Author’s response to reviews

Title: Senior orienteering athletes as a model of healthy aging: a mixed-method approach

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Author’s response to reviews: see over
Dear Dr Qiushi Feng,

We hereby submit a revised version of our manuscript "Senior orienteering athletes as a model of healthy aging: a mixed-methods approach" after having carefully considered the reviewers’ comments and suggestions.

We have addressed all of the reviewers’ suggestions and substantially revised the manuscript accordingly. Please see point-by-point response below. In the uploaded file of the manuscript changes and revisions are marked in yellow.

We hope that you now will find our manuscript suitable for publication in BMC Geriatrics, and are looking forward to your reply.

Sincerely,

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Point-by-point response to reviewers:

Editor’s remark:
Your manuscript named “Senior orienteering athletes as a model of healthy ageing: a mixed-methods approach” has been reviewed at BMC Geriatrics. We have received reports from two experts in this field. As you could see as below, the reviewers have proposed some substantial issues for the current manuscript. And I would like to invite you for a careful response and revision to all these comments and questions.

- In particular, one of the reviewers questioned about your method of transforming all index scores into a percentage scale for comparison. This is also rare to my knowledge. So I asked you to further justify this method in the revision. It is indeed preferable to compare these scores to some other health data, for example, statistics for general elders in Sweden; or introduce the range of these indices for general population of old age.

Reply: We thank the editor for pointing this out and we fully understand your concern. We have now included data from a population of Swedish free-living older adults collected during the same time as the OR-data. Our qualitative data from the orienteering athletes are compared to these reference values and we now present all values as original scores as seen in table 3. Furthermore, we have performed statistical analysis to compare the OR-data with the reference values obtained from the free-living older adults. The figure were the data was
transferred into a percentage scale has been excluded. The population of free-living older adults is described on pg 8. (line 152-162), the added section is marked in yellow.

Reviewer: #1

Major Compulsory Revisions:

- Your purpose assumes results prior to your investigation. The assumption made is that a group of older adults who participate in orienteering are a model of healthy ageing. Throughout the paper's results and conclusions it does not appear that you allow for the possibility that some of these older adults are not a model of healthy ageing, yet they still participate. Aspects that do not fit the pre-conceived model are explained away in your discussion of the results. If this is a scientific investigation of an active population I would treat it as that and then determine if it is indeed a "healthy" active population or an active population despite some health issues. Rewording your purpose to investigate/explore/characterize an active population rather than a "healthy" population is advised.

Reply: We thank the reviewer for pointing this out. We have now changed the wording and have added the following sentence in the end of the introduction of the manuscript to clarify that our purpose is to investigate if senior orienteering athletes may represent a potential model of healthy ageing:

“In this study we aim to explore and characterize a Swedish population of senior orienteering athletes as a potential model of healthy ageing”, pg 5. (line: 78-80), the sentence is marked in yellow.

In addition we have also changed our conclusion in the abstract, where we clearly state that senior orienteering athletes may be regarded as an ideal model of healthy aging. The section can be found on pg. 2-3 (line 23-29) and is marked in yellow. Similarly, we have also removed sections in the introduction where we previously assumed that all orienteering athletes represent a model of healthy ageing, see track changes pg. 5. Furthermore, we have also thoroughly investigated the data collected from senior orienteering athletes scoring a low physical activity or indicate problems with depression and anxiety. These data have been extracted and illustrated in tables, 4 and 5, to see if a pattern can be observed in how these subjects answer the questionnaires to further understand the reason behind the reported scores.

- Your purpose also states that you wish to identify factors of importance in order to promote health among older adults. However, you did not ask your focus groups specifically about health promotion. I would change this statement in your purpose as it is not addressed by your methods. Based on your methods it appears you hoping to describe this active population.

Reply: We thank the reviewer for observing this and we have now excluded this sentence in the introduction and abstract, see track changes pg.5. This statement is no longer included as an aim of the study. Instead we have added a section in the discussion, where we clarify that by investigating a population experience health the first step is made to identify factors important to maintain health. This section can be found on pg 26. (line: 590-596), the section
is marked in yellow.

- Your discussion suggests that you have determined an appropriate way to promote healthy aging. Your results did not determine this but could "suggest" options that "may" work. Please change the wording to more accurately reflect the nature of your findings.

**Reply:** We thank the reviewer for pointing this out and we fully understand your concern. We have now changed the language throughout the paper, using the wording suggested by the reviewer.

- In your Results, page 14 line 280 you report that the median level of physical activity was 83.3% despite six of the 122 having reports at 50% or lighter. You offer the explanation that this could be due to higher levels of activity in the summer months. Those 6 who are less active may be of great interest to the reader. If you are able to report their summer and winter scores we may learn that they are participating without regular exercise or that they are only exercising when they are "in season". A figure with summer and winter scores would help the FGAS results.

