Reviewer's report

Title: Pain disorder leads to a frequency shift in the anterior default mode and the salience network

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Reviewer: Radi Masri

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Dear Dr. Anderson

The research manuscript by Noll-Hussong and colleagues describe significant temporal changes in brain functional connectivity in patients suffering from somatoform pain disorder. In these patients, the authors find increased power in higher frequency bands in cortical networks commonly involved in pain processing. While overall this is an important contribution to the literature, I have several reservations:

Major Compulsory Revisions:

1- The authors provide no rationale as to why they decided to use 6 frequency bins. None of the cited studies that perform similar analysis used similar bins. What did the authors do to confirm that the results they find are not just due to the bins they used?

2- The conclusions are over stated. The authors demonstrate that the patients suffer not only from somatoform pain, but also from depression and anxiety. All of these conditions are known to affect the networks studied. Why are the changes due to pain and not depression, or anxiety? or the combination of the three?

3- The authors provide spatial connectivity maps (Fig. 1) for the two groups combined together (patients and controls). The authors should show these spatial maps separately for each group.

4- In the Results, the authors provide no numbers or statistical figures for the readers to evaluate the magnitude of shifts in the frequencies. The 3D figure shown (Fig. 2) depicts the results poorly. A two dimensional figure showing standard deviations and statistical annotations on the figure would be more helpful. In addition, perhaps show only the results from the networks that had significant changes.

Minor Compulsory Revisions:

4- In Table 1 please indicate that these results are the average of the group scores (not a total score). Also, please provide the median scores, range and p values.

5- When reporting that no correlation existed, please provide the correlation coefficient s and the p values.

6- The authors should be consistent with the terms they use throughout the manuscript, for example: The authors use the term cingulate-insular networks
(CIN) in the results while in discussion they refer to the frontal-insular networks (FIN); use the term somatoform pain disorder rather than chronic pain disorder and avoid using the term “nociceptive pain”.

7- Spell out abbreviations the first time they are mentioned.

8- In the text, Table S2 is mentioned before Table S1. It is probably more logical for them to be numbered according to when they appear in the text.

9- In Table 2, please replace all commas with a decimal point.

10- In Background, second paragraph, the authors report: “chronic pain influences the temporal aspect of functional connectivity by changing the frequency of spontaneous firing of neurons within the FIN from lower levels (below 0.12 Hz) to a higher range between 0.12 and 0.24 Hz [11].” The study cited did not assess spontaneous firing of neurons, and only studied rhythmic oscillations in BOLD signals.

11- There were several grammar mistakes. Those are indicated in the attached file.

Discretionary Revisions:

12- It is not clear why the authors focused their study only on the 4 networks described in the results. Somatoform pain, as the authors point out, is atypical and may affect areas other than those altered by neuropathic or diabetic pain, especially when combined with depression and anxiety. It would be helpful to the readers to show whether other networks are changed/or not in this condition.

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

Quality of written English: Needs some language corrections before being published

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

Declaration of competing interests: I have no competing interests