Reviewer's report

Title: Deviations in Gait Metrics in Patients with Chronic Ankle Instability. A Case Control Study

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Reviewer: Cameron Powden

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Deviations in gait metrics in patients with chronic ankle instability, a case control study.

The authors have made significant changes to the manuscript and its quality has significantly improved at this time. Parts are easier to read and allow the reader to get a greater picture of what is being presented. However, I feel that there are still some areas of the manuscript that need to be revisited. The discussion is still an area of the most concern as it still needs to relate to past research and explain what specific variations in gait metrics may mean. Revision should be made to reflect the aims and scope of the study. Pulling data concerning the sensorimotor deficits seen in CAI may help to build the case for why you found these gait metric deficits. Additionally, discussion concerning the correlations may be better served to provide possible recommendations for rehab strategies. I again commend the authors on the hard work they put in and look forward to helping them moving forward with the manuscript.

Specific comments are located below:

Abstract-
• Within the result “inpatients” appears. Please make sure that a space is added between these words. Additionally, make sure the results is one paragraph.

Background-
• Page 6, last paragraph – A transition or summary sentence is needed after the knee osteoarthritis sentence and before the aims. As it is written now it seems like there is a jump or disconnect. This makes it hard to follow the logic to your aims. Please a sentence that ties together you discussion about gait deviations and knee osteoarthritis findings and how gait metrics may be important in those with CAI.

Methods-
• Page 7 – I'm glad that you found interest in the new recommendations for classifying CAI in research and hope it can help you in the future. Your additions regarding recruitment of participants, reasons for being in therapy and exclusion of recent ankle injury were a great addition. It allows readers to better classify who was included in the study. I understand that due to the nature of your data you most likely would not be able to provide all of the recommended
demographic information such as number of ankles sprains or episodes of giving way in the last three months. However, like I said before the additions paint a much better picture of your participants.

Data acquisition and processing-
• Page 8, first paragraph – Revision of the following sentence is suggested to reflect the fact that your measures captured either temporal or spatial gait characteristics. “Spatiotemporal gait metrics are a group of measures that depend on space and time motion.” As this sentence is written now it seems to be relaying different information than the sentences following that states some gait metrics are temporal and some are spatial.
• Page 8-9 – Can you clarify how double limb support was measured for left and right values? During double limb stance both limbs would be in contact with the ground (as you define). Does it have to do which limb is the lead and which is the trail (aka – in heel strike vs toe off)?
• Page 9 – The last sentence of the first paragraph. Is this reflecting that only the left limb of the control was used to compare to both the more symptomatic and less symptomatic limbs of the CAI group? Can you add some clarity to this statement.
• Page 9 – Please state how many items comprised the composite score for each summary. Additionally, please make the correction of or changing “physical” to “mental” when discussing the mental component.
• Page 9, last paragraph – This may be better located earlier in within this section of the manuscript. Perhaps it could be worked in at the beginning of the first paragraph when you discuss the comprehensive assessment. Where it is now it seems out of place and as if it was an after thought.

Statistical Analysis-
• Page 9-10, power section – Please indicate how these power analyses were completed? Was it a priori or post hoc?

Results-
• Page 10 – Please provide a p-value in-text for BMI significance.
• Page 11 – When discussion correlations in the discussion section please provide p-values and r values within text as completed with difference tests.

Discussion-
• Page 12 – When discussing the classification of CAI I feel that it is important to include the Ankle Consortium Position Statement, as it provides an up-to-date consensus on how to characterize CAI. Additionally, because of this I do not believe that the statement “there is no consensus about value of various tools for measuring it” can be made. You could state that only recently consensus values have been established but there is still a need for more objective measures.
• Additionally, an article by Lines et al, 2014 (Postural-Stability Tests that Identify Individuals with Chronic Ankle Instability) could also be include in this section. It
identifies objective postural control measures and cutoff scores that can be used to identify those with CAI.

Lastly, I would also refer you to a paper by Wikstrom et al 2012 (Discriminating between copers and people with chronic ankle instability). It discusses how to differentiate between individuals with CAI and copers. It uses self-reported, postural control and mechanical measures attempt to differentiate between groups. I believe that it could be useful when building your case for more objective measures as CAI is likely due to many reasons and thus is multifactorial.

• Page 12 – I feel that there is a disconnect between these two sentences that makes this section hard to follow; “Rodriguez-Merchanin reported a review on the diagnosis and treatment of CAI. One of the methods to detect an increase in ligament laxity, in the clinical setting, is by using the dynamic anterior ankle tester.” Perhaps they could be combined to state that Rodriguez-Merchanin identified a mode of objectively evaluating CAI using the dynamic anterior ankle tester to detect increases in ligament laxity within their review.

• Page 12-13 – End of third paragraph. Please add a summary sentence that reflects how these gait metrics could all be representing cautious walking or a protective walking strategy.

• Page 13 – Fourth paragraph of discussion. I believe that the idea of postural control deficits and sensory deficits in those with CAI could be further use to draw possible conclusions as to the importance of your gait metrics. By having deficits in static (SL force plate), dynamic (SEBT, drop landing) postural control and decreases in sensation at the sole of the foot it only makes sense that these deficits would manifest as gait alterations. I feel that you need to build the case of how gait can be affected by these measures. In other words how decreases sensation and somatosensory function could potentially manifest as gait alterations.

• Page 14 – A reference is needed to support the statement that SL support values were within lower threshold of normal values.

• Page 14 – Wider stance and less time in SL support. Please expand on these findings more as I feel they are important. They again could be indicative of a more cautious walking pattern/safer walking pattern. Perhaps adapted due to sensory motor deficits (sensation, postural control). Talk more about why we may be seeing these changes/what they mean rather than just saying that there were differences.

• Page 14 – Correlations. I feel that instead of trying to build the case that these gait metrics could be used as a replacement for subjective measures I would lean toward the clinical value of this information. What does it mean for rehabilitation? The findings could be saying that if we improve gait metrics we may also improve self-reported function.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being
Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.