**Reply:** We thank the reviewer for observing this important issue. We fully agree with the reviewer that this would add interesting information to the paper. As indicated above all questionnaire data from these individuals scoring a low level on physical activity have now been extracted and are shown in table 4. As seen in table 4, no differences can be seen between the summer and winter season. Interestingly, this was also found to be true for the orienteering athletes as well as the population of free-living older adults.

- Results page 14 line 294. If you are able to report whether the same 6 were low on HADS that were low on FGAS it would be helpful. You report that 2 were had "probable mood disorder" later in your results, but if the other 4 were also low, or were not low, on HADS it would be meaningful. Please clarify these results in the manuscript.

**Reply:** We agree with the reviewer that it would add to the paper to more thoroughly investigating the subjects indicating problems with depression and anxiety. We have now displayed all subjects scoring high on this questionnaire in a separate table. To further clarify how these subjects responded to the questionnaires we have included all raw scores for all questionnaire data in table 5. As seen in the table the high HADS score did not correspond to a low physical activity level.

- I am confused by the organization of the FGD results. You give an example of "self-related" factors as "mental wellbeing" in line 302 page 15 but then leave "feeling mentally stronger" in line 311 under Body-related Health. Looking at the figure from the Algilani article I would place "mental wellbeing" as reported by the men in your study in the "self" category. I think it is a great idea to categorize your FGD information into these three cornerstones but it appears that your Tables also stray from the way the categories are defined in the original article by Algilani. Another example is putting "the ability to move and walk," which would be "autonomy" or "activity" under "body-related" in Algilani's article and you've placed them in "Self". Please re-consider this organization to clarify your results to the reader.
**Reply:** We thank the reviewer for observing this mistake by us. We have now reorganization of our FGD results according to the reviewer’s comments. The tables, 6 and 7, have now been restructured according to our previous findings presented by Algilani et al.

- You have concluded that the "main drivers" are short-term values such as "enjoyment and passion" while neglecting the fact that the majority of these athletes started orienteering in their 20's. After reading this paper I feel the need to market life-long sport to 20 year olds.

**Reply:** We fully agree with the reviewer and we have now included a section (pg 34, line 774-781, marked in yellow) in the discussion were we clearly discuss that our population of senior orienteering athletes have been practicing the sport since young age. In this section we further emphasize that long-term engagement in physical activity is an important factor to achieve a healthy life style in old age. In addition, we also discuss the importance of a supportive childhood in terms of promoting an active lifestyle, for example through the physical education in school.

- It would also be difficult to support the conclusion that promoting the short-term values of enjoyment and passion are the key to motivating this population based on what you have presented. Please look again at all of your findings. It appears your discussion could be re-organized and your conclusion should be re-written to emphasize key findings more than opinion.

**Reply:** We thank the reviewer for this important comment. We have now reorganized the discussion substantially. Taken into consideration the long-term engagement in physical activity that is a hallmark for this population. We have also reconsidered our conclusion and have now included that the choices of a healthy life style among senior orienteering athletes are commonly founded during childhood. Furthermore, we conclude that despite the regular engagement in physical activity since childhood, this population still emphasizes the importance of short-term values. An observation that might be of importance when introducing public health interventions in the general older population not commonly engaged in physical activity. The added section can be found on pg 34-35, line 786-794 section is marked in yellow.

- Include limitations of this study. Some to consider 1) Athletes were self-reporting their health 2) FGD were a sample of convenience and may have self-selected as the more healthy athletes 3) results were not compared to normative data thus, not allowing us to know if these individuals are scoring at a level higher than community-dwellers.

**Reply:** We thank the reviewer for these important comments. We have now included the limitations suggested by the reviewer in the discussion. Comment 1 and 2 can be found on pg 31 (line 693-699) and pg 32 (line 724-729), respectively. In addition, we have also added a section (pg 31, line: 699-703) were we discuss that the study is cross-sectional and future longitudinal studies will be of importance to investigate the actual relation between health status, behaviors and opinions over time in this population of senior orienteering athletes. Furthermore, we have added a thorough discuss on the choice of questionnaires used, pg. 28 (line: 622-630) and pg. 29 (line: 647-658).
Regarding comment 3, we have now as previously mentioned included reference values from a free-living population of older adults. The results from the OR-population have been statistically compared to these values, as presented in table 3.

- The results in figure 3 make it clear that these older adults scored themselves frequently near the score maximum. However, without seeing any raw scores or reference norms it is hard to quantify the difference in their perceived health as compared to the health of the general population. Including normative data converted in the same way or raw data compared to normative data for each of the scales would give your results more meaning to the reader and those wishing to cite this work.

