Reviewer’s report

Title: Relationship between segmental trunk control and gross motor development in typically developing infants aged from 4 to 12 months: a pilot study

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Reviewer: Eloísa Tudella

Reviewer's report:

Comments:

In general, the paper presents scientific relevance because it provides support to the premise that segmental trunk control is related to motor development, which, to date, has not been documented. It also presents fundamental clinical implications as the data provided here may underline the importance of assessing the trunk in a segmental way, which will serve as a basis for therapists to detect changes in the development of trunk control and gross motor skills of at-risk infants and, thus, intervene appropriately.

The fact that the study is longitudinal, evaluating infants from 4 months to 12 months of age, makes it stronger.

However, some points need to be reviewed, as described below.

Sometimes, the authors use the terms "gross motor function", "motor performance", "gross motor skill" and "gross motor development". Please standardize the term "gross motor development" throughout the text. This term is in accordance with that used in the Alberta Infant Motor Scale, which the authors used to measure one of the outcomes of interest.

Abstract

Since the correlation between trunk control and motor development is the differential of the study, as this information has not been documented, the authors should consider including this objective in the abstract.

In the Methods section, it is important to emphasize if the infants were healthy and the period in which they were evaluated.
Background

The rationale of the study is focused on the clinical scenario and, consequently, on infants with movement disorders. Thus, the introduction leads the reader to think that the population evaluated in this study was infants with movement disorders.

The authors should follow the study objective, which was to "systematically investigate and document the development of segmental trunk control in TD full-term infants from 4 to 12 months of age and (ii) examine the correlation between segmental trunk control acquisition and gross motor development". Therefore, the authors should emphasize how the development of trunk control and gross motor skills in healthy infants occurs, based on what has been documented so far. Recently, an article was published that provides information on the development of trunk control of healthy infants in a segmental way, identifying the level of trunk control of healthy term infants aged from 6 to 9 months (https://doi.org/10.1016/j.infbeh.2017.12.007). The authors could consider citing this study, as it supports the topic of the paper.

In addition to this, according to the existing evidence, please show the importance of trunk control for the gross motor skill performance, therefore the objective of relating these two variables. If the authors already provide information on the correlation between these variables, as mentioned on page 4, from line 42 onwards, what is the differential of this paper? The idea that trunk control plays an important role in the development of gross motor skills should be addressed in more depth.

What is the justification for initiating trunk control assessments at 4 months of age, since trunk control emerges at about 2-3 months of age with head control?

- Page 4, line 22: the authors cite the scales used to specifically evaluate motor control and refer to a review study. However, it is important to also refer to the authors who developed the scales (Trunk Control Measurement Scale and Pediatric Reach Test), thus disseminating the knowledge of other measurement instruments to the reader.

- Page 4, line 44: Please rewrite this part according to the study objectives. Previously the authors discussed situations of trunk control in healthy infants and then relate them to children with Cerebral Palsy.

- Page 5, line 7: This sentence is unclear. Please rewrite this part.
Methods

The authors mention that 1 infant was excluded from the study and data from 5 other infants were lost, but not excluded. Please clarify if, in addition to the mentioned exclusion criteria, the authors considered some discontinuity criteria in the study. If so, please include how the exclusion and discontinuity criteria was defined.

- Page 6, line 7: This sentence is unclear: "The SATCo considers the head and neck as one segment and sub-divides the trunk into five further segments", it is understood that the SATCo considers 6 trunk segments. This seems confusing since SATCo presents 7 functional levels of trunk control and not 6 (1 = head control, 2 = upper thoracic control, 3 = mid thoracic control, 4 = lower thoracic control, 5 = upper lumbar control, 6 = lower lumbar control, 7 = total trunk control), as described by Butler et. al (2010). Please clarify this.

- Page 6, line 12: Please explain why the authors describe that the active control was tested during head or upper limb movements. According to Butler et al. (2010), it is recommended to evaluate the active control during reaching movements. Therefore, head and upper limb movements can occur simultaneously.

- Page 6, line 26: The authors state that the AlMS evaluates infants up to 18 months of age, however, according to the scale, it can be used up to 18 months of age or until the infant acquires independent walking.

- Page 6, line 32: In the sentence "…two cameras set on tripods at 45° and 90° to the infant respectively to capture the infants' performance during both tests." I do not think the word "respectively" is necessary.

- Page 6, line 32: The authors mention that the tests were recorded using 2 cameras but did not explain which of them were used for data analysis. Or do the authors think it is necessary to analyze the infants in the frontal and sagittal planes? Was just one camera used for data analysis and the other to clarify doubts, when needed? This information is important regarding the replicability of the study.

- Page 6, line 35: The information that minimum clothing was allowed in the assessments is not necessary.

- Page 6, line 56: Why do the authors consider a sample size of 20 suitable for a pilot study? What were your reasons for choosing this number? Why do the authors did not did the sample size calculation considering the Cohen's d?

- Page 7, line 26: It is not necessary to provide examples of the items evaluated in AIMS, as it is an internationally-known instrument.

- Page 7, line 40: Please explain why the authors chose to use the Pearson test to verify the relationship between the outcomes of interest. SATCo provides the ordinal level data, as the authors mention on page 7, line 4. Thus, the data should be considered non-parametric. In this case, the most indicated statistical analysis would be Spearman.
- Page 7, statistical analysis: In addition to the correlations analyzed and the level of significance of the results, it would be interesting to calculate the effect size of the results. Mainly because the sample calculation was not made. In the absence of both pieces of information, it is not possible to predict how this result could be representative.

Results:

It is important to present the percentile found by AIMS of the infants. The authors discussed this fact only in the "Discussion" section for two at-risk infants in motor development.

- Page 7, line 58: The authors report that one of the infants had "severe stranger anxiety". Does the term used refer to uninterrupted crying? Please explain this.

- Page 8, line 20. It seems confusing when the authors mention that they used the Chi-Square test to verify changes in the level of static, active and reactive trunk control over the months, because previously they explained that they used the Friedman test for this very purpose. Which test was performed? Please explain this.

At 10 months of age, what was the level of static, active and reactive trunk control? The authors only show the correlation between outcomes but do not describe the level of trunk control for each test.

- From 8 to 10 months of age, the authors showed the results of the level of trunk control and gross motor development separately for each age. At 11 and 12 months, the results were shown together. Was there any reason to join the data together in these months?

- Page 10, line 14: When discussing the gain of active and static complete trunk control, the authors report the following "(11 months: n = 17/19, 89%, 12 months: n = 17/19) ". Please rewrite this, as it may confuse the reader if 'n' represents the active and static control respectively, or if only 17 out of the 19 infants achieved total trunk control at 11 months of age.

Discussion

- Page10, line 44: The idea of the first paragraph is confusing. Please rewrite this.

- Page10, line 52: The assertion that the present study investigated the emergence of trunk control is not correct as the authors evaluated the infants from the fourth month.

- Page11, line 17: The term "types of postural control" is not clear. What do the authors mean by using this term? Static and dynamic postural control or static, active and reactive trunk control? Please explain this.

- Page 11, line 32: The results of the good correlation between trunk control and prone posture at 8 months of age do not support the following statement "...non-vertical postures such as lying where the control demands are greatly simplified and there is no necessity to actively maintain dynamic stability of a column of unsupported segments". As non-vertical postures require
simplified trunk control, why then was there a good correlation between prone posture and trunk control? The authors should explore these results.

- Page 11, line 37: The sentence "When an infant moves towards more upright functional challenges of sitting and standing, it is likely that assured control in the trunk will assist in acquisition of these goals, while recognizing that, in typical development the practice of, for example, sitting, will itself further that goal." is confusing. Please rewrite this.

The paper of Sato and Tudella (2018) (10.3389/fped.2018.00185) could also provide support for the claim that reaching ability is related to segmental trunk control in at-risk infants. Consider including it.

Il the information in the fourth paragraph is confusing. Please rewrite this.

- Page 12, line 6: The term "at these ages" is repetitive. Please remove it.

- Page 13, line 15: If the authors mention that the positive and negative correlations are relevant, why did they only show the positive ones?

- Why was there no correlation observed before 8 months? What explains the fact that 6-month old infants are able to sit with anterior hand support and this has not been correlated with the level of trunk control?

List of figures

- Page 21, Figure 2, line 34: The abbreviation LL is used simultaneously for the terms 'lower thoracic' and 'lower lumber'. Please correct this.

- Page 22, Table 1: No information is presented for the correlation line of the SATCo static score with the AIMS supine subscale. Please add this information.

- Page 22, Table 1: In some fields of correlation the abbreviation NS is indicated, corresponding to a non-significant result. However, in other fields (such as the table in row 4, column 6 - correlation at 8 months of the SATCo static score with the AIMS prone subscale), it does not present a significant p-value and presents the values instead of the abbreviation NS. What criteria were adopted for using the abbreviation NS? Were only positive correlation values considered significant?
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

No

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

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If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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