Author’s response to reviews

Title: An analysis of the foot in turnout using a dance specific 3D multi-segment foot model

Authors:

Sarah Louise Carter (sarah.carter@uwa.edu.au)
Alan Bryant (abryant@iinet.net.au)
Luke Hopper (l.hopper@ecu.edu.au)

Version: 1 Date: 30 Nov 2018

Author's response to reviews:

Reviewer 1

Thank you for your comments and recommendations, they are greatly appreciated.

I have attempted to improve the level of comprehension via

1. To provide more clarity to reader with no dance background I have provided additional information in;

   a. Defining the term “functional turnout angle” and “first position” in the background. Lines 79-83
   b. I have expanded the descriptions of the instructions provided to the dancers for the three first position conditions in the methods section. Lines 224-234
   c. I have removed some terminology which is not highly relevant. “The ballet tasks performed were demi-plié and port de bra exercises in first, second and fifth position, battement tendu, glissé and grand battement exercise of the right and left sides, and 16 sautés in first position.” And simplified it to “All participants performed a standardised 10 minute ballet specific warm-up routine before data collection commenced.” Lines 217-219
   d. I have included an additional figure i.e. Figure 4 of a dancer performing a sauté with the marker set-up attached.

2. The term foot abduction is referring to the whole foot relative to the lower leg (i.e. shank). This term has been previously used an article which has very similar methods, however it examined the hip, knee and foot. So for consistency we are using the turnout foot abduction.
3. Regarding whether foot abduction is a singular anatomical plane or a 3D combination, I have highlighted that it is in a single plane on line 205 and 262.

“Data extraction and averaging of the 3D inter-segmental and joint angles; tibia-foot transverse plane, tibia-hindfoot frontal plane, hindfoot-midfoot transverse plane, midfoot-forefoot transverse plane, first MTPJ transverse plane, knee transverse plane, and the height of the marker on the navicular tuberosity for each dancer was performed using MATLAB (custom software written using MATLAB, MathWorks Inc., USA). “ Line 283-287

4. Listed the all the segments of the lower limb rather than segments and individual bones. I have included a foot segment, to highlight that the foot was modelled as a whole rigid segment, in addition to the following rigid segments; hindfoot, midfoot and forefoot. line 205

5. Abstract: I have included the measured variables into the abstract. Line 43

6. The labelling, calibration and construction of joint coordinate systems for hip and knee joint was needed in order to investigate the fourth hypothesis “Passive external tibiofemoral rotation will negatively correlate to hindfoot eversion during first position conditions.”

7. Removed “natural stance” and replaced it with natural double leg up-right posture.

8. I have removed “functional” from “functional pronation”. Line 415

9. I have changed “functional joint” to “mobile joint”. Line 127

10. I have removed the term “functional reference trials” and included a descriptive section on SARA and SCoRE. Line 211-217

11. I have removed the term “protective function” with “function to provide static stability”. Line 437

12. Conclusion in the Abstract. I have reduced the conclusion in the abstract. Line 56-61

13. The variable “medial longitudinal arch” has been explained further from lines 40, 96, 97, 275, 307 to highlight that the medial longitudinal arch will be represented by the measurement, navicular drop. The results of this variable is displayed in Table 2.

To provide clarity that the values in Table 2 are a single value, I have provided extensive explanation of the data extraction and analysis in section 294-298.

14. The variables “tibiofemoral rotation” have been expanded in the methods, and the results are in Table 3. Which addresses the last hypothesis.

15. Regarding mentioning the original models, I have included this in the two statements below.
“Quantitative measurement of in situ 3D segmental movements of the foot using a modified Rizzoli Foot Model (26-28) during turnout may assist in understanding the risk factors for these foot related injuries and stressors in dancers.” line 136.

“Retro-reflective markers were attached to the dancers’ dominant lower limb and foot in accordance with the positions described in the Besier, Sturnieks, Alderson, & Lloyd (2003)(29) lower limb model and the modified dance-specific Rizzoli Foot Model (20-22) (Figure 3).” Line 200

16. The calibration and reconstruction of the virtual markers is stated on Lines 206 – 217 and Lines 253-256.

17. Regarding Figures 1 and 2, not have markers attached. I still want to include these figures without markers so the reader can see the poor alignment and foot posture more clearly. I have included to new figures, Figure 3 demonstrating the marker set-up on the foot in three views, and Figure 4 of demonstrating a dancer performing a sauté with the marker set-up attached.

18. Figure 3, is now Figure 5. I have modified the figure and added notes to the figure caption. As well as to highlight to that is a single value.

19. Figure 4 is now Figure 6. I have change the title to illustrate that the values are single time point values.

20. I have removed the number of citations and the unnecessary repetition of author’s names.

21. I have reduced the number of acronyms to five rather than nine.

Reviewer 2

Thank you for you kind response, comments and recommendations, they are greatly appreciated.

1. To provide more clarity to reader with no dance background I have provided additional information in;
   a. Defining the term “functional turnout angle” and “first position“ in the background. Lines 79-83
   b. I have expanded the descriptions of the instructions provided to the dancers for the three first position conditions in the methods section Lines 224-234.
   c. I have removed some terminology which is not highly relevant. “The ballet tasks performed were demi-plié and port de bra exercises in first, second and fifth position,
General points

1. What makes a model dance specific? The modifications to the Rizzoli Foot Model were made taking into account the extreme ranges of movement ankle joint and first MTPJ which occur during dance movements. The repeatability of the modification of the marker set-up were then examined on pre-professional dancers performing extreme range of the ankle dorsiflexion and plantarflexion and static dance positions.

The inter- and intra-assessor repeatability and modifications of the multi-segment model was previously established on six female pre-professional dancers (28).

2. Figure 1 has had more description included in the figure caption. Also I have included more definitions, as mentioned above.

3. Line 170, has been moved to the results section.

4. Line 225- I am not sure what you’re referring to. “ 0.05 was used to determine significance for all the statistical tests performed.” The statistical analysis, is under the heading of Methods.

5. Line 392: “Dynamic arch stability” I have included this term into the results on line 364.

And I have mentioned static and dynamic arch stability to highlight the difference.

“Arch stability”, I have reworded to “arch height stability” line 104, 279, 463

Results/Statistics:

Line 234, we have removed this line as it is causing confusion.

The statistics have been rerun for the multiple regression analysis to only include the following variables in the model: hindfoot hindfoot eversion, midfoot and forefoot abduction, and navicular drop (i.e lowering of the medial longitudinal arch). I have rewritten the results.

For table 2, we included all the columns as the results were not what we expected. As there was a greater change between natural double leg up-right posture and functional turnout hindfoot eversion angles. We have removed one row from the table.
Table 4 is now Table 3. I am not sure what you mean regarding a third row of comparisons in Table 4. I have reduce the number of variables in the table as the correlation analysis is testing hypothesis number 4. There are 6 correlations instead of 15.

“Correlation and multiple regression with 18 subject must be re-considered”.

I have run a retrospective power calculations were conducted using G*Power (v.3.0.10) for the Stepwise multiple linear regression analyses and the Pearson’s correlation analysis. These results are stated in the results section.

Dance specific terminology

- I have provided a definition of functional turnout, first position, and sautés in first position, as well as a figure, Figure 3 showing a sauté.

Over-repetition of authors- I have removed the number of these citations.

Line 199/200 I have included a reference from the criteria for “excellent repeatability”

I have added appropriate references to line 96, 162, 199/200.