PEER REVIEW HISTORY

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ARTICLE DETAILS

<table>
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<th>TITLE (PROVISIONAL)</th>
<th>Executive Functioning in Children with Unilateral Cerebral Palsy: Study Protocol</th>
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<tr>
<td>AUTHORS</td>
<td>Boyd, Roslyn; Brodimede, Harriett; Whittingham, Koa; Lloyd, Owen</td>
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VERSION 1 - REVIEW

<table>
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<tr>
<th>REVIEWER</th>
<th>Dr R.J. Vermeulen</th>
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| REVIEW RETURNED     | 21-Jan-2013        |

| GENERAL COMMENTS    | the manuscripts is of excellent quality however contains some misspellings: Page 8 line 45 “lanauge skills” mistyping should be language Line 48 “has higlitied that” change to “has highlighted that” Line 58 “langauge re-organisation.” Should be exchanged into “language re-organisation” Page 15 line (c) “Behavioural functioning, as measures” should be changed into …measured |

<table>
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<tr>
<th>REVIEWER</th>
<th>Dr. Louise Bøttcher, Associate Professor, Department of Education, Aarhus University, Denmark</th>
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<td>I have no competing interests.</td>
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| REVIEW RETURNED     | 28-Jan-2013        |

| THE STUDY           | A large part of children with unilateral CP have bilateral lesions (Cioni et al., 1999; Okumura et al., 1997). It is not clear whether the study takes this into account; e.g only includes children with unilateral lesions confirmed by MRI scans. Many children with bilateral lesions would undermine the possibilities for answering the main research question (Hypothesis 3). In answering hypothesis 2, it is not clear whether the authors take into account the limited correlation previously found between cognitive and behavioural measures of EF (Anderson et al., 2002 in Child Neuropsychology) The role of level of IQ need to be clarified. E.g. do the study include children with IQ in the normal range only or will it include children with e.g. mild mental retardation? Will children with CP and the control group be matched for level of IQ? Children with incontrolled seizure activity are excluded. Will the |
study control for the effect of seizures controlled by medication? This would be interesting as seizures have previously been found in impact on other aspects of cognitive functioning in children with CP (For references, see Bottcher 2010).
The interpretation of test measures of EF is very clear. However, the normal interpretation of some of the measures might be violated in children with CP: White matter lesions have been shown to impact on processing speed. This might affect timed measures e.g. Trail making and colour-word interference, e.g low scores might be caused by slow processing speed, problems in aspects of EF or both. Spastic CP is associated with impairments in visual perceptual processes. This might impact their scores in tests with components of visual analysis, visual construction and visuo-motor performance e.g. symbol search and Rey-Osterrieth complex figure test.

**VERSION 1 – AUTHOR RESPONSE**

**Reviewer #1**

Q1. The manuscripts is of excellent quality however contains some misspellings:
Page 8 line 45 “lanauge skills” mistyping should be language
Line 48 “has highlited that” change to “has highlighted that”
Line 58 “langauge re-organisation.” Should be exchanged into “language re-organisation”
Page 15 line (c) “Behavioural functioning, as measures” should be changed into …measured”

Our response: All of these have been updated accordingly.

**Reviewer #2**

Q1. A large part of children with unilateral CP have bilateral lesions (Cioni et al., 1999; Okumura et al., 1997). It is not clear whether the study takes this into account; e.g only includes children with unilateral lesions confirmed by MRI scans. Many children with bilateral lesions would undermine the possibilities for answering the main research question (Hypothesis 3).

Our response: Children with a history and diagnosis of congenital hemiplegia will be recruited for this study. The inclusion is based on the clinical findings of unilateral CP. Confirmation of a unilateral lesion by MRI scans was not part of this study, we agree that some children may have asymmetric brain lesions (i.e. bilateral lesions) with a unilateral clinical picture.

Q2. In answering hypothesis 2, it is not clear whether the authors take into account the limited correlation previously found between cognitive and behavioural measures of EF (Anderson et al., 2002 in Child Neuropsychology)

Our response: Yes, we are aware of Anderson et al. (2002)’s findings and have taken this into account in forming our hypotheses. We thought, given Anderson’s findings that it is important to measure both cognitive and behavioural aspects of EF.

Q3. The role of level of IQ needs to be clarified. E.g. do the study include children with IQ in the normal range only or will it include children with e.g. mild mental retardation? Will children with CP and the control group be matched for level of IQ?

Our response: The control group will not be formally matched for IQ level. Children will not be excluded on the basis of IQ as our intention is to collect data on a real-world sample of children with hemiplegia. We will, however, be measuring IQ so that it may be taken into account when interpreting
the findings.

Q4. Children with uncontrolled seizure activity are excluded. Will the study control for the effect of seizures controlled by medication? This would be interesting as seizures have previously been found in impact on other aspects of cognitive functioning in children with CP (For references, see Bottcher 2010).

Our response: We will be collecting data on whether children take medication for seizures. Given adequate sample size to do so, we will analyse the effects of this.

Q5. The interpretation of test measures of EF is very clear. However, the normal interpretation of some of the measures might be violated in children with CP: White matter lesions have been shown to impact on processing speed. This might affect timed measures e.g. Trail making and colour-word interference, e.g low scores might be caused by slow processing speed, problems in aspects of EF or both. Spastic CP is associated with impairments in visual perceptual processes. This might impact their scores in tests with components of visual analysis, visual construction and visuo-motor performance e.g. symbol search and Rey-Osterrieth complex figure test.

Our response: We agree with the reviewer that processing speed is impacting by white matter lesions, and this is why a control group of age-matched typically developing children has been included. Also, the model of executive functioning adopted for this study includes a component on information processing, which incorporates speed of processing, so this is accounted for. It is also plausible that visual deficits may impact test results and hence this will be considered during analysis. Motor deficits are not likely to account for differences because the children used their unimpaired hand.
Executive functioning in children with unilateral cerebral palsy: protocol for a cross-sectional study
Harriet L Bodimeade, Koa Whittingham, Owen Lloyd and Roslyn N Boyd

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