Reviewer’s report

**Title:** Comparison of the kinematics and kinetics of shoulder exercises performed with constant and elastic resistance

**Version:** 0  **Date:** 07 Aug 2018

**Reviewer:** Lucy Parrington

Reviewer’s report:

SSMR-D-18-00028: Comparison of the kinematics and kinetics of shoulder exercises performed with constant and elastic resistance.

The paper describes a comparison of multiple shoulder rotation exercises under constant and changing (elastic) resistance in 12 (50%) healthy participants. The authors found joint range of motion did not differ across exercises, but that the joint moments were greater with constant resistance. The authors conclude that exercises can be chosen to reflect the needs/aims of the training. I have few major concerns and overall feel the paper is well written, descriptive and has practical application. The authors have done a good job in providing supporting figures.

Concerns and questions listed below.

Major:

Methods: I see one of the main issues with this assessment relating to gimbal lock and shoulder joint assessment. While the authors acknowledge this as a potential limitation, I would like to know more about what prior pre-submission assessment the study team used when considering their final approach. I do not see this as much of an issue for the internal and external rotation exercises where the shoulder was in a fixed adducted or abducted position, however, I have my concerns for the combined exercise which involves all three rotations. I find this to be of particular importance given the results and discussion of these combined movements, and further the practical application indicated.

Do the authors have some data relating to assessment using different orders of rotation vs. the method they used? Did the authors look to validate the method used in any way regarding the two rotations of interest? To put it more clearly, how certain are the authors that their data for the combined movements effectively estimates the joint motion?

Results: Please provide either a written summary or table that gives the fixed and random effects coefficients for the mixed linear model used. E.g. Beta and standard error, OR confidence intervals, OR t-statistic for fixed effects tested, as indicated you used a linear mixed model.

Minor concerns/ comments:
Abstract -

At the end of the background information, a statement of aims could be helpful, as could the addition of some summary data into the results summary. Final concluding sentence should be reworded.

Introduction -

-Generally the introduction is clear and well written. The final sentence regarding aims would benefit from having a number of smaller cleaner and more direct sentences.

-Did the authors have any hypotheses?

Methods -

-I request that the authors add a statement to the paper confirming whether, for all experiments, they have reported all measures, conditions, data exclusions, and how they determined their sample sizes. The authors should, of course, add any additional text to ensure the statement is accurate. This is the standard reviewer disclosure request endorsed by the Center for Open Science [see http://osf.io/hadz3]. I include it in every review.

- Can you please indicate how handedness was assessed or dominance determined? Preference for coordination based tasks does not always align with strength dominance, so it is important to provide this detail within the methods to allow any study replication.

- Experimental approach - line 30. I think it would benefit from breaking this sentence up and more clearly indicating that the exercises are visualized in Figure 1. As is, the reference to the figure is less clear.

- Line 48 - this was the typical range of load used in rehab - citation?

Procedures

- An indication of the filtering of the load cell given - but no indication on treatment of vicon data. filtering method, cut-off freq?

- Supplementary Figure 1 would be helpful in the main document, rather than supplementary. Unless there is a limit on figures, I would put this there.

- Supplementary Figure 2 - If there is a way to simplify this skeleton into a line image (with the marker set overlay), it will help the clarity. The current grey scale shading makes it hard to read some of the things written over the chest area.
- Line 52, and Line 1 and 10 (following page) currently reference the wrong sup. figure.

- Can the authors please provide more information with regards to the use of a Bonferroni correction in their analysis? i.e. what was the p-value corrected by?

Results -

- Please insert table reference in first sentence.

- In your statistical methods section, you do not mention about analysis of SCJC, which then confused me with lines 20 to 28 (under kinematics results). If the authors see these results are relevant, then this analysis should be indicated in the stats-methods.

- Table 1 and 2 are comprehensive, but I believe in the need for p-values for all statistical tests to be presented (not just highlighted as p<0.05). I would suggest for the actual p-value per contrast (exception of p<0.001 listed as that) to be entered in the section of exercise comparisons.

Conclusion -

- Caution should be indicated on the results relating to the combined movements based on motion capture limitations for these movements

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics
Quality of written English
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Acceptable

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