Reviewer's report

Title: Dual-task walking performance and muscle quality in children

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Reviewer: Marc Dalecki

Reviewer's report:

Review of the manuscript “Dual-task walking performance and muscle quality in children” from Dr. Rainer Beurskens and colleagues submitted 02.09.2014 to BMC Pediatrics.

General comments:

The purpose of this manuscript was to examine whether muscular correlates of the lower legs influence children’s dual-task walking performance. Children walked under single and dual-task conditions. During dual-tasking they had to perform a concurrent arithmetic task while walking. Additionally, their leg lean tissues mass was registered using bioimpedance analyses. During dual-task walking, children’s gait velocity, stride length, cadence and variability thereof were negatively affected compared to single task walking. Furthermore, leg lean tissues mass correlated with step time and variability thereof in dual task but not in single task walking. The findings indicate a potential link between muscular capacities and dual task walking performance in children. The authors interpret their finding as evidence that higher leg muscle mass in children mitigates the impact of a concurrent cognitive task during dual task walking. More muscle mass in the lower legs seems to enhance gait stability, thus freeing up attentional resources needed to perform the cognitive interference task. The manuscript is very well written, the experiment methods and analyses are well chosen, and the findings are interesting and will add significantly to the present literature. The study provides an interesting approach (the role of muscle mass for a better performance during dual task walking in children), that drives forward the detailed understanding of neuromuscular functions and walking performance of growing children.

I only have some minor comments before I can recommend the manuscript for publication and suggest a discretionary revision.

Detailed comments:

Abstract:
- I suggest including information what exact age range (i.e., prepub, under 12, etc.) of the children.

Introduction:
- Page 3, line 18-21: Are the two sentences based on present literature or reports from parents/children?
- Page 4, line 36-37: I suggest adding some information that these findings are related to aging.

Methods:
- Page 6, line 69-72: Did the authors find correlations between physical activity and muscle mass, walking behavior or cognitive parameter? Physically active children may have more muscle mass than inactive children (authors already mentioned the relation between activity and performance; page 4 line 41-45). That may be one more interesting aspect of the author’s approach regarding the relation between muscle mass and walking performance, i.e. that active children have more muscle mass thus more walking stability and thus more resources available to perform walking well?

- Page 6, line 80: A path length of 10 m was used. Is this a typical length used in walking studies? To my mind, it seems to be a very short distance. Did the authors choose 10m due to the experimental setup (i.e., the OptoGait System)? Is there information available whether subjects (children, middle aged and or elderly) dual-task locomotion changes when walking longer or shorter distances?

- Page 6, line 78-84: How many walking trials were performed? In my current understanding, participants walked the 10 m pathway once in each condition (ST and DT). If subjects only performed one walk in each condition, what was the reason not to include more trials to increase the amount of data?

- Page 6, line 84-86: Didn’t the authors measure and analyse the cognitive task performance during the arithmetic task while dual task walking? I cannot find information to that in the methods or results section.

Discussion:
- Page 11, line 185: I suggest to add a short sentence stating that there was a significant relation between LMT and walking performance at the end of this first paragraph (right after author summarize their findings). This information follows now until the third section. In my opinion, this is the most important new finding and should be mentioned more prominently.

- Page 13, line 237-241: I like the major finding and conclusion regarding the relation between muscle mass and gait stability while dual task walking. Is it possible that this finding is relevant for elderly people too? That is, they have less muscular capacity as well, thus need more attentional resources to integrate sensory information. In turn, those resources are not available for concurrent cognitive tasks. Is there anything known about that? There is evidence that both, children and seniors experience similar impairments in terms of motor and cognitive functions.

Title:
The title might be adjusted, so that the reader gets more information about the most interesting approach, i.e., the correlation between performance and mass. For example a title like “Dual-task walking performance and its correlates with
muscle quality in children”?

This review may be considered signed, by me, Marc Dalecki

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests' below