Reviewer's report

Title: Discriminant validity and test re-test reliability of a gait assessment in patients with vestibular dysfunction

Version: 2 Date: 16 June 2015

Reviewer: Avril Mansfield

Reviewer's report:

Overview
This is a generally well-written paper that aims to determine the test-retest reliability of instrumented gait assessment with the Gaitrite walking among individuals with vestibular dysfunction. This is important foundational work required prior to using this test protocol in a clinical setting or in future research (e.g., to evaluate the effect of an intervention on characteristics of walking among individuals with vestibular dysfunction).

Major compulsory revisions
1. The authors must specify in the methods section that only one pass was completed per condition. This is not stated until much later in the paper (limitations, line 321). Additionally, the authors must provide further justification for only including one pass per condition. It is likely that reliability could have been enhanced by averaging data from several passes – the authors had the opportunity to determine if one pass was sufficient or if an average of multiple passes should be taken and I believe failure to do so is a major limitation of the current work.

2. Further explanation is required regarding how the Gaitrite data were processed. It appears that the authors accepted the automatic footfall identification performed by the Gaitrite system (lines 117-118) with the exception of manually removing some footfalls (line 153). However, for two conditions (tandem and backwards walking) I suspect the Gaitrite software would have had considerable difficulty detecting footfalls automatically (e.g., line 299-300) and human intervention would have been required to process the data. When such intervention is required, rater reliability cannot be assumed and, therefore, rater error or judgement may have influenced the results of the current study (e.g., see Wong et al., Gait & Posture, 2014).

3. What was the rationale for replacing missing data with the mean (line 198-199)? Consider just removing these data points from the analysis.

Minor essential revisions
3. The authors must specify in the introduction that they are interested in test-retest, rather than rater, reliability.

4. m/s is the preferred unit for walking speed.
5. Lines 208-210: clarify that these are the ranges in mean values across all conditions.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare I have no competing interests.