Reviewer's report:

The authors have conducted a cross-sectional study to compare people with and without mild-to-moderate symptomatic hip OA on several physical impairments (hip ROM and muscle strength) and gait variables. The study methodology was generally appropriate and the sample size was relatively large (when compared with sample sizes of most previous gait studies). Furthermore, the paper is clearly written and it should be of interest to the readers of BMC Musculoskeletal Disorders. That said, the authors have made some statistical and methodological choices that I cannot fully agree with, and my concerns are detailed below.

- Major Compulsory Revisions

Background

The secondary aim of the study was to evaluate the influence of radiographic OA severity on the various gait parameters. Can the authors justify why they have chosen to use a minimal joint space (MJS) cutpoint to dichotomize their patients into 2 groups instead of analyzing MJS as a continuous variable? To be sure, the authors admitted (on page 11) that there is no absolute consensus on subcategories for radiographic severity based on MJS in hip OA. Given the arbitrariness and statistical limitations (e.g., the biggest of which is low statistical power) associated with categorizing patients into subgroups, the authors need to provide clear and strong justifications for dichotomizing continuous variables.

Results

The body-mass adjusted muscle strength values are disproportionately large and I suspect that these are unadjusted values. Please provide the body mass-adjusted data and results.

Discussion

The authors are at pains to explain why velocity is not a covariate in their regression analyses (they argue that velocity is the mediator of the relationship under study and hence, its inclusion in regression models may lead to over-adjustment). With that said, however, consistent with previous studies, I feel that the authors should still perform the velocity-adjusted analyses and issue the appropriate caveats. To my mind, these analyses would potentially allow us to identify OA-related gait parameters which are NOT attributed simply to a slow walking speed.
The authors recognize that multiple testing increases the false discovery rate in their secondary analyses. What of the main analyses?

The concept of motion discontinuity is interesting but it is abruptly introduced only at the end of the paper. Can the authors reword the paragraph to include a clearer topic sentence? Or, the authors may want to consider the analysis of motion discontinuity as part of their secondary analyses.

- Minor Essential Revisions

Outcome measures, gait analysis section

Please explain why a \( p < 0.05 \) was used to support the statement that “there were no significant systematic differences between these patients and the patients with unilateral involvement on any of the outcome variables.”

Results

The authors sensibly state that their findings related to the secondary aim of this study should be regarded as an explorative supplement to the main analysis and hence, they should be interpreted as hypothesis-generating rather than conclusive. For this reason, please consider re-organizing the results section such that the findings of the primary and secondary analyses are presented in separate sections.

Discussion

page 12, analysis of variance: Shouldn’t that be an “analysis of co-variance” given the main thrust of Wilson’s paper (referenced by the authors) was that gait velocity should not be included in the regression analysis as a covariate?

Table 1

• Please include gait velocity in your variable list
• Please include the 95% CI for the “mean difference” column
• I am a little troubled by the fact that the SD ratio between the 2 groups is greater than 2 for some of the variables (e.g., hip flexion and external rotation ROM). Please consider the use of the Welch t-test. Do note that the limitations of the Student t-test are inherited by the Mann-Whitney U-test when the equi-variance assumption is violated. In the P-value column, please indicate which tests which are used.

Grammatical and typo errors

Background

o pg2: “had focus” should read “had focused”

o pg3: Please remove the repeated word, “this”

Materials and Methods

o pg4: “Subjects that” should read “Subjects who”
- Discretionary Revisions

Study Title
This paper has a fairly ambitious title (gait characteristics) but the authors only reported sagittal plane gait data. Please consider re-wording the title. Also, per STROBE guidelines, please consider re-wording the title to include the study design.

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

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests