Reviewer's report

Title: Does flip-flop style footwear modify ankle biomechanics and foot loading patterns?

Version: 1 Date: 16 March 2014

Reviewer: Angus Chard

Reviewer's report:

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- Major Compulsory Revisions
  1. Grammatical improvements are required throughout the paper.
     a. Delete or substitute the 13 uses of “also”.
     b. Consider alternatives to the 6 uses of “apparent”.
  2. Background
     a. Paragraph 1
        i. Change “UK” to United Kingdom
        ii. Change “lesser-toe” to second toe
     b. Use of the word “because” is inappropriate for scientific writing.
  3. Background, Paragraph 1
     a. Rewrite with references following statements.
  4. Background, Paragraph 2
     a. Rewrite with the primary statement leading the paragraph
     b. Rewrite sentence starting; This was attributed to a … for improved clarity.
  5. Background, Paragraph 3
     a. First sentence appears unsubstantiated, needs reference.
     b. Delete “alludes”
     c. Requires reference
        i. The FitFlop was originally developed to increase muscle activation in the
           lower limb by incorporating a soft mid-foot to induce instability within the
           midsole design.
  6. Background, Paragraph 4
     a. Re-write; exclude point form and speculations among the hypothesis.
  7. Methods, Participants, Paragraph 1
     b. Greater detail describing inclusion exclusion criteria of sample
i. This is necessary due to the use of “generalizable” within the discussion.

8. Results
a. Greater clarity is required regarding the FitFlops results.
i. If the male and female FitFlops are different in design where their results combined for reporting?

9. Discussion
a. Re write for clarity. Take care to reduce speculation outside of the experiment.
b. Recommend deletion or greater detail of the participants.
i. “This suggests that results are generalizable to adults walking in flip-flop and FitFlop footwear in a real-world environment.”

10. Conclusion
a. Tightening of report experiment findings and their immediate consequences are required.

11. Discussion, Paragraph 2
a. Speculation, if no data delete;
i. The authors attributed their finding to contraction of the toe flexors to hold the flip-flop, creating a plantar-flexor moment at the ankle, however no electromyography data was collected.

12. Discussion, Paragraph 3
a. Recommend you find another way to say;
i. “no real upper” or provide a thorough description of the FitFlop strap and why it is realer.

13. Discussion, Paragraph 6
a. Change reference format from superscript
i. “….structures of the foot as protective materials. A plantar pressure study has also suggested that results show the flip-flop protecting the body at heel-strike compared to barefoot.”

References
14. Reference 5 needs all authors

- Minor Essential Revisions
15. Abstract, Conclusion
c. Delete “Overall it is apparent that the”
d. I recommend this sentence removed or altered as the upper strap dimension have
not been described, nor has the profiled footbed been described “These changes may be attributed to design features of the footwear such as a thicker upper strap and a thicker and profiled footbed compared to a standard flop-flop design.”

16. Background, Paragraph 1

e. Despite the popularity of the footwear style, localised heel pain

i. Delete “localised”

f. Flip-flops break recommendations for footwear by being thin, not supporting the medial arch, not protecting the toes, having a loose fitting upper and having no pitch from heel to toe [2,3].

i. Change: “break” to deviate

g. Suggest you re write final sentence for clarity: Despite the popularity of flip-flops in warm climates, limited scientific investigation into their influence on adult gait has been published

h. Suggest you re write 2nd paragraph for clarity; Children wearing flip-flops display a trend towards a more dorsiflexed, everted and abducted midfoot during walking compared to barefoot [4] and reduced hallux dorsiflexion prior to contact during walking and jogging and in adults reduced eversion during walking midstance, compared to barefoot [5,6].

17. Background, Paragraph 3

i. This statement should be in the first paragraph as defines the main difference of fitflops

i. The footwear encompasses a thick multi-density EVA footbed with a wide and high-fitting flip-flop upper, these features may reduce gait modifications and make this footwear a suitable alternative to a flip-flop. However, gait motion in this footwear compared to a flip-flop comparator is yet to be fully investigated.

