Author’s response to reviews

Title: Coordination among the rearfoot, midfoot, and forefoot during walking

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Response file

We would like to thank the editor and the reviewer for carefully reading our manuscript and for giving useful comments and fruitful suggestions. I have included the editor’s and reviewer’s comments along with our responses. Revisions and additions to the manuscript are highlighted. Our responses to reviewer’s comments are as follows:

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Response for the Editor
Comment 1:

For comments related to your responses to reviewer 2, I am not convinced that you have yet justified your selection of 10 participants. Whilst you refer to this as a limitation in your discussion, please add justification in the methods. Inclusion of references 17 and 28 certainly does indicate that other authors have used 10 participants, however you have not explained this. Did those investigators conduct power calculations or include explanations of selecting only 10 participants?
Response:

The purpose of the present study is to quantify the coordination of intersegmental foot kinematics while walking and the categorized coordination pattern. Since this research does not involve a comparison of the two groups (i.e., a statistical test, such as the paired t-test is not performed), we thought that power calculations were not possible. However, based on your comment, we have increased the sample size from 10 to 20 using the same experiment protocol. Consequently, while the coupling angle and proportion of coordination patterns of intersegmental foot kinematics changed slightly compared to the previous results, the main findings (the rearfoot-midfoot coordination and midfoot-forefoot coordination are mainly in-phase with distal and proximal dominancy, respectively) did not change. Hence, we considered that a sample size of 20 was sufficient.

Because the results in this study had slightly changed, we have revised the Results section of the manuscript (refer to page 13, line 243 to 280). Additionally, we newly have added Figures 4 and 5, and revised the sample size and subjects’ parameters in the Methods section (refer to page 7, line 119 to 120).

Comment 2: Also in response to reviewer 2, you have now changed your conclusion to suggesting that due to the low numbers in your study you now consider the investigation 'basic' research. What does this mean? Please expand this.

Response:

We increased the sample size; however, we reconsidered that this is not a “basic” research.

Accordingly, we have removed the term ‘basic’ and revised the sentences on page 20, line 384 to 388 as follows: “Thus, the results of this study could be used as data to distinguish the presence of injuries or abnormal inter-segmental foot motions, such as pes planus. Furthermore, these data might be used in the future for comparison with data on foot deformities, running injuries, or the elderly population.”

Likewise, because the term “basic” was used in the Abstract and Discussion, we have revised the sentences in these sections.

Page 3, line 39 to 40: “Additionally, these data might be used in the future for comparison with data on foot deformities.”
Page 18, line 334 to 335: “The results may be used in the future for comparison with data on foot deformities, running injuries, or the elderly population.”

Comment 3: Do you mean that due to the low numbers the data you have collected is limited in external validity and thus not transferrable outside of the scope in which you have conducted your study?

Response:
We increased the sample size; however, the main findings did not change compared to the previous study (refer to the response for comment 1). Thus, the results represent inter-segmental foot kinematics of healthy subjects while walking, and it may be used in the future for comparison with data on foot deformities, running injuries, or the elderly population. This specific content is described in the Discussion section (refer to the page 18, line 334 to 354).

Response for the Reviewer 1

Comment 1:
Regarding the content of the amendments made, the authors have mostly addressed the comments that I made in my previous feedback. However, I still find the sole use of the "too many toes sign" an overly simplistic screening tool for the presence of pes planus, bearing in mind the structural features normally associated with this pathology.

Response:
Forefoot abduction is associated with flatting of the medial longitudinal arch (Bubra, P.S., et al, J Family Med Prim Care, 2015). In this study, participants who had been observed one or more toes along the lateral aspect from the back in the standing position were excluded from subjects. Hence, because we excluded subjects with flat foot, we believed that the target subjects should only have normal feet. Additionally, we increased the sample size from 10 to 20 using the same experiment protocol, and the main findings did not change (refer to my response for editor comment 1). Cases of pes planus that were included in the target study showed changes in their
coordination patterns compared to the previous results. Thus, while “too many toes sign” may be a simplistic screening tool for the presence of pes planus, we considered that cases with pes planus are excluded from the subjects. However, because quantitative assessment of the foot may be necessary, we have described it in the Limitations section.

Accordingly, we have revised the sentences on page 7, line 121 to 127 as follows: “Forefoot abduction is associated with flatting of the medial longitudinal arch [20], and the pes planus presents as an abduction of the forefoot during standing. Thus, the foot posture was evaluated using the “too many toes” sign [21], and participants who had been observed one or more toes along the lateral aspect from the back in the standing position (i.e. forefoot abduction) were excluded. Based on this evaluation, as we excluded subjects with pes planus, the target subjects had only normal foot.


Comment 2:

Regarding the presentation of the amended transcript, my overall impressions are now that to allow publication, additional work is required to make the narrative of the transcript more affective in communicating the key elements of why this study was undertaken and its contribution to the wider body of evidence. This in part arises from the amendments that have been made in response to the feedback from the last review process. The insertion of extra sentences and paragraphs within the existing transcript have resulted in a loss of consistency in the presentation of the work. Whilst most of the text is clear, some parts of the background and discussion are sometimes confusing and difficult to read. For example, the following exerts lacks clarity and can be difficult to follow:

A. "Dubbeldam et al. [3] investigated kinematic coupling between the hallux and rearfoot during walking. While the midfoot and forefoot are present between the rearfoot and hallux, they did not include midfoot and forefoot in kinematic coupling [3]. Hence, because midfoot and forefoot motion have not been understood, the mechanism with which the kinematic coupling between hallux and rearfoot occurs has not been understood".

B. "Second, while subject numbers in this study determined in reference to previous studies [17, 28] quantifying intersegmental coordination in healthy subjects, the sample size is likely to be small. Actually, the CAV in the transverse plane obtained in the present study
especially showed high values throughout the stance phase, and this result may be due to the influence of the sample size”.

Response:

A. We have revised the sentence on page 6, line 100 to 103 as follows: “Dubbeldam et al. [3] investigated the kinematic coupling between the hallux and rearfoot while walking. However, because they did not include midfoot and forefoot motion, the mechanism with which the kinematic coupling between hallux and rearfoot occurs has not been known.”

B. Considering the editor’s comment, we increased the sample size from 10 to 20. Therefore, we have removed the limitation related to the sample size.

Comment 3:
The level of written English communication is variable with lapses in grammar and construction being evident in parts of the document. This is an important consideration in making this document accessible, particularly to readers unfamiliar with this topic. For example:

A. "..all foot of participants is not symptomatic…"

B. "While leardini foot model…"

C. "These limitations will need to address in future studies"

D. "However, because this range of motion assigns a single value for the whole stance same as the method of ratio, angular amplitude in time series cannot be understood"

Response:
A. We have revised the sentence on page 19, line 362 to 363 as follows: “In this study, all participants are asymptomatic with normal foot.”

B. We have revised the sentence on page 7, line 130-131 as follows: “While the foot model used in this study has been…”

C. We have revised the sentence on page 19, line 357 as follows: “These limitations will need further investigation in the future.”

D. We have revised the sentence on page 17, line 318 to 319 as follows: “However, this method cannot produce a range of motion (i.e. angular amplitude) in time series.”

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Add revision

Considering the comments from Reviewer 2, we have further revised the manuscript to improve its readability. Additionally, we have removed the redundant sentences in the Discussion section.

The following sentence has been removed: The present study applied the methods of Needham et al. [18] to intersegmental foot kinematics and categorized the coordination patterns as in-phase with proximal dominancy, in-phase with distal dominancy, anti-phase with proximal dominancy, or anti-phase with distal dominancy.