Reviewer's report

Title: Perception versus polysomnographic assessment of sleep in CFS and non-fatigued controls: results from a population-based study

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Reviewer: Catherine S Fichten

Reviewer's report:

This manuscript reports on a comparison of sleep in a sample of 35 individuals with CFS and 40 controls. Based on significant differences between the two groups on various self-report questionnaire measures and an absence of significant findings using polysomnography the authors conclude that sleep complaints in individuals with CFS are most likely explained by sleep state misperception.

Major Compulsory Revisions

The literature review is up-to-date, the writing is grammatical, and participants were selected from the community rather than physicians' offices. The control group seems to have been matched to the CFS sample. These are important elements for a good manuscript in this area. In spite of these strengths, there are several difficulties with the manuscript. These pertain to the method, the results, and the interpretation of the findings. Specifics follow.

The Method section is too sketchy. While the authors note that aspects of the investigation were published elsewhere, it is not possible to understand the findings without additional information about the subjects, the measures and the procedure. For example, were individuals who had CFS as well as fibromyalgia included? What proportion of the sample had fibromyalgia? What was the age range? Was the control group a healthy control group or simply "non-fatigued?" How were they recruited? The "surveillance study" in which subjects participated seems to have started in 1999-2000. What was investigated in this study? When were participants tested for the current investigation? Also, I am not clear about what the measures measured or about the psychometric properties of the instruments. I am also confused about what, exactly, the dependent variables were and how many of these were used evaluated. These aspects of the Method should be clarified.

The medications listed, which the authors grouped overall as medication that affects sleep used/not used and which they used in several analyses, include both sedating and stimulating substances (e.g., pseudoephedrine, hypnotics). Frankly, I do not understand the rationale for combining sedating and stimulating medications for these analyses. Sedating and stimulating medications should either be examined separately or these medications should eliminated altogether from the analyses.

Sleep state misperception refers to insomnia. Yet, the investigators do not indicate how they defined, diagnosed or measured insomnia, be it primary or secondary (see Table 1), using either PSG or self-report. The sleep lab allowed participants approximately 7.5 hours in bed. People without insomnia often sleep more than this, and individuals with CFS often spend as much as 9-10 hours in bed. Thus the protocol did not allow for the evaluation of insomnia in the two populations, even if the conditions in the lab had been conducive to "normal" sleep. In this context it should be noted that according to the consensus conference, insomnia should not be diagnosed using PSG. As for nonrefreshing sleep... to the best of my knowledge there are no acceptable self report or PSG based measures to evaluate this construct and in the present investigation this was evaluated by a single self report item.

Sleep state misperception in the present study refers to misperception of what? Total sleep time? Total wake time? Nonrefreshing sleep? Frequency of arousals? This central concept is never operationally defined! Also, I do not believe that any of the self-report measures evaluated sleep during the nights of PSG evaluation, a requirement if one is to conclude that sleep parameters are being misperceived. Also, the data do not allow us to determine if there were significant numbers of participants who had discrepancies between insomnia parameters, such as total sleep and wake items, and PSG results. Given these considerations, I find it difficult to understand how the authors concluded that individuals with CFS
suffer from sleep state misperception. Yet, in the Discussion (page 11 bottom) the authors argue that type of “underlying wakefulness at sleep onset (that characterizes insomnia – not sleep state misperception – italics mine) might also interfere with nonrefreshing sleep.” Why? Do we know that the CFS participants complained of insomnia according to any standard definition (e.g., duration 3 months, three nights per week of undesired wakefulness lasting 31 minutes of more, distress related to sleep problems)? Is there any evidence that nonrefreshing sleep is associated with misperception of anything?

Since I have strong concerns that the authors have failed to show that there is sleep state misperception in CFS I clearly do not agree with the conclusions. Yet, I feel strongly that additional information about sleep in CFS, both measured via PSG and questionnaire, is needed. An organizing framework other than sleep state misperception should, however, be used.

Minor Essential Revisions

I am not sure what “frequency matched” (p. 5) and “case status” (p. 9) mean – please clarify.

The section on Statistical Analyses would fit better in the results where the findings are detailed.

The first paragraph of Results belongs in Method.

Alpha level was set at .05. I do not think this is appropriate given the number of comparisons. A Bonferroni correction to the alpha level would be useful.

In the Discussion (last paragraph p. 11) the authors indicate that insomnia is associated with underestimation of total sleep time and overestimation of wake after sleep onset. But in the present study they did not report on sleep diary vs PSG findings for the same night – so I don’t see the relevance of this statement. It should be deleted. Also, the literature shows that most medical patients have higher anxiety and depression scores than controls. So this type of “evidence” cannot be used to infer that individuals with CFS have insomnia or sleep state misperception.

Page 12 bottom paragraph – I do not understand how hypnotic medication is expected to improve unrefreshing sleep. If anything, sleep meds increase morning grogginess and fatigue.

Page 12 -13 several statements about the findings are not presented in the Results (e.g., medication use was more common in CFS sample (top para) and median duration of illness was 7. 3 years). These should be included.

Discretionary Revisions (which the author can choose to ignore)

I believe that the factor analysis was done for the two samples combined. The authors may want to examine factor structure separately for the two samples. Factor structure and loadings for people with dysfunctions are often different from those of controls.

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

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 declare that I have no competing interests' below