Reviewer's report

Title: Temporal organization of rest defined by actigraphy data in healthy and childhood chronic fatigue syndrome children

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Reviewer: marie J hayes

Reviewer's report:

This is an interesting translational research effort to examine the distribution of actigraphy counts during estimates of sleep (down) and wake (up) periods to examine whether differences exist when analyzed using two curve fitting paradigms: power law vs. exponential methods. The hypothesis was that rest times reflection sleep and awakenings will show actigraphy distributions that are different from the daytime-based rest and active periods based on fly research by the authors and other animal research and human work that has suggested that a nonstochastic process is observed during rest periods resembling sleep/awakenings best described by the power law algorithm. The study also examined two groups: healthy children and children with chronic fatigue syndrome. There were no findings with these measures between groups.

The paper is well written and the math is correct as far as it goes. The authors were very careful to spend time on the threshold definitions for actigraphy bout analyses, and divided the data into down and up periods (thought to correspond to sleep vs. wake based on diaries) as well as 24 hour periods. It is of interest down segments appear to conform to the power law equation best, whereas, the up segments are exponential. The figures and tables are well presented and explained and are convincing to the reviewer. However, Table 1, a test of the conditions and the fit to the different functions is difficult to interpret.

The discussion is not arranged carefully and should flow better.

Suggestions and Clarifications:
1. How were subjects recruited to the study? please restate in Methods.
2. Define ZCM
3. P.5,l.3: What is a “bad bin”?
4. P.5, l.9: What does “defined by a series of rest or activity bins” mean exactly? What were the criteria for bout onset and offset?
5. P.8, l.29-33 : “On the contrary, 60% of controls and 10% of CCFS Down data were similar to the exponential distribution”. This is not very convincing for CCFS and not addressed. What did the other 90% of the CCFS data conform to? The authors state that 56% of CCFS data conformed to the power law. This section does not make sense.
6. Figure 4. In the text and the figure captions there is no clear test for statistical differences between the two groups, or whether the data in each group are
Statistically more similar to the power vs. exponential function. Table 1 is not summarized adequately. It seems that it may also need an additional statistic such as a chi square.

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

**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.