

## Peer Review File

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### Review Comments

Our knowledge on how physical activity patterns (beyond just physical activity intensity and volume) influence bone outcomes during adolescence is limited. Animal model data suggests that recovery periods between physical activity bouts may help osteogenesis. Therefore, assessing the influence of HIIT on bone development in adolescents is an interesting topic area and may help to fill the gap in the literature regarding physical activity patterns.

Authors response: Thank you for your kind feedback.

Overall, the topic is interesting and relevant, but I have concerns about the scope of the systematic review search. I'm not sure if broadening the search would yield any additional papers, but only using BMC and BMD (should be noted these are areal bone mineral density [aBMD] variables and come with the limitations of 2D imaging) as bone outcomes discounts the literature that may be available on other measures of strength, architecture, and geometry. More general search terms such as skeleton, osteo, calcific, bone architecture, etc may be considered.

Authors response: We really agreed with the reviewer and we have added new terms, as follows:

Example for Pubmed:

“bone and bones” [MeSH Terms] OR skeleton [MeSH Terms] OR skeleton [Title/Abstract] OR “bone mass” [Title/Abstract] OR “bone demineralization” [Title/Abstract] OR “bone development” [Title/Abstract] OR “densitometry” [MeSH Terms] OR “densitometry” [Title/Abstract] OR “bone architecture” [Title/Abstract] OR “bone structure” [Title/Abstract] OR “bone strength” [Title/Abstract]

Moreover, we also have included all these terms for SCOPUS and Embase searches.

So, our search was updated in 05 September 2020.

Specifics:

Lines 35-36: why just this article specifically? There have been many excellent systematic reviews that may get at this more broadly, including but not limited to, McKelvie (2002) Br J Sports Med, Tan (2014) J Bone Miner Res, Hind (2007) Bone, Bland (2020) Osteoporos Int, Behringer (2014) J Bone Miner Res

Authors response: Thank you for your concern and suggestions. We have mentioned this article as an example of a recent study and because it presents a well conducted longitudinal design. However, we are very grateful for your suggestions and have included these articles, as follows:

Lines 37 – 38: “Systematic reviews have shown that physical activity, as well as weight-bearing exercises, enhance bone mineral accrual<sup>3-6</sup>”

Line 46: a review on HIIT was mentioned that included children (and presumably adolescents) how much of the literature was children vs. adolescents vs. adults. May help to clarify the gap you are aiming to fill in the literature.

Authors response: We think that this commentary have helped us to improve the introduction section. We have removed this sentence and have replaced it for specific references from adolescent populations.

Lines 51-53: “Despite these health evidences support HIIT practice, only 5 reviews<sup>19-23</sup> from all 33 addressed children and adolescents which reflects that the focus has been given to adult population.”

Line 66: recommend expanding bone search terms (bone, skeleton, bone architecture, bone structure, osteo\*, bone strength) to ensure search terms encompassed a wider variety of bone outcomes.

Authors response: We really agreed with the reviewer and we have added new terms, as follow:

Example for Pubmed:

“bone and bones” [MeSH Terms] OR skeleton [MeSH Terms] OR skeleton [Title/Abstract] OR “bone mass” [Title/Abstract] OR “bone demineralization” [Title/Abstract] OR “bone development” [Title/Abstract] OR “densitometry” [MeSH Terms] OR “densitometry” [Title/Abstract] OR “bone architecture” [Title/Abstract] OR “bone structure” [Title/Abstract] OR “bone strength” [Title/Abstract]

Moreover, we also have included all these terms for SCOPUS and Embase searches.

So, our search was updated in 06 September 2020.

In accordance with the reviewer concern, in our previous search we found 29 articles and now have increased to 63 articles.

Lines 75-77: data provided should be presented in results section. Consider Prisma flow chart to clarify how many articles were duplicates or removed because of screening.

Authors response: As suggested, we have included a Prisma flow (Figure 1).

Discussion: should build up a better literature base to justify need for HIIT interventions on bone outcomes in children. Do adult data suggest this could be effective? What is the literature foundation for this need? Reference for line 89 is female specific. Any evidence in males?

Authors response: We have rewritten this paragraph and included two more studies with adults which give us more results about HIIT effects on bone outcomes. Moreover, we have included some sentences as literature foundation for the relevance of this type of investigation, as follows:

Lines 114-122: “Given that (a) current recommendations suggest that vigorous intensity physical activity<sup>10-13</sup> for young people achieve large health benefits and reduce the risk of developing diseases later in life<sup>11,14,15</sup>, including bone health<sup>8,9</sup>, (b) HIIT may improve health-related outcomes<sup>19,21-23,25,26</sup>, and (c) the development of bone health during childhood and adolescence is substantial and may be an important protective factor for osteoporosis and fractures<sup>1</sup>, it becomes essential to understand HIIT effects on bone health in adolescents, specially nowadays when this type of exercise is on spotlight. Briefly, recent studies with adults showed that, HIIT can be an effective way to improve BMC and BMD<sup>27</sup>, and regular power-based training and competition in sprinting and jumping is associated with better maintenance of bone mass<sup>28</sup>”.

Line 81-82: Are harmful effects of HIIT in adolescents suspected? If so, would it be ethical to continue to study this intervention?

Authors response: This concern was very helpful and improved our manuscript. According to this important concern from the reviewer, we have added the following sentences in the discussion section:

Lines 123-130: “As previous evidences have suggested<sup>18</sup>, HIIT may also improve anthropometric variables, cardiorespiratory and cardiovascular functions, and mental health. Studies mainly with adults have shown a good adherence rate of  $\geq 80\%$  and HIIT appears to be safe, with no acute injuries or serious cardiovascular events, similar to other active controls <sup>18</sup>. Despite this positive evidences, HIIT adherence and adverse events should be carefully addressed in adolescent populations, for both sexes as well as different puberty stages. Further recommendations as type of movement, exercise duration and frequency, and rest intervals remain unclear due to the lack of studies currently available<sup>23</sup>”

Line 83: Narrative review checklist completed but this is described as a letter to the editor on this line.

Authors response: Thanks for your in-depth review. This manuscript was submitted to this Journal as a Letter to the Editor, but the Editor has suggested to change it to Narrative Review. We apologize for this mistake. As suggested, we have replaced “Letter to the Editor” by “Narrative Review”.