Reviewer’s report

Title: Decreased levels of physical activity in adolescents with Down syndrome are related with low bone mineral density: a cross-sectional study

Version: 1 Date: 19 March 2013

Reviewer: Carol Garrison

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Major Compulsory Revisions:
1) One of the primary aims was to determine the relationships between physical activity and the risk of having low bone mass in adolescents with Down Syndrome (DS). To accomplish this, the authors have classified the individuals with DS into physical activity (PA) tertiles – using the total minutes of PA, regardless of the level of physical activity. The three tertiles being: fewPA (< 755 minutes or <12 hours, 35 minutes), lotPA (>795 minutes or >13 hours, 15 minutes), or medPA (between the above parameters). The study participants were asked to wear the accelerometer over seven consecutive days during waking hours (except while bathing, showering, swimming, and playing contact sports). However, for inclusion, the accelerometer only needed to be worn for a minimum of 10 hours per day, for a minimum of 4 days of the 7-day monitoring period.

Do the authors have information indicating that the individuals in the study truly wore the accelerometers from awakening in the morning until going to bed at night? The third of participants in the lowest PA tertile recorded activity for barely 12.5 hours, and 2/3 of participants recorded activity for less than 13 hours, 15 minutes. This seems like a very short waking day for an adolescent during a school term.

Do these tertiles truly represent length of physical activity during a day, or simply the length of time the accelerometer was worn? Is it possible that the individuals in the fewPA tertile simply took their accelerometers off earlier in the day?

This issue is a significant portion of this paper. Though the results regarding Bone Density as related to the activity tertiles as they are now defined are interesting, it is not clear what is actually being measured by these tertiles. Therefore, one cannot draw the major conclusions in this work regarding duration of physical activity and bone density in adolescents with DS. This would alter much of the Discussion and Conclusion sections of the paper.

Minor Essential Revisions:
1. The authors refer to “PA guidelines” several times through the manuscript. Are they referring to the guidelines proposed by the Australian Dept of Health and Ageing in 2005?
2. Materials and Methods, paragraph 1, sentence 2: Regarding recruitment, would recommend the authors clarify the contraindications for inclusion in the study.

3. Materials and Methods, paragraph 1, sentence 5: The authors mentioned that the individuals without Down Syndrome were healthy and without illness. There is no mention of the general health of the individuals with DS.

4. Materials and Methods: Assessment of PA: The authors provide no information on the time individuals were involved in activities such as bathing, showering, swimming, or playing contact sports. This would underestimate activity level for all participants.

5. Materials and Methods: Bone Mass:
   a. “BMD (in grams/cm2)” should read “BMD (in grams/cm3)”.

6. Materials and Methods: Statistical Analysis:
   a. BMI percentiles adjusted for age and gender should be used whenever referring to the BMI throughout the manuscript.

7. Results: Physical Activity:
   a. Please define what “valid time” means.
   b. Figure 2: The authors discuss four physical activity intensities in the text, however, there are five categories represented in the figure. I am assuming the MVPA category is a combination of Moderate and Vigorous PA to make the point that neither the adolescents with DS nor the controls met the suggested >60 minutes daily of moderate to vigorous PA. However, I think it is confusing to add it into this figure.

Discretionary Revisions:

1. Materials and Methods: Bone Mass:
   a. “BMD Z-score values were calculated in order to diagnose the future risk of developing osteoporosis.” In this study, BMD Z-scores were calculated for purposes of comparison.

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

**Quality of written English:** Not suitable for publication unless extensively edited

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests.