Reviewers report

Title: Variability of activity patterns across mood disorders and time of day

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Reviewer: Meredith E. Rumble

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Krane-Gartiser et al investigated differences in activity patterns between 52 inpatients with unipolar (UP) depression, 12 inpatients with bipolar depression (BD), 18 inpatients with bipolar mania (M), and 6 patients with bipolar mixed states (MS), as well as between time of day of measurement (morning or evening). Activity was measured in 1-minute epochs over a 24 hour period shortly after inpatient admission. The morning period of examination was between 6am-3pm and the evening period of examination was from 3pm-12am. Both morning and evening periods were examined, and, within each time period, a 64-minute period without 2-4 minutes of consecutive non-zero (immobile) was identified for each participant. Then, 4 main variables were created, median level of activity, standard deviation of activity from the mean, the root mean squared successive difference (intra-individual variability), and sample entropy (regularity of the pattern). Results revealed group differences between those with BD and M in the morning period (greater variability in activity for BD versus M) and between UP and M and MS in the evening period (greater median activity count in MS versus UP and greater variability in UP versus M). Looking at differences between time of day, those with UP had more change from morning to evening, and this was less present in those with bipolar disorder (BD, M, and MS).

The use of actigraphy to examine rest-activity patterns is intriguing and the lack of research outlining potential differentiating factors between UP, BD, M, and MS is an area of importance in clinical research. Thus, the current study is of importance to the field. Although novel and of importance, there are some limitations in this study, which are addressed below.

1. This reviewer appreciates the creativity of the authors in thinking about an approach to actigraphy that could potentially illustrate some differentiating actigraphic variables in those with mood disorders. Although, it is unclear the rationale for picking the time periods selected to then look for these periods of starting activity. More information about this method and the rationale behind it could be helpful to interpret the findings. Also, with this approach, were there times that the last period of activity was missed in the evening due to eveningness, a common sleep pattern characteristic of those with mood disorders? What was the timing of these periods? Did that differ by diagnostic type?
2. The authors note in limitations that the actigraphy was only collected for 24 hours in an artificial setting (the start of an inpatient stay). This limitation is fairly significant and would be helpful to emphasize more clearly.

3. Overall, the paper could benefit from revision to simplify the presentation of the results and discussion section so that the information presented is easier for the reader to follow. Along these lines, Table 1 could benefit from further labelling to understand in full the numbers presented.

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

No

**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

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I am able to assess the statistics

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Acceptable

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