Reviewer's report

Title: Comparing 3D Foot Scanning with Conventional Measurement Methods

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Reviewer: Sophie De Mits

Reviewer's report:

General comments
• Although the topic is important, the paper does not really reveal new insights
• The rationale to print a digital footprint, made by a 3D scanner to perform manual measurements, remains unclear. Why would you print and measure yourself if the software provides all the data?
• Why were only measurement in one spatial plane chosen if a 3D scanner is used?
• The language needs to be looked at. In many sentences articles are missing making the reading more difficult. Also the tenses of the verbs should be checked.

Major Compulsory Revisions
P 4-L3: lower extremity musculoskeletal problems, such as corns, ankle injury, chronic pain or blister of foot
Corns and blisters are skin lesions, not musculoskeletal problems
P5-L4: Some studies applied the 3D scanner to collect foot dimensions and for various applications [9-11]
Only 3 articles to demonstrate this seems limited.
P7-L10: how was it determined that all the subjects were right-handed?
No inclusion/exclusion criteria are described for the subjects, except that they were ‘healthy’
e.g. could they participate with foot deformities?
could they participate with a history of foot surgery?
P7-L12: how was the dominant foot determined?
P7-L13: all measurements are in one spatial plane. Why is this, since a 3D scanner is used, which can easily provide data in several planes.
P8-P9: the structure of the following paragraphs could be changed to make reading easier, now information seems to be all trough one another:
1/ the different landmarks + explanation what they are (cause this terminology is not common outside the shoe industry)
2/ the different measurements with their explanation
as mentioned in the general comments: the rationale for this is not clear.

I also think it is important to mention it has to be a true size outprint in order to make the manual measurements

a caliper might have the highest accuracy and resolution as instrument, yet you mentioned yourself that the measurer should be trained and experienced to avoid human mistakes in the data.

This should be commented in the discussion as this might influence the use of a caliper as a ‘golden standard’.

Minor Essential Revisions

can enhance the fitness of the shoes

I assume you mean the “fit” of the shoe is

Moreover, Mits et al. [16] conducted a study to evaluate the validity of the 3D

De Mits et al.

The subjects were requested to keep their two feet separated with shoulder width apart to ensure their body weight was equal on each foot before data collection

I’m not sure if keeping the feet on shoulder with ensures equal bodyweight on both feet. Was this also instructed to the subjects? If yes, please indicate this in the methods.

Each subject was requested to measure twice

I suppose this should be … to be measured twice.

are those gender difference not to be expected?

This was because the 3D scanner detects the outermost point of the metatarsal head easier than manual when measuring the ball of foot length, outside ball of foot length and the two foot breadth (diagonal and horizontal) dimensions (as shown in Figure 3)

Can the difference be caused by the fact that the scanner uses the widest point to make the measurements and that this point might be situated higher in the foot and not necessarily on the foot surface?

The experimenter palpates the metatarsal point protrusion during using digital caliper method which may not be the outer most point for taking foot dimension measurements

To my knowledge this should be the most outer point, otherwise the measurement is not correct

This was because the pressure distribution on the edge of the foot bottom surface was lower and the footprint contour captured tends to be smaller than the actual foot bottom surface contour. Thus, it seems that the footprint methods tend to underestimate the foot dimensions
Was the contour drawn when the subject was standing on the Harris Mat or afterwards on the print? In my experience, drawing the contour around the foot when standing, seems to overestimate the footsize. When drawn on the print, the bulging of the soft tissues in not included which might lead to underestimation of the foot. Please comment.

P17-L5: Since the digital caliper cannot contact the metatarsale tibiale (or the metatarsale fibulare) head and the end point of the heel simultaneously, the extension line of the heel end point was used to take this measurement. This could be solved by using a bigger caliper (which do exist on the market) to avoid measuring mistakes.

P18-L7: That landmarks with large intra-observer errors also had large inter-observer errors, because it is difficult to make sure that the markers were correctly placed on the most outside edge of foot. This cannot be commented based on this manuscript, cause, to my understanding, the markers were left in place for all the measurements.

Ref 16-18: the first authors last name is De Mits (not Mits) and the third authors last name is De Clercq (not Clercq).

Table 3: Instead of marking only the first numbers I would put Mean (SD) and Duncan’s MRT as a title above the appropriate columns and I would state the p-values instead of ***.

Figure 2: The label on the Y-axis is missing.

**Level of interest:** An article whose findings are important to those with closely related research interests.

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

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:** I hereby state that I have no conflicting interests.