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
Reviewer’s report
Title: Socio-economic differences in self-reported insomnia and stress in Finland from 1979 to 2002: a population-based repeated cross-sectional survey.
Version: 4 Date: 28 March 2012
Reviewer: Jane Ferrie

COMMENT 1:
Authors' response: We have changed the ‘unbearable stress’ for ‘extremely high stress’.
For methods –section, starting page 7, last paragraph, we also tried to be even more precise with the option formulation: Stress was addressed in a separate four-point scale question:
“Have you had symptoms of tension or been under great stress or considerable strain during the past 30 days?” (1= my life is nearly unbearable (2.5%), 2=more than people in general (15%), 3=somewhat but not usually so (60%), 4=not at all (23%)).

Reviewer comment:
I am happy with the change in the description of the highest stress category, although the authors should note that the original labels remain in place in Figure 2. However, having seen the analyses in Additional file 3 I feel more strongly than before that it should be the findings for the wider ‘high stress’ category that should be presented in the main paper and those for the extreme stress category in an additional file. This would mean that Figure 2 would show trends for the high stress category rather than the extreme stress category. I also feel that the tables for both outcomes should be shown in the main body of the paper adjusted and unadjusted for self-reported depression.

Author’s most recent response:
We are grateful for reviewer’s thorough reading and comments. We have done all the changes as was suggested: the findings for the wider stress (called as ‘stress’) category are presented in the main paper, as well as trend figure 2 is presented for wider stress. Findings for the extremely high stress are presented in Additional file 1. Adjustment for self-reported depression is shown in tables in the main body of the paper. In order to do so, to fit in the model and in order to simplify the comparison of the models, we have deleted the fully adjusted models for separate study periods (as they were not providing any new significant information compared to age-adjusted model). So the stepwise modelling in the tables 2-5 include: age-adjusted model for separate study periods and total study period; a model for mutually adjusted SES variables for total study period; and a model for mutually adjusted SES variables further adjusted with depression. These revisions induced major changes throughout the body of the text, and all the parts that have re-written are listed here below:

Abstract, page2
Deleted old version:
Results: The overall prevalence of insomnia was 18-19% and that of extremely high stress around 2-3%. During the recession in 1993-1997, the proportion of those reporting extremely high stress slightly increased in both sexes. There was no increase in those reporting insomnia during that time; however, the prevalence of insomnia increased during the last study period, 1998-2002. Socio-economic differences in insomnia and extremely high stress were detected among all SES indicators. Respondents who were unemployed or had retired early reported more insomnia and extremely high stress over time. Lower household income level was associated with extremely high stress. Educational level differences in insomnia and extremely high stress were mostly explained by other socio-economic factors. Differences between unemployed and employed respondents narrowed during a period of high unemployment 1993-1997 in both insomnia and stress. In general, socio-economic differences in self-reported insomnia and extremely high stress did not change substantially over the study period 1979-2002.

Conclusions: Self-reported insomnia and extremely high stress were more common during later study periods. The socio-economic differences in insomnia and extremely high stress remained mainly stable over a 24-year time period. The constant socio-economic differences in the psychological symptoms present an ongoing challenge for national public health policy.

New version

Results: The overall prevalence of insomnia was 18-19% and that of stress 16-19%. Compared to the first study period, 1979-1982, the prevalence of stress increased until study period 1993-1997. The prevalence of insomnia increased during the last study period, 1998-2002. Respondents who were unemployed or had retired early reported more insomnia and stress over time. Lower education was associated with more insomnia especially among men; and conversely, with less stress among both sexes. Compared to the highest household income level, those in the intermediate levels of income had less stress whereas those in the lowest income levels had more stress. Income level differences in insomnia were less consistent. In general, socio-economic differences in self-reported insomnia and stress fluctuated some, but did not change substantially over the study period 1979-2002.

Conclusions: Self-reported insomnia and stress were more common during later study periods. The socio-economic differences in insomnia and stress have remained fairly stable over a 24-year time period. However, some of the associations in socioeconomic differences were curvilinear and converse. Future studies are needed to explore the complex socioeconomic gradients, especially in stress.

Methods, page 8, first paragraph

Deleted old version:

Extreme stress was considered to have the greatest negative effect on health [13, 32]; therefore those reporting nearly unbearable situation were classified as having extremely high stress. However, for additional analyses we expanded stress category also to include ‘more than people in general’ group (17%) in order to examine the robustness of the stress outcome. Pearson’s correlations (p< 0.001) between insomnia and extremely high stress were r=0.16 in males and r=0.14 in females.

New version:

Those reporting stress ‘more than people in general’ or ‘my life is nearly unbearable’ were classified as having stress. Pearson’s correlations (p<0.01) between insomnia and stress were r=0.29 in males and r=0.26 in females. We also conducted some additional analyses for ‘my life is nearly unbearable’-category alone (2.5%) as referring to extremely high stress.

Statistical methods, page 10, first and second paragraphs

Deleted old version:
The first logistic regression model explored the age-adjusted effects of each socio-economic variable. We further conducted a fully adjusted logistic regression model where all socio-economic variables were analysed simultaneously in order to see their adjusted effects. With a view to exploring the changes in socio-economic differences in insomnia and extremely high stress over time, we tested and reported p-values for interaction effects between SES variables and the study period in both models. In the fully adjusted model, SES and study period variable interactions were mutually adjusted.

Finally, as insomnia is included in the diagnostic criteria for depression with well-known co-morbidity [26], we used self-reported depression (measured by a single-item question) as a covariate in additional analyses for total study-period 1979-2002 for insomnia and extremely high stress (see Additional files 1 and 2). Moreover, additional logistic regression analyses for expanded stress category (17%) by socio-economic indicators were conducted in order to examine the robustness of the stress outcome (Additional file 3). We carried out all statistical analyses separately for men and women using SPSS 17 for Windows (SPSS Corporation 2008).

New version:
The first logistic regression model explored the age-adjusted effects of each socio-economic variable for both total and separate study periods. With a view to exploring the changes in socio-economic differences in insomnia and stress over time, we tested and reported p-values for interaction effects between SES variables and the study period. We further conducted a logistic regression model for total study period, where all socio-economic variables were analysed simultaneously in order to see their independent adjusted effects. Finally, self-reported depression (measured by a single item ‘yes-no’ question) was included as a covariate in the last model in order to exclude the possible effect of depression on insomnia and stress.

Moreover, additional logistic regression analyses for extremely high stress category (2.5 %) by socio-economic indicators were conducted in order to examine the robustness of the stress outcome (Additional file 1). We carried out all statistical analyses separately for men and women using SPSS 17 for Windows (SPSS Corporation 2008).

Results, page 11, second paragraph

Deleted old version:
The overall prevalence of insomnia was 17.6% for men and 18.6% for women; the numbers for extremely high stress were 2.6% for men and 2.4% for women. The trend in the prevalence of insomnia was slightly u-shaped; a decreasing trend was seen after the study period 1979-1982, but then the prevalence began to increase again in the latest study periods (Figure 1). During the last study period, 1998-2002, there was a statistically significant (p<.001) almost three percentage points increase in insomnia, among both men and women compared to the first study period. In extremely high stress, there was a statistically significant increase during the 1993-1997 study period among men (p=.011) and women (p<.001), which persisted among men but not among women during the last period, 1998-2002 (Figure 2).

New version:
The overall prevalence of insomnia was 17.6% for men and 18.6% for women; the numbers for stress were 18.5% for men and 15.6% for women. The trend in the prevalence of insomnia was slightly u-shaped; a decreasing trend was seen after the study period 1979-1982, but then the prevalence began to increase again in the latest study periods (Figure 1). During the last study period, 1998-2002, there was a statistically significant (p<0.001) almost three percentage points increase in insomnia, among both men and women compared to the first study period. As for stress prevalence, there was linear increase until study period
1993-1997 among both sexes, indicating a statistically significant (p<0.001) four to seven percentage points increase compared to the first study period (Figure 2). For the last study period, 1998-2002, the prevalence of stress remained similar to the 1993-1997 study period.

Results, page 12, first paragraph

Deleted old version:

However, the educational level differences were no longer statistically significant among women, and the odds for lowest household income level no longer differed from the highest income level among either of the sexes. Additional adjustment for self-reported depression was conducted in both age and fully adjusted models for total study period 1979-2002. Following this adjustment, socio-economic differences attenuated but existed statistically significant among men, however, the lowest educational and household income levels were no longer associated with higher odds for insomnia among women (see Additional file 1).

New version:

However, the educational level differences were no longer statistically significant among women, and furthermore, the association of insomnia with household income level turned u-shaped as the intermediate levels of income had the lowest insomnia among both sexes. Following further adjustment for self-reported depression; intermediate level no longer differed from the highest education among men; and even the lowest level of income had statistically significantly less insomnia compared to the highest income among both men and women.

Results, pages 12,13,14

Deleted old version:

Socio-economic differences in self-reported extremely high stress

In the age-adjusted model for the total study period (Table 4 and 5), the lowest educated experienced more extremely high stress compared to the highest educated among both men (OR 1.54, 95% CI 1.27-1.86) and women (OR 1.54, 95% CI 1.28-1.87). After mutual adjustment for other SES variables, the associations of the lowest level of education were no longer statistically significant. In the case of employment status, retired men (OR 3.16, 95% CI 2.56-3.92) and women (OR 2.90, 95% CI 2.33-3.61), and unemployed men (OR 4.55, 95% CI 3.73-5.56) and women (OR 2.91, 95% CI 2.31-3.68) had more extremely high stress compared to the employed in the both models. Regarding household income, extremely high stress was more common among those in the lowest household income levels compared to the highest level among both men (OR 2.19, 95% CI 1.77-2.70) and women (OR 2.86, 95% CI 2.30-3.56) in the age-adjusted model, and the associations remained after adjustment for educational level and employment status. Additional adjustment for self-reported depression as a covariate in the models slightly attenuated educational, employment status and household income level differences in extremely high stress among both sexes. However, statistically significant associations vanished only for the lowest income level in the fully adjusted model among men (see Additional file 2).

Complementary analysis with extended 17% stress category (including ‘more stress than people in general’ and ‘my life is nearly unbearable’ combined) as an outcome measure resulted in reversed educational differences; the highest educated had more stress compared to the lowest educated among both men and women in the both models (see Additional file 3). Employment status and household income level gradients in the extended stress category were parallel to those associations of ‘my life is nearly unbearable’ category, in other words, extremely high stress.
In men (Table 4), a statistically significant change over time appeared in extremely high stress by employment status. Extremely high stress fluctuated in all employment status groups over total study period. During the period of high unemployment in 1993-1997, similarly to insomnia, differences in extremely high stress narrowed between employed and unemployed men. During the last study period, 1998-2002, differences widened again between the employed and the unemployed men owing to an increase in the prevalence of stress among the unemployed. In women (Table 5), no statistically significant change occurred for the association of self-reported extremely high stress with any socio-economic indicators. However, the findings suggest a narrowing of the differences between the employed and unemployed respondents and a widening of the differences by household income level during the recession period, similar to men.

New version:

Socio-economic differences in self-reported stress

In the age-adjusted model for the total study period (Table 4 and 5), the lowest educated experienced less stress compared to the highest educated among both men (OR 0.75, 95% CI 0.70-0.80) and women (OR 0.80, 95% CI 0.74-0.86). In addition, less stress was observed with intermediate education. Those associations remained statistically significant even after mutual adjustment for other SES variables. In the case of employment status, retired men (OR 1.52, 95% CI 1.37-1.68) and women (OR 1.36, 95% CI 1.22-1.52), and unemployed men (OR 1.68, 95% CI 1.50-1.87) and women (OR 1.45, 95% CI 1.28-1.64) had more stress compared to the employed in the age-adjusted model, and following adjustment for other SES variables. Moreover, students reported higher stress and housewives less stress. Regarding household income, compared to the highest level of income, stress was less common among the intermediate levels of income, but more common among those in the lowest household income level among both men (OR 1.12, 95% CI 1.03-1.21) and women (OR 1.18, 95% CI 1.08-1.29) even after adjustment for educational level and employment status.

After further adjustment for self-reported depression as a covariate in the models, statistically significant associations in stress vanished for the retired and unemployed respondents among both men and women, and for the lowest income level among men.

Complementary analysis with extremely high stress -category (‘my life is nearly unbearable’) as an outcome measure resulted in reversed educational differences compared to the original wider stress classification; in the age-adjusted model lower educated had more stress compared to highest educated among both men and women (see Additional file 1). However, after mutual adjustment for other SES variables, educational level differences were no longer statistically significant. Employment status gradients resembled association of wider stress, as well as the lowest level of household income was associated with more stress according to both stress classifications.

In men (Table 4), a statistically significant change over time appeared in stress by employment status (p<0.001) and household income (p=0.017). In particular, there were narrowing differences during the period of recession in 1993-1997, however, at the same time some associations increased; statistically significantly higher odds for stress were among students and those in the lowest level of income. In women (Table 5), change over time was statistically significant for stress by all socioeconomic indicators. In women narrowing of the differences by employment status (p<0.001) during recession were even more pronounced than in men; students, early retired and unemployed had no longer statistically significantly more stress compared to the employed. Educational level differences had a statistically significant change over time (p<0.001); no differences existed during the first and last study periods whereas the other study periods showed clear reversed educational differences in stress. Changes in household income level (p<0.040) differences in stress fluctuated over time with no pronounced pattern.
Discussion, page 14, last paragraph

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Our aim was to study the prevalence and the socio-economic differences in self-reported insomnia and extremely high stress over the years 1979-2002 in Finland. Compared to the first study period, 1978-1982, there was a minor increase in the prevalence of stress during the period 1993-1997 among men and women, which persisted during 1998-2002 among men but not among women. There was also an increase in the prevalence of self-reported insomnia among both men and women during the last study period, 1998-2002. A socio-economic gradient was demonstrated in insomnia and extremely high stress by all SES indicators. Consistently more insomnia and extremely high stress was among the unemployed and retired (early retirees in this data). Lowest income level was associated with extremely high stress. Additionally, more insomnia and extremely high stress were in the lower educational levels, although associations were weaker and less stable. Differences between the unemployed and employed respondents narrowed during the period of high unemployment in 1993-1997 in both insomnia and stress among both sexes. However, socio-economic differences in self-reported insomnia and extremely high stress did not change substantially from 1979 to 2002.

New version:

Our aim was to study the prevalence and the socio-economic differences in self-reported insomnia and stress over the years 1979-2002 in Finland. Compared to the first study period, 1978-1982, there was increase in the prevalence of stress until the period 1993-1997 among men and women. There was also an increase in the prevalence of self-reported insomnia among both men and women during the last study period, 1998-2002. Consistently more insomnia and stress was among the unemployed and retired (early retirees in this data). Lowest education was associated with more insomnia especially among men, and less stress among both sexes. Those in the intermediate levels of household income had least stress. Income level differences in insomnia were less consistent. Socio-economic differences slightly fluctuated over the total period 1979-2002; however, there were no substantial changes in socio-economic differences in insomnia and stress.

Discussion, page 15-17, starting page 15, last paragraph

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Some other methodological issues need to be addressed concerning the variables used. In this study we used ‘my life is nearly unbearable’ category as an indicator for extremely high 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 the additional analyses with present data, we have used extended classification of stress, which included ‘more stress than people in general’ and ‘my life is nearly unbearable’ combined. In those analyses with stress prevalence of 17-20%, 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. However, extremely high stress was more common in the lower levels of education compared to the highest education. In general, our stress measure is exploring only perception of stress, with no further information about sources of stress, or possible coping resources or mechanisms. However, our present study seems to indicate, that those in the lowest socio-economic position are most affected by extreme stressful situations.

Mental symptoms are known to be associated with each other with complex interrelations and causality. In particular, insomnia is included in the diagnostic criteria for depression [26]. In our study, Pearson’s correlations (p<0.001) between insomnia and depression were r=0.37 in males and r=0.34 in females; and between extremely high stress and depression r=0.24 in males and r=0.21 in females. After additional
analyses with adjustment for self-reported depression, statistically significantly higher insomnia no longer existed by the lowest educational and household income levels among women. Among men, the independent effect of the lowest household income on extremely high stress was either statistically significant. Therefore, some of the educational and income level differences in insomnia and stress may be explained by depression.

New version:

Some other methodological issues need to be addressed concerning the variables used. In this study we used ‘my life is nearly unbearable’ and ‘more stress than in people general’ categories combined as indicator for stress. Educational differences were reversed in stress; those in the highest education were more stressed compared to the less educated. This finding is in line with many other previous research, however, the phenomenon is not clearly explained in the literature [24, 35]. It has been proposed, especially related to work stress, that those with higher education have for example gained occupational position with greater responsibilities, higher expectations and higher stress [25]. One explanation is relating to the complexity of the stress construct and measurement. In general, our stress measure is exploring only perception of stress, with no further information about sources of stress, or possible coping resources or outcomes. In additional analyses we used ‘my life is nearly unbearable’ category alone as an indicator for extremely high stress (2.5% in the exposed group). Extremely high stress was more common in the lower levels of education compared to the highest education, although the associations were not independent of other socioeconomic factors. Our results indicate that even though stress seems to be more common among the highest educated, some of the most extreme stressful situations may be experienced among those in the lowest education. Specific measures of stress would be needed in order to examine different sources and exposures of stress, duration, as well as coping resources and responses. Stress, and less consistently insomnia, also produced an u-shaped distribution with household income level, suggesting intermediate levels being protective for insomnia and stress. More stress and insomnia in the lowest income group may relate, for example, to low social participation and material resources, whereas more symptoms among the highest income group might relate to the factors associated with the higher social position and occupational status, as was discussed with education.

Psychological symptoms are known to be associated with each other with complex interrelations. In our study, Pearson’s correlations (p<0.001) between insomnia and depression were r=0.37 in males and r=0.34 in females; and between stress and depression r=0.40 in males and r=0.38 in females. We made adjustment for self-reported depression in order to control the possible effect of depression on the associations for insomnia and stress. Most significant effect on following this adjustment was for retired and unemployed respondents, which had no longer statistically significantly higher stress among neither of sexes. Therefore, some of the employment status differences in stress may be explained by depression. However, if stress and insomnia symptoms are preceding and predictors of depression, as some of the evidence is demonstrating [36-38], then adding depression in the analyses may have caused over adjustment in the models.

Discussion, page 17, second paragraph

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In our data, over half of those having extremely high stress reported insomnia, and 6-8% of those who reported insomnia also had extremely high stress; however, the cross-sectional study design of our data does not allow us to make conclusions about the causality of the stress-insomnia relationship, or any other studied associations. Trends in the prevalence of insomnia and stress were not identical to each other or to what we previously found using the same data with self-reported depression, which for example showed a decreasing trend contrary to the increasing trend in insomnia [6]. Prevalence trends over time may partially relate to the measures and classifications used, and partly to the complex
association of those symptoms. Even though insomnia and stress are known to be related to each other and other indicators for mental health problems, they may also produce an independent risk factor for health and well-being.

New version:

In our data, 39% of those having stress reported insomnia, and 41% of those who reported insomnia also had stress; however, the cross-sectional study design of our data does not allow us to make conclusions about the causality of the stress-insomnia relationship, or any other studied associations. Trends in the prevalence of insomnia and stress were not identical to either each other or to what we previously found using the same data with self-reported depression, which for example showed a decreasing trend contrary to the increasing trend in insomnia and stress [6]. Even though insomnia and stress are known to be related to each other and other indicators for mental health problems, they may also produce an independent risk factor for health and well-being.

Discussion, page 18, second paragraph

Old version:

The results of those non-respondent analyses indicate that the socio-economic differences are more likely to be even more pronounced than what we observed from the survey data. They also indicate that the non-respondents may have, for example, unhealthy lifestyles, more severe illnesses and mental health problems, and may also differ from the respondents in terms of self-reported psychological symptoms.

New version:

The results of those non-respondent analyses indicate that the non-respondents may have, for example, unhealthy lifestyles, more severe illnesses and mental health problems, and may also differ from the respondents in terms of self-reported psychological symptoms.

Discussion, page 19, first paragraph

Old version:

However, there was a statistically significant one percentage point increase in reporting extremely high stress, in particular among men with the lowest educational level and in the low household income levels among both sexes. During the recession, differences between the employed and unemployed narrowed in both insomnia and extremely high stress. This indicates that when national unemployment rates were relatively high, being unemployed was obviously not as selective as usual. Similarly, Valkonen et al. [56] found that economic recession slowed down rather than sped up the growth of relative inequalities in mental health related mortality (such as alcohol-related causes, accidents and suicide) in Finland. After the recession period, during 1998-2002, extremely high stress was especially high amongst the unemployed men. This may indicate that those who remained or ended up being unemployed even though the recession was over experienced more extremely high stress.

New version:

The prevalence of stress had a linearly increasing trend, which during recession period strengthened especially among women. However, general increase in stress was not attributable to any specific socioeconomic levels. During the recession, changes in socioeconomic differences were somewhat inconsistent, but differences especially between the employed and unemployed respondents rather narrowed in both insomnia and stress. This indicates that when national unemployment rates were relatively high, being unemployed was obviously not as selective as usual. Valkonen et al. [58] found that
economic recession slowed down rather than sped up the growth of relative inequalities in mental health related mortality (such as alcohol-related causes, accidents and suicide) in Finland.

**Discussion, page 20, second paragraph**

**Deleted old version:**

Although socio-economic differences slightly fluctuated over the total period 1979-2002, significant changes in socio-economic inequality were rare. However, future studies are needed to follow up the observed increase in symptoms, especially in the prevalence of insomnia. The growing prevalence of psychological symptoms as well as constant socio-economic differences should be considered to be a great public health concern.

**New version:**

Although socio-economic differences slightly fluctuated over the total period 1979-2002, significant changes in socio-economic differences were rare. It is noteworthy, that some of the differences in insomnia and stress were reversed and curvilinear. Future studies are needed to explore the complexity and significance of socioeconomic differences, especially in stress, as well as the growing prevalence of psychological symptoms.

**Conclusion, page 20, third paragraph**

**Deleted old version:**


**New version:**

Insomnia and stress have become more prevalent over the years. The socio-economic differences in self-reported insomnia and stress fluctuated but did not change substantially during the total study period 1979-2002. Some of the socioeconomic gradients in stress and insomnia were curvilinear, and reversed depending on the measure and classification used.

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**COMMENT 2**

Author comment: As suggested, we have done additional table to present results for extended stress category, for total study period. In text, we have explained following:

**Methods, page 8, first paragraph:** However, for additional analyses we expanded stress category also to include ‘more than people in general’ group (17%) in order to examine the robustness of the stress outcome.

**Statistical analyses, page 10, last paragraph:** Moreover, additional logistic regression analyses for expanded stress category (17%) by socio-economic indicators were conducted in order to examine the robustness of the stress outcome (Additional file 3).

**Results, page 13, second paragraph:** Complementary analysis with extended
17% stress category (including ‘more stress than people in general’ and ‘my life is nearly unbearable’ combined) as an outcome measure resulted in reversed educational differences; the highest educated had more stress compared to the lowest educated among both men and women in the both models (see Additional file 3).

Rewier comment:
This finding very clearly demonstrates the problem of departing from the categorisation of stress used in their previous paper. The authors state on page 12 that ‘In the age-adjusted model for the total study period (Tables 4 and 5), the lowest educated experienced the most extremely high stress,….’. However, when this category, which comprises only 2.5% of the population, is combined with ‘more stress than people in general’ to make a high stress category, in the age-adjusted models intermediate and low education are highly protective. The authors need clearly to state and discuss this finding. Merely to state that the gradient was reversed and highest educated had more stress does not do justice to the import of these findings. At the end of their paper the authors claim that ‘constant socioeconomic differences should be considered to be a great public health concern’. When low education is associated with higher levels of extreme stress in a tiny percentage of the lowest educated but much lower levels among the 17% with high stress it is not clear which socioeconomic differences provide the cause for concern.

Author’s most recent response: Re-written results and discussion are presented in total in the sections above.

COMMENT 3:
Authors’