Reviewer’s report

Title: Stress levels predict substantial improvement in pain intensity after 10 to 12 years in women with fibromyalgia and chronic widespread pain. A cohort study.

Version: 0 Date: 16 Oct 2018

Reviewer: Marcus Beasley

Reviewer's report:

Thank you for this well written and interesting paper that aimed to look at the course of symptoms for people with fibromyalgia or chronic widespread pain, and identify some predictors of improvement. There are however two main problems with the methods and analyses, one to do with each of the aims, that limit the conclusions that can be made.

Firstly, when looking out how symptoms progress after 10 to 12 years for people with fibromyalgia or chronic widespread pain, you have not considered regression toward the mean. This occurs if you recruit people into your study according to whether they meet certain eligibility criteria related to the severity of their symptoms. The severity of symptoms can be treated like a random variable, they fluctuate over time. A group of people recruited when their symptoms are at their worst will tend to improve anyway.

Secondly, a related problem in looking at predictors of recovery or improvement in symptoms has not been considered. That is, if a measure has random fluctuation over time (in this case, pain intensity) and if recruitment to the cohort is related to this measure (having CWP or FM diagnosis), and the characteristics considered as predictors are related to the measure at the time of recruitment (current stress is related to current pain status), then the characteristics can seem to predictive even without a change in outcome. A better explanation of this is given in this recent paper: Sorjonen, K., Lundberg, M., & Melin, B. (2018). Using logistic regression to predict onset and recovery with tau equivalency. Frontiers in Psychology, 9, 1849.

I also have a few minor comments and suggestions:

- The word 'contradicting' in the abstract and page 3, line 25 of the Background section might need to be replaced with 'contradictory'.

- Would 'communicated' be a better word than 'mediated' in the abstract and page 14, line 19 in the Conclusions?
- Rather than use p-values in the abstract and in Table 2 of the results, it might be better to give changes along with confidence intervals.

- As you have given the number of people who got had moderate or substantial improvement, you could also show the number of people who had moderate (30-50%) or substantial (<50%) worsening of pain intensity, and the number remaining unchanged (<30% better or worse).

- I'm not sure that you have used the right measure of improvement (i.e. relative improvement from baseline). The IMMPACT recommendations you reference are for measuring treatment outcomes in clinical trials, and this study isn't looking at treatment outcomes in a clinical trial.

- I think all your logistic regression models of predictors should be adjusted for baseline pain intensity. If not, it might be helpful to explain why.

**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.

No

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

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