**Reply:** We thank the reviewer for this important comment. As previously stated we have now included norm values from a free-living older population. The data are displayed as raw values and the previous figure 3, where all questionnaire data were presented on a unified scale has been excluded. Moreover, we have performed statistical analysis of our data and compared the results obtained from the orienteering to the norm values from the free-living older adults using the Mann-Whitney U-test. All scores and results are outlined in table 3.

**Minor Essential Revisions**

**Reply:** We appreciate the thorough reading the reviewer has done of our manuscript and have now revised all minor revisions according to the reviewer’s suggestions. All revisions are marked in yellow.

**Discretionary Revisions**

- You consistently refer to this as a "new" model of healthy ageing. I suggest referring to it only as a "model of healthy ageing".

**Reply:** We thank the reviewer for pointing this out we has now changed the wording throughout the paper, according to the reviewers’ suggestion.

- For ease of reading it may be helpful to abbreviate OR for O-ringen and LO for local orienteers as the methods and results are, at times, confusing. This would allow quick reference to which population is being referred to.

**Reply:** We fully agree with the reviewer and we have now included these abbreviations throughout the paper.

**Reviewer: #2**

- The premise of the paper is that orienteering serves as a model of healthy ageing. Throughout the paper the authors emphasize the fact that the participants have been engaging in orienteering throughout their adults lives. Thus I would argue that these data are not necessarily specifically related to orienteering as a model of healthy ageing, but that engaging regularly in rewarding physical activity throughout the lifespan is a model of healthy ageing. Does it really matter if this is in the form of orienteering? Couldn't this be as true for older adults involved in regular cycling, hiking, walking, etc throughout their lives? The authors need to consider this issue,
and provide a more robust justification that there is something unique about orienteering (above other forms of physical activity) that make it an optimal model of healthy ageing above other activities. Alternatively, authors may wish to consider rethinking their approach and focus of the paper to emphasize that their data represent lifelong physical activity (in this case, in the form of orienteering) as a model of healthy ageing.

Reply: We thank the reviewer for pointing this out. To clarify how orienteering is different from other sports/activities we have now included a section in the discussion were we thoroughly discuss the main features of orienteering and the unique combination of physical activity, cognitive challenges and social environment. Especially the social context particularly singles orienteering out from other activities, such as cycling, which is usually performed individually or together with friends. As we now point out in the discussion the senior orienteering athletes finds it particularly rewarding to share their sport across generations, with children and grandchildren, and particularly points out that this makes them feel young. This section can be found on pg 33, line 747-754. In addition, we also bring up the importance to perform physical activity through life as an important factor in healthy ageing, pg 34, line 775-782.

- The results from the focus groups have been distilled into a list of topics, which is unfortunate as one of the advantages of conducting a mixed-methods approach is enhancing the richness of quantitative data with qualitative data. As currently reported, these results are not particularly insightful as they would be what I would expect to see with this population. Thus the uniqueness of these findings needs to be emphasized in the discussion in reference to other literature on physical activity in older adults.

Reply: We thank the reviewer for this particular comment. To integrate our results we have now included a thorough section in the discussion were we particularly discuss how the qualitative data support the quantitative findings. In addition we have also included a section were we discuss the FGD findings. Furthermore, we have extended the qualitative results section to also include quotes from the focus group discussions to better illustrate our findings, this section can be found on pg 17, starting at line 368:

- Additionally, there are changes to the methods and results that will substantially enhance the clarity of the methods and richness of the findings. These include:
  - In the methods, you need to identify and describe the guiding framework for the qualitative component of the research. Did you employ a phenomenological approach? Ethnographical? Grounded Theory? It is impossible to put the qualitative results into context without this information.

Reply: We thank the reviewer for pointing out that our methodology was not thoroughly described. We have now updated this section to include the following sentence, were we have added two new references for better understanding of our methodology:

We adopted a mixed-method approach comprising both quantitative (i.e. questionnaires) and qualitative (i.e. focus group discussions (FGD)) data collection methodologies, in order to
provide complementary knowledge about the topic in question. The qualitative framework was based on a qualitative descriptive design (Polit, D. F et al, 2004) using a content analysis (Krippendorff, K, 2012; Elo S et al, 2008).

The added references are:


   o In the methods, provide more detail on how many focus groups were conducted, and the gender mix and age range within the focus groups. It is not clear how many focus groups were conducted, if men and women were in the same groups, etc.

