Author’s response to reviews

Title: The impact of shoe flexibility on gait, pressure and muscle activity of young children. A systematic review

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Reviewer reports:

Reviewer #1: Thank you for the opportunity to review this manuscript. I would like to start by commending the authors on a very clear and very well written piece. Indeed, the purpose was outlined well, the methodology was sound and the conclusions were easy to interpret. In addition it is very obvious from this body of work where the direction of research is likely to be required. Below are minor comments.

1. Line 82 - in this paragraph the final line states 'again a study undertaken with children aged above six years'. I was unable to ascertain whether the first reference in this paragraph (reference 6) was also undertaken in those above 6 years. Suggest revising for greater clarity.

Response 1: Further clarification of two studies and age ranges. Changed text “There has also been an observation of changed in lower limb kinetics with shoes changing tibialis anterior activity compared to barefoot in children with a mean age of 7.7 years (Range 2-15 years).

2. Line 84 - consider changing 'shoes was also' to 'shoes were also'

Response 2: Text changed to ‘shoes were also’
3. Line 101 - states Databases included.... consider revising the term 'included' as all the databases have been stated here (rather than some of the databases). Included here, implies to me that not all databases are listed.

Response 3: Changed to “Databases searched were: OVID, Medline, EMBASE, CINAHL, EBM review, AMED and Sports Discus.”

4. Line 150 - consider changing 1 to 'one'

Response 4: Text changed to the word ‘one’

5. Line 198 - findings for increased velocity (SMD=1.65, 95%CI=0.74, 2.56). As the 95% CI crosses no difference (i.e. is less than 1 in some cases) consider revising 'increased velocity' - for example - may increase velocity.

Response 5: Thank you, authors agree and text changed “Compared to barefoot walking, shoes decreased cadence (SMD= -2.50, 95%CI=-3.45,-1.54, I2=87.2%), increased step time (SMD = 1.44, 95%CI=-0.04, 2.91, I2=95.8%), increased step length (SMD=5.60, 95%CI=4.66, 6.55, I2=66.4%) and may increase velocity, (SMD=1.65, 95%CI=0.74, 2.56, I2=89.9%)”

6. Line 206 - In the plantar pressures paragraph it states 'Peak Plantar pressure as generally lowest in the stiff shoe design'. Consider whether this could be quantified with some data.

Response 6: Thank you, this has been changed to quantify the data with the statement. Text changed as follows:

“Overall, the peak plantar pressure was generally lowest in the stiff shoe design (mean=9.6, SD= 3.2 N/cm2) and there was a higher peak plantar pressure in the Ultraflex shoes (mean=13.0, SD= 3.8 N/cm2).Respon6:

7. Line 269- states 'It is unknown if the lack of studies is correlated to the challenges that present while testing this age group of children, or if there is a lack if interest in researching this age group'. In the prior paragraph it was outlined well the limitations to researching this population. It may be worth considering moving the above paragraph to this spot to link better with this limitation. The comment about lack of interest is a challenge, as I am not aware of supporting data which could quantify this. I would recommend to consider removing this part of the sentence or adding in a reference to support this statement.
Response 7: Authors agree that there is no supporting data for this statement quantifying a lack of interest in researching this age group, therefore this was removed from the manuscript. Paragraph moved to link in with limitations as per recommendation.

8. Consider the limitation that all full text articles were limited to English.
Response 8: Agree with this is a limitation, included “All full text articles were limited to English, which is another limitation of this study”

9. Consider the limitation that Kennedy reference has a very small sample size of 4.
Response 9: Text changed to acknowledge limitation “One of the included studies had a small sample size of four participants for the age range we were interested in. Therefore, caution should be applied to these results”

10. Table 4 has some formatting errors - the 13 is justified to the top and the Lythgo reference 12 is also justified to the top.
Response 10: Formatting errors corrected within table.

Overall this is a very well written piece and I wish the authors the best moving forward.

Reviewer #2: This review paper presents the current evidence on the effect of shoes on gait in young children. The review is robustly conducted and the findings clearly presented.

11. I have only fairly minor comments to make. It would be helpful to provide more evidence/better justification as to why this question needs answering. It it stated multiple times in the paper that health professionals advice barefoot walking/soft-soled shoes, but only one reference is given for this, from 1991. It would be useful to provide further evidence to justify this statement.
Response 11: This advice given by health professionals as to whether children is lacking clear evidence or guidelines, hence the need for further research. Staheli is the only paper to our knowledge that references the advice that children’s shoes should be based on the barefoot model. There are studies which indicate that inadequate footwear or footwear in general may affect the physiological development of the foot. Rao and Joseph showed a higher incidence of flat foot among those who wore footwear compared to those who did not.

Wording to be changed within the paper to reflect that health professional advice on barefoot walking/soft soled shoes is based on the assumption not evidence. Paragraph changed as follows:

“Health professionals and shoe manufacturers often give advice based on the assumption that a shoe should not affect normal foot function or motor development in younger children and therefore be as close to barefoot walking as possible[3]. However, there is limited research evidence to guide these shoe recommendations in younger children.”

12. It is stated that two studies had the same cohort of participants (line 184). Could you please clarify how this was dealt with in the statistics and meta-analysis?

Response 12: Thank you, we wish to draw your attention to the statistical methods line 151. Data were extracted from each study by age. This was the data then used within the meta-analysis. Where we were unable to get age based data, we contacted authors for a break down. We have also provided further clarification in this statement to ensure the reader understand that it was extracted per age and per condition.

We have also pointed towards this in the results section ln 182.