Reviewer’s report

Title: Sauna bathing is associated with reduced cardiovascular mortality and improves risk prediction in men and women. A prospective cohort study

Version: 0 Date: 20 Jul 2018

Reviewer: Oliver Gibson

Reviewer's report:

The Manuscript Number: BMED-D-18-00870 entitled Sauna bathing is associated with reduced cardiovascular mortality and improves risk prediction in men and women. A prospective cohort study provides insight into the benefits of sauna bathing as a lifestyle intervention to attenuate mortality in males and females. The inclusion of a combined analysis interacting sauna use with typical CV risk factors provides some novelty beyond the previous work of the group.

The manuscript is well written, and the methods and analysis are clearly outlined. I believe that the paper is incremental in the contribution to knowledge in this area and a greater advancement could be made by more explicating dichotomising the cohort into males and females, and by age. In addition to this further analysis, whilst I appreciate the intention to group usage of Sauna by 1, 2-3, and 4-7 times per week to mirror previous work, I think this is a limitation of the analysis, particularly as the group are proposing dose responses. To me it would be more logical to divide the Sauna use into 1, 2-3, 4-5, and 6-7, thus creating more clearly identifiable boundaries for an upper limit of use.

Below are some more specific comments as per each section -

Abstract

Provide some additional data relating to the dose response and in the latter parts of the abstract include identified target doses of sauna use to attenuate the CVD related events/mortality.

The conclusion eludes to sex differences, yet I am not convinced that the analysis fully explores this. Could separate HI be calculated based upon different doses of Sauna use in males and females and these subsequently calculated.

Background

A clear, well cited overview of the area that provides appropriate context.
Methods

Well written, however the following additions (alterations) could (should) be made

- How were participants recruited?
- State that the 10-20% relates to relative humidity
- State typical sauna duration
- State sauna floor temperature
- State extent of humidity change with water throwing
- Describe blood collection technique
- Consider above point relating to groupings for sauna exposure number

Results

It is interesting that more frequent Sauna use is related to higher BMI, alcohol intake and energy intake. Is it the case that access to Sauna, and/or use is limited to only a specific cohort? i.e. wealthy? Does this impact upon their ability to seek medical care or other influences on health more potent than Sauna?

Revised hazard ratios should be presented in text following the adjustment for age and gender. Here is where I believe it would be relevant to explore the benefits in four groups, younger males, younger females, older males, older females.

Discussion

As outlined above, you have made comments relating to males and females, but not provided clear differentiating data/results between them.

In the second paragraph, provide some physiological data that characterises the acute responses to Sauna use, and then the alterations in key dependent variables described which change with repeated Sauna exposures.

Given 45 min is the optimal total duration, across 4 sessions, does 4 x 11 min of exposure need to be the recommendation? Can the 45 min be divided into uneven exposures, and if so, to what extent? i.e. 1 x 25 min + 3 x ~6.5 min?
Please elaborate on the key point at the foot of page 10. How impactful is Sauna use likely to be on those undertaking regular exercise training i.e. meeting recommended guidelines? Is it such that you are seeing a protective effect because (as described in the results) a gluttonous, inactive group are being assessed vs a healthy active cohort.

Sauna access may be easy in Finland, but this is not true of much of the world.

Please expand on the benefits of Sauna in conjunction with, and it's interaction with regular exercise (consider endurance and resistance)

**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.

Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable

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