Reply: We thank the reviewer for pointing this out. To better clarify the number of focus groups conducted, we have now moved this section to pg 11, line: 219-222 (marked in yellow). This section now clearly states how many focus groups that were conducted, gender mix and age range, as suggested by the reviewer.

   o In the methods, provide a table that includes the interview schedule for the focus groups. Lines 211-212 are not useful, as asking for further description and examples are always done in focus groups. It would be much more useful to see the questions asked and the additional probes put forth by the interviewer.

Reply: We fully agree with the reviewer and have added the interview schedule for the focus groups in figure 3. We have also removed lines 211-212.

   o In the results, provide illustrative quotes for each of the main findings. Typically two quotes per finding are reported - doing this will enhance the richness of the findings and make the most of the qualitative data you collected.

Reply: We thank the reviewer for pointing this out. We have now substantially revised the qualitative results section and added quotes, as suggested by the reviewer. The improved qualitative results section can be found on pg 17, starting at line 368 (the section is marked in yellow).

   • In the results section, it is not clear how you distinguished (in the focus groups and through your analysis) between “factors contributing to experiences of health” and “factors contributing to the maintenance of health.” How are these different/distinct from each other? This might become more clear when the interview schedule is provided, but I think it would be helpful to provide more clarity on how you distinguished between these two topics.

Reply: We thank the reviewer for this insightful comment. When going over the results again
we realized that it is difficult to distinguish between factors contributing to experiences of health and factors contributing to the maintenance of health. We have therefore revised the qualitative result section substantially and included the identified factors in the section describing factors contributing to experience and maintenance of health, pg 17 (starting at line 368).

As the authors clearly state, this is a study examining a very homogeneous group of older adults. However, the population of 'older adults' is very heterogeneous with regards to income, health, function (physical and cognitive), and experiences of physical activity. More can be done to compare this group of participants with older adults in general, but also with other physically active older adults - although I would fully agree that participating in life-long physical activity, particularly an activity such as orienteering, which provides vigorous intensity activity and cognitive challenges, would be a way to optimise health.

- But how can this apply to the majority of older adults who are currently very sedentary and doing little or no activity? Are you suggesting that they should get involved in orienteering? Or that they should be more active throughout life? The former would not be realistic, and the latter is something everyone would agree with (and thus is not new).

Reply: We thank the reviewer for pointing this out. We have now changed the aim of the paper so it doesn't include identifying factors of importance to promote health among the general population of older adults (the excluded sentence can be found on pg 5, via the track changes function in word). Instead we have included a section in the discussion were we thoroughly discuss the advantages of orienteering and how certain aspects that our study participants find important can be implemented among the general older population. Indeed, we do mention the importance to motivate children to engage in physical activity (pg 34, line: 777-782), but also discuss how the social context and the possibility to interact with individuals from different ages can be implemented among the general population. For example centres combining nursing homes with day care centres could be beneficial for older adults as they create a natural place for older adults and children to interact and perform activities over the generations, pg 33, line: 755-759. Furthermore, we conclude that in future studies it would be of importance to identify the older person's own preferences to make an activity meaningful and rewarding and investigate if this could act as a motivator to undertake healthy routines and make healthy choices among the general population of older adults, pg 35, line: 792-795. Even though the general population of older adults are heterogeneous, we find it is important to investigate a homogeneous population in order to identify factors important to maintain health. By investigating a relative large homogenous population we can identify factors that apply to many people. In future studies it will be important to elucidate whether these factors can be applied to motivate engagement in physical activity among the general heterogeneous older population.

- I feel the authors need to be more clear about the implications of this current research to both future research and to public health policy. How can policy makers and local governments use this information to promote more activity amongst older adults (many of whom would struggle to engage in higher intensities and durations of physical activity that are required in orienteering)?

Reply: We thank the reviewer for pointing this out. We have revised the aim of the paper to explore and characterize a Swedish population of senior orienteering athletes as a potential
model of healthy ageing and the previous part of the aim stating that we also aim to identify factors of importance to promote health among the general population of older adults have been excluded, pg 5.

Our findings further show that despite the fact that senior orienteering athletes are well aware of the long-term benefits of physical activity they still emphasize the importance of short-term values such as enjoyment and passion. Thus, based on our findings it would be of extra interest in future studies to identify the older persons individual preferences to make an activity meaningful and rewarding to investigate if this can act as an motivator to engage in physical activity on their own level and continue with that engagement, pg 35, line: 792-795.

Minor Essential Revisions

Reply: We thank the reviewer for the careful and thorough reading of our manuscript. We have changed all minor essential revisions according to the reviewers’ suggestion.

Additional Editorial Requirements:

We thank the editor for pointing out the need to copyedit the paper to improve the English. Our collaborator, who is native English speaking and well acquainted with the language used in the research environment, has now edited the manuscript. The manuscript has now been formatted according to US English and we have particularly adjusted the manuscript so there is no mix between British English and US English.