18. Background, Paragraph 4

a. The current research therefore aims to investigate gait kinematics, kinetics and electromyography when walking barefoot and in a flip-flop and identify whether walking in a FitFlop is significantly different. It is hypothesised that:

i. Delete, “therefore” and “:”

19. Methods, Participants

a. All indicated they were healthy and free of injury…
i. More detail if available if free of injury for preceding six months, foot posture? (flat feet or cavus feet etc)

ii. The sample advertised to participate if so how or was this a convenient sample

20. Statistical Analysis
a. Which version of SPSS was used?

21. Results, Frontal plane ankle in stance
a. “Despite the aforementioned alteration in Gastrocnemius activation in stance and Tibialis Anterior activation in swing, the Peroneus longus and soleus activation did not differ between conditions during stance (Figure 2).”
i. If not significant, I recommend deletion and moved to discussion

22. Discussion, Paragraph 1
a. Should “, and any modifications” say FitFlops?

23. Discussion, Paragraph 2
a. Reword for clarity
i. “The uppers both only cover the front of the foot. Without a heel strap, gait may be adapted to hold the shoe on the foot [8].”

24. Discussion, Paragraph 2
a. Speculation, if no data delete;
i. The authors attributed their finding to contraction of the toe flexors to hold the flip-flop, creating a plantar-flexor moment at the ankle, however no electromyography data was collected.

25. Conclusion
a. Recommend Deletion
i. “suggesting that the footwear may be more suitable for daily wear than a standard flip-flop. “ without strengthening Participant description.
b. Further detail describing the difference in upper and footbed within the manuscript are necessary for this inclusion;
i. “The results identify that altering the upper positioning and size and the footbed shape may reduce gait modifications in flip-flop style footwear.”

- Discretionary Revisions

26. Background, Paragraph 4
a. Suggest you change use of “to keep the footwear on”
i. To maintain the footwear

27. Ankle angle swing: Shod conditions will increase ankle dorsiflexion, and tibialis anterior muscle activation, in swing compared to barefoot to keep the footwear on during swing. This increase in dorsiflexion is expected to be less in FitFlop than flip-flop due to the upper size and fit.

b. Delete, “Ankle angle swing: ”

c. Delete, “. This increase in dorsiflexion is expected to be less in FitFlop than flipflop due to the upper size and fit. ”

i. etc

28. Method, Protocol

d. Data from the right leg only was used for all analysis.

i. Delete “only” and “all”

29. Results

e. Recommend delete headers; Ankle angle swing, Frontal plane ankle in stance and Loading rate

f. Recommend delete “aforementioned”

30. Discussion, Paragraph 2

a. Reword for clarity;

i. A previous study has also suggested that plantar pressure analysis discounted gripping of the flip-flop by the hallux in swing to control the flipflop [9], however the analysis undertaken may not have been sensitive to pressures in swing. A recent plantar pressure analysis has identified gripping in swing in both flip-flops and FitFlops [11]. The FitFlop demonstrated reductions in magnitude and duration of gripping [11], potentially reducing any resultant plantar-flexor moment at the ankle, allowing greater dorsiflexion compared to the flip-flop. Inferences from the current data and literature imply that ankle dorsiflexion and toe flexion may combine to hold toe-post footwear on the foot during swing, however toe motion must be quantified to confirm this.

31. Discussion, Paragraph 3

a. Consider changing “contradictory” to inconsistent
32. Discussion, Paragraph 3
   a. This point may be strengthened;
      i. This may be potentially beneficial to wearers and may, in-part, explain positive testimonials from consumers as excessive frontal plane motion of the ankle has been repeatedly linked to overuse injuries [20,21].

33. Discussion, Paragraph 6 Loading Rate
   a. This point may be strengthened;
      i. Explanation of increased heel velocity in this shoe style may be proprioceptive due to the shoe leaving the foot at the heel, or due to protective kinematic adaptations in barefoot gait to reduce impact energy, as apparent in running [25]
   b. Consider rewording
      i. “as opposed to at”

34. Discussion, Paragraph 6 Loading Rate
   a. The FitFlop absorbed greater shock at heel-strike, evident by 19% and 15% reductions in loading rate and impulse compared to flip-flop, with strong effect.
      This is likely due to the thicker construction of EVA in the heel section of the FitFlop compared to flip-flop and likely reduces the potential for skeletal injury during walking [26,27].
      i. Does this support Shore A hardness scores reported in table 2
      1. Recommend you discuss the Shore A results.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:
I declare that I have no competing interests