Reviewer's report

Title: Time-course of Exercise and Bone Changes in a 12-Month Exercise Trial

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Reviewer: Katherine Brooke-Wavell

Reviewer's report:

The authors have previously published a randomised controlled trial of effects of high impact exercise on bone mineral density (Vainionpaa 2005) and bone geometry (Vainionpaa 2007). This research is novel in the use of monitors to evaluate impact exercise much more objectively than has been achieved in most previous studies. They found that the measured acceleration level was associated with bone mineral density (BMD) change (Vainionpaa 2006). This manuscript aims to elucidate the timecourse of exercise effects on bone in this trial. This issue is important for design and evaluation of future trials on exercise effects on bone. They quantify impact exercise in each quarter of the intervention in the exercisers and examine the strength of associations between impact forces and bone change over 12 months. The reported findings were that volume of high-acceleration exercise during the first six months and subsequently was associated with BMD change, whilst that during the first three months and onwards was associated with bone geometry change.

The research described has largely used appropriate methods and the paper is clearly written. The major limitation is with the analytical approach: those individuals that were generating higher accelerations in the first three/six months are also likely to be generating higher accelerations subsequently. It is thus impossible from the data presented to determine whether the initial exercise alone was adequate to promote bone adaptation, or whether those with greater initial impact forces were able to accumulate a greater volume and/or intensity of exercise subsequently and that it is the subsequent (or cumulative) exercise that influenced bone adaptation.

Major compulsory revisions

1. Please use an analysis that will determine whether associations between daily impacts in months 0-3 or 6 and bone outcomes were independent of daily impacts in later months.

2. To determine timecourse of bone change (as implied by the title) or the outcome of exercise intensity at various stages of the intervention (as stated in the aim) requires measurements of bone changes at intermediate time points.

3. Pearson’s product moment correlation coefficients are reliant on the distribution of data and measurement range and are highly influenced by outliers. Please confirm that data were normally distributed and preferably provide a scatterplots of the key associations to demonstrate whether outliers are present that might inflate correlations.
4. When conclusions are being drawn from comparing correlation coefficients, please indicate whether these differ significantly.

5. Poorer compliance with using activity monitors would contribute to error in activity measures and so may weaken associations, so changes in compliance may confound findings. Please describe how many days activity data were available for at each stage of the study, and what procedure was used for missing data.

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

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

I declare that I have no competing interests.