Reviewer’s report

Title: Exploring impaired walking dynamics as a new clinical feature in multiple sclerosis

Version: 1 Date: 1 October 2012

Reviewer: Robert Motl

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Major Compulsory Revisions

1. There are many published papers on the 6MW in persons with MS that are not reviewed in the Introduction. There is a paper on oxygen consumption and cadence during the 6MW in this journal, 6MW and fatigue in another journal through Pubmed, and still other papers on 6MW in MS. These should be reviewed for a comprehensive background on what is known about the 6MW in MS before stating what is to be done in this study.

2. The researchers divided the MS sample based on 6MW performance. This confounds the outcome with the intervening variable and is not acceptable. The groups should be formed based on a variable that is independent of the dependent variable. This should be the EDSS and there should be groups of mild, moderate, and severe based on previous research.

3. The method of measuring distance during the 6MW and 12MW is poor and there are published approaches for accurately measuring this using a precise wheel. Why was this not undertaken in this study and what are the potential consequences?

4. The researchers repeatedly state that one group walked slower or faster. This might be technically correct, but the 6MW is expressed in distance and not speed. Please change speed into distance throughout.

5. There is no indication on whether the linear model fit the data better or worse than the quadratic model per group. Please make this very clear and backed-up based on statistics.

6. Inspection of the figures suggests a linear change in severe, L-shape in moderate, and u-shape in controls. Did you test all of these models? If not, please do so.

Minor Essential Revisions

1. There is no differential correlation between fatigue and 12MW between methods of describing performance. This should be made clear. Did you check the data for normality or outliers before correlations? Did you consider Spearman correlations as this would be preferred over Pearson?
**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.