Author's response to reviews

Title: Socio-economic differences in self-reported insomnia and stress in Finland from 1979 to 2002: a population-based repeated cross-sectional survey.

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Author's response to reviews: see over
Author’s response to the reviewers

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Socio-economic differences in self-reported insomnia and stress in Finland from 1979 to 2002: a population-based repeated cross-sectional survey.
Kirsi M Talala, Tuija P Martelin, Ari H Haukkala, Tommi T Härkänen and Ritva S Prättälä

Reviewer 1: Markus Jokela
1. The prevalence estimates shown in figure 1 should have some indicators of variation, e.g., confidence intervals.
2. Given that insomnia is 10 times more prevalent than unbearable stress, maybe the figures for insomnia and stress should be presented in separate figures with appropriate ranges for the y-axis?

Both referees commented on figure presentation. The first reviewer is requesting confidence intervals and separate figures for insomnia and stress, second reviewer is requesting a figure of annual data. We conducted separate figures for insomnia (figure 1) and unbearable stress (figure 2), including age-standardized prevalence of five year periods, which is the base of our main analyses, with 95% Confidence Intervals (shown in the end of this file). We have conducted figures with annual point estimates as well (not age standardized), however, due to random variation, we found these more difficult to read. We have included several additional figures of annual data for reviewers to see, also shown in the end of this file. In case reviewers still prefer annual figures to be shown in the article with any new suggestions, we are happy to provide age standardized figures later on request.

3. The tables are quite exhausting, and the text in the results section repeats the information of the tables in a rather listwise fashion. I think the text in the results section could be made more readable and more streamlined by emphasizing the substance and the most important points of the results rather than going through the tables in detail. This makes it easier for the reader to follow your presentation. Also, please change the expression “respondents reported the highest odds…” because odds were not reported by the participants.

We agree with the referee-comment, and we have worked on the text in the result section in order to make it more readable. We also no longer use expression “respondents reported the highest odds”.

4. Did you use sampling weights?

For the question of sampling weights, we did not use those. The sampling was selected using the simple random sample method. The total Finnish population was a basic population. We were more specific about the selection process by adding the following text to the manuscript on page 6, last paragraph: The sampling was selected using simple random sample conducted by The Finnish Population Information System which is a computerized national register that contains basic online information about all Finnish citizens residing permanently in Finland. For this study, data were...

5. Page 11, second paragraph starting “For employment status, …” should probably be “For insomnia, …”
We have corrected the second paragraph on page 11 as suggested

**Reviewer 2: Jane Ferrie**

**Major Compulsory Revisions**

1. I do not understand why the data on prevalence in Figure 1 are presented in 5-year groups. This seems to miss the point of annual data, which would show exactly when trajectories start to change.

Both referees commented on figure presentation. The first reviewer is requesting confidence intervals and separate figures for insomnia and stress, second reviewer is requesting a figure of annual data. We conducted separate figures for insomnia (figure 1) and unbearable stress (figure2), including age-standardized prevalence of five year periods, which is the base of our main analyses, with 95% Confidence Intervals (shown in the end of this file). We have conducted figures with annual point estimates as well (not age standardized), however, due to random variation, we found these more difficult to read. We have included several additional figures of annual data for reviewers to see, also shown in the end of this file. In case reviewers still prefer annual figures to be shown in the article with any new suggestions, we are happy to provide age standardized figures later on request.

2. I am concerned by the decision to dichotomise the self-reported stress variable into `unbearable`/`bearable`; a split that results with 2.5% in the exposed and 97.5% in the unexposed groups. This dichotomy is justified by two references but neither reference provides evidence of a threshold effect. I would like to see these data reanalysed with response categories 1 and 2 combined to form the stress exposure group. At a minimum, these findings should be presented as sensitivity analyses in the text.

We acknowledge reviewer’s concern about stress cutpoint. We have used different cutpoint in our first article, where response categories 1 and 2 were combined as indicator for stress. We did additional analyses with wider stress outcome for present data, and we have added following texts on methods, results and discussion:

**Methods, page 8, first paragraph:**

However, for additional analyses we expanded stress category to include “more stress than in people normally” group also to examine the robustness of the stress outcome.

**Results, page 13, first paragraph:**

When wider stress category (including ‘more stress than normally in people’ and ‘unbearable stress’ combined) was used as an outcome measure in additional analyses, this resulted in reversed educational differences; highest educated had more stress compared to the lowest educated among both men and women in both models (data not shown in the tables).

**page 15, last paragraph:**

Some other methodological issues need to be addressed concerning the variables used. In this study we used “nearly unbearable stress” as an indicator for stress. This results with 2,5% in the exposed and 97,5% in the unexposed groups. In our previous study with 2002-2003 data [36] and also in additional analyses with present data, we have used other classification of stress, which included ‘more stress than normally in people’ and ‘nearly unbearable situation’ combined. In those analyses with stress prevalence of 16-20%, we found that the effect of education was reversed with stress; those in the highest or intermediate education were most stressed compared to the less educated. In our present study, unbearable stress was more common in the lower levels of
3. The authors have published previously on the psychological symptom data in this study. In their previous paper they look at self-reported depression (reference 6). This paper similarly found that there had been little change in socio-economic inequalities in self-reported depression over the 24 years reported. With insomnia included in the diagnostic criteria for depression the assumption in the past always tended to be that insomnia was a symptom of depression. However, studies over the last decade show insomnia to be a separate condition; albeit one that has high co-morbidity with depression. The present study is limited if findings for insomnia are presented without adjustment for self-reported depression. A similar argument can be made for self-reported stress.

This is a justified comment. However, next concern is why not to adjust for physical symptoms, as these may also be associated with insomnia (pain, chronic diseases, musculoskeletal diseases)? Furthermore, adjustment for stress with depression does not seem necessary as stress is not a diagnostic criteria for depression. We had both insomnia and depression questioned in a list of 14 symptoms and health problems (including physical symptoms). People were asked if respondents experienced any of the following symptoms or problems during the past 30 days. Based on that question, our focus is on the self-reported psychological distress symptoms, not diagnosed depression or insomnia. Regardless, we conducted all analyses for insomnia with adjustment for depression. We have not shown any additional data, but we added text on methods, results and discussion about the effect of adjustment, and we hope these will be satisfactory and clear the issue.

Page 10:
Self-reported depression was used as an additional covariate in the models for insomnia.

Page 12, first paragraph:
Additional adjustment for self-reported depression was conducted in both age and fully adjusted models in insomnia. Following this adjustment, no statistically significant differences existed by educational or household income level among women (data not shown in the tables).

Page 16, second paragraph:
Mental symptoms are known to be associated with each other with the complex interrelations and causality. In our study, Pearson's correlations (p<0.001) between insomnia and depression were $r=0.37$ in males and $r=0.36$ in females. As insomnia is included in the diagnostic criteria for depression with well-known co-morbidity [26], we therefore conducted additional analyses for insomnia with adjustment for depression. This resulted for some attenuation of the associations between insomnia and socioeconomic factors, and statistically significant associations no longer existed in insomnia by educational and household income levels among women. Therefore, some of the socio-economic differences in insomnia, but not considerably, may be explained by depression.

Page 19, first paragraph
Even though insomnia and stress are known to be related to each other and other indicators for mental health problems, they also may produce an independent risk factor for health and well-being.
4. In the categorisation of employment all those in employment are put into the same category. This method of categorisation completely ignores the large body of work that has demonstrated social gradients in many health outcomes; including insomnia e.g. Sara Arber’s work and stress e.g. the Whitehall II study.

We agree with the reviewer. However, in our questionnaire we have only three employment categories: 1 agricultural work, 2 industrial work, and 3 office work and service. We do not find these crude classifications to yield any relevant new evidence, especially when third category contains majority of the working population with heterogeneous working conditions, and no other work-related data (such as psychosocial and physical working conditions, shift-work etc.) was available. Therefore we would rather stick to our original categories. We changed the text in order to be less misleading on page 8, paragraph 2, as following...

*Employment status was queried with the following question: “What kind of work do you do most of the year?” Three occupational categories were given in the questionnaire; ‘agricultural work’, ‘industrial work’, and ‘office work and service’. As being crude measures of occupation, all those categories were grouped together in the employed category.*

5. The group labelled ‘retired’ are actually ‘early retirees’. The implications of this need to be spelled out and discussed. Recent work has shown self-rated health and sleep problems in longitudinal studies of the same individuals to improve after statutory retirement.

We have clarified and discussed this issue on page 8, second paragraph:

..all the retired respondents had taken early retirement (these comprise early old-age pensioners (62-64 years old), part-time pensioners, disability pensioners and unemployment pensioners (60-64 years old)).

and page 17, second paragraph:

*Studies of the effects of retirement on mental health, including sleep outcomes, has produced inconsistent findings showing both improvement and increase in symptoms [40, 41]. In a longitudinal follow-up study, sleep disturbances have been found to improve after retirement, which were explained by removal of work-related risk factor exposures. Retirement on health grounds was, however, associated with increase in sleep disturbances following retirement [48]. In the Finnish register-based follow-up study sleeping problems were found to be associated with subsequent disability retirement [10]. In our study retired respondents, which were early retirees, had more insomnia and unbearable stress. Early retirement is known to be associated with lower mental and physical health [42-44], and mental and musculoskeletal disorders are the most common reasons for granting disability pension in Finland [45-47].*

**Minor Essential Revisions**

1. Unless the authors have used measures of gender please could they use the term sex when they present separate findings for women and men.

We have changed term ‘gender’ for term ‘sex’

2. I am not sure if the word ‘unbearable stress’ was used in the questionnaire. If not maybe the authors could use a less hyperbolic term such as high stress.
A correct term in the questionnaire was ‘nearly unbearable situation’. We have been more specific on explaining the different choices in the question of stress.

Additional changes:

- Reference 17 included no actual reference, page 4, paragraph 2, and it was corrected as reference 10.

- In order to be more clear and precise with main results, we have corrected text in the abstract page, and discussion page, paragraph as follows:

New abstract version:
Respondents who were unemployed or had retired early reported more insomnia and unbearable stress over time. Lower household income level was associated with more unbearable stress. Educational level differences in insomnia and unbearable stress were mostly explained by other socio-economic factors.

Old abstract version:
Respondents who were unemployed or had retired early reported more insomnia and unbearable stress over time, while insomnia and stress in both lower educational and lower household income levels appeared less consistent.

New discussion version:
Consistently more insomnia and stress was among the unemployed and retired (early retirees in this data). Lowest income level was associated with more unbearable stress. Additionally, more insomnia and stress were in the lower educational levels, although associations were weaker and less stable.

Old discussion version:
Consistently higher prevalence of insomnia and stress was observed among the unemployed and retired (early retirees in this data). Additionally, a higher prevalence of insomnia and stress was seen in the low educational and low income levels among both genders, although it was weaker and less consistent.
Figure 1. Age-standardised prevalence of self-reported insomnia 1979-2002 (%).
Figure 2. Age-standardised prevalence of self-reported unbearable stress 1979-2002 (%).