Reviewer’s report

Title: Identification of gait domains and key gait variables following hip fracture

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Reviewer: Masami Akai

Reviewer’s report:

Overall evaluation:

In this article entitled "Identification of gait domains and key gait variables following hip fracture", the authors tried to identify domain structure and key variables of gait analysis in patients after hip fractures.

Individual step and averaged spatial and temporal gait parameters measured with this walkway system (GAITRite) has already compared with a three-dimensional motional analysis system or other gait analytic systems. Therefore the original gait parameters from the patients of hip fractures could be valid and reliable. Considering such preceding reports, this is a very interesting and well-written article.

However, I have a concern about their statistical handling with the mixture of original independent variables and secondary synthetic variables.

Major Points:

(1) Flow of the variables handling

The authors combined the following two procedures;

1. Electronic walkway (GAITRite); platform type, portable gait analytic system
2. Computer software (PKmas)

They cited previous article (by the same research group) using the method of the same combination, and insisted the usefulness of the present method.

It seems to me that the authors provide the flowchart of variables not as Appendix 1 but as Figure 1.

(2) Each step for factor analysis
I recognize such "foot print" type device provides spatial and temporal parameters. And the results of factor analysis and multiple linear regression analysis appear to be quite reasonable. And I can follow each step for factor analysis.

1. Sample number
249 cases, usually > ca 200 cases

2. Ratio between samples and variables
249:31, usually > 10-5

3. Assumption for factor analysis
Bartlett test of sphericity  p<0.0001
Kaiser-Meyer-Olkin (KMO) measure (measure of sample adequacy)
Overall 0.79 middling

4. Eigenvalues
1> (Kaiser-Guttman rule)

5. Interpretation of factors
Oblique rotation

6. Reliable factors
Usually 4 factors with loading > 0.60 or 3 factors with loading > 0.80

I think their procedure could be very sound and valid in a case just like answers (qualitative) to some questionnaires.

Even in the original 31 quantitative variables, however, there are the mixture of original independent variables and secondary synthetic variables.

How did they handle latent confounding influence with the mixture of various levels of variables?

Minor points:

None

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.

No

**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 recommend additional statistical review

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Please indicate the quality of language in the manuscript:

Acceptable

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