Reviewer's report

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

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Reviewer: Alberto Leardini

Reviewer's report:

The manuscript addresses foot mechanics on postures specific of dance. The field is of interested to a limited readership, but the paper has a value. The data collection, analysis and reporting seems accurate. However, a number of very confounding aspects make the comprehension difficult, and these must be adjusted very carefully.

The exact biomechanical meaning of "foot abduction" must be clarified, since the Abstract; it is not clear whether it represents overall motion of the foot with respect to the shank (in this case it is "ankle abduction"), or the sum of the abductions at all foot joints. In addition, which motion is exactly meant by ab/adduction must be clarified (in a single anatomical plane, or the 3D combination, because still terminological confusion still exists).

"... lower limb, hindfoot, midfoot, navicular, forefoot, hallux and pelvis ..." is weird, including groups of foot bones, a single bones (navicular and pelvis), and apparently no in between pelvis and foot. Also, Methods of the Abstract jumps from this marker set and the statistical analysis, without saying what exactly has been calculate (foot joints motion, navicular drop etc.). Finally, pelvis, hip and knee joints are mentioned several times, but no results are provided for these: if the foot is the only segment here reported, please remove all the rest throughout the manuscript.

For JFAR audience, "natural stance" can be too generic; it is 'natural double leg up-right posture' meant? Also the meaning of the following phrases is not straightforward: "standing functional posture", "functional joint", "functional reference trials", "functional pronation", "protective function".

The Conclusions of the Abstract are very long, with large speculations mixed up with real observation.
In the hypotheses there are variables which apparently are not reported at all: tibiofemoral rotation, and medial longitudinal arch. In addition, if four are the hypotheses, corresponding results and conclusions must be reported and discussed precisely.

".. in accordance with the positions described in the Besier et al. (28) lower limb model and the Carter et al. (22) multi-segment foot model ..."; the original models shall be cited explicitly. In addition, how the virtual markers were reconstructed must be revealed.

Figures 1 and 2 would have double value if taken with the marker set mounted.

What in Figure 3 not clear; its caption must explain every abbreviation and every concept in it.

Figure 4 reports "MTPJ abduction", which has a time-history, it is not in itself a single value, as reported (also in Table 2); clarify whether it is a maximum value, or the range, or what else. Please also report this in the axes of the plot, including the measurement unit.

The citations from the literature are tedious, with unnecessary repetitions of the author names. There are citations of references also in the Abstract, not appropriate.

Large confusion also with acronym/abbreviations:

. TFR acronym is introduced twice; does this imply also the concepts of passive/active? internal/external? it is not clear, nor consistent

. Simular confusion exists for FPI, MTPJ and HV. The latter is certainly not the core of the study, but it is mentioned too many times, please reduce to one. Every acronym must be introduced at its first occurrence, and then used thoroughly.

. 3DMFM is in the abbreviations, but not in the manuscript

. HAL MET Xmet acronyms are introduced and never used in the text; if these are for explaining the figure, they must go into its caption.
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