research).

IPD sharing plan summary

Other

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
HRA research summary			28/06/2023	No	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes