Reviewer’s report

Title: The effect of home-based low-volume high-intensity, low-volume interval training on cardiorespiratory fitness, body composition and cardiometabolic health in women of normal body mass and those with overweight or obesity: protocol for a randomized controlled trial.

Version: 0 Date: 01 Oct 2019

Reviewer: Evelyn Parr

Reviewer's report:

The authors are conducting an interesting study which I look forward to seeing the results of in due course. With regards to the manuscript, there are a few areas for minor improvement.

Firstly, please use people first language to describe women with overweight/obesity rather than overweight/obesity as an adjective. Obesity in many (but not all) countries is a NCD (line 65) and should be communicated here as such.

Why are the same number of controls enrolled when the attrition rates may be higher, what is their incentive to remain in the study?

How is diet being controlled, or at least assessed, as changes to dietary intake can have a large effect on body composition irrespective of exercise?

The authors correctly point out the vast number of benefits of exercise that occur irrespective of weight loss. Considering the primary outcome of HIIT-type exercise is to increase CRF, why is the primary outcome a change in body composition? What aspect of body comp is expected to change (Line 215)- lean mass or fat mass or body fat percentage? What aspect of body composition being studied should be specified. Further, the hypothesis (on line 161-165) does not hypothesise a change in the primary outcome of a change in body composition and instead postulates on cardiometabolic health which is extremely broad.

The conclusion suggests that the primary outcome is feasibility? i.e. that HIIT protocols are sustainable outside of the lab. So, is the primary outcome feasibility or improvements in body composition?

The power calculations are unclear, the total number of participants needed is for two groups yet one of the study aims is to compare between "healthy" weight and women with overweight/obesity thus creating four subgroups. It is unlikely the sample size will be powered for this outcome and this should be disclosed accordingly.

Are participants provided with HR monitors to be able to monitor their training adherence and prescription throughout the study?
Minor comments:

Title: should it read "on the body composition and cardiometabolic health of healthy…" or "on body composition and cardiometabolic health in healthy…"?

Lines 80, 105, 122, 442, 464, 470, etc use "this" which is ambiguous and can be clarified in each instance. Line 453 with "it" can also be clarified.

Line 81: change caloric to energy, as a calorie is a unit of energy

Line 194: why is it a requirement that participants are employed?

Line 198: Type 1 or type 2 diabetes or both?

Line 199: What do the authors mean by "if participants consider themselves as trained athletes" and what does a "structured exercise program" include?

Line 266: Please reference this protocol.

Line 303: add "per session" to the total exercise time to clarify.

Line 304: does this mean participants could complete the training twice per day? What was the rationale for only allowing one "day off" from training? Is this going to be likely to be adhered to (pilot data or previous studies?)?

Lines 344-346: Skinfolds in a population of overweight and obesity are notoriously difficult to be accurate. Please detail what methodologies are being used to keep as accurate as possible (i.e. person measuring, number of measures per site, time of day of measure) etc. Especially as body composition is the primary outcome, skinfolds are less accurate in a population with greater amounts of body fat (as the estimations for the calculations which lead to body fat percentage are from lean populations) and only estimate subcutaneous fat depots, thus limiting interpretation.

Line 424: add "per week" after 66 minutes to clarify.

Line 439: please add a reference for lack of time being cited as a primary reason.

Line 458: Provocatively, how is "home-based own-body weight" HIIT any different to HIIT performed in the lab? i.e. why would the mechanisms of improvements to cardiometabolic health be any different?

**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.

Yes

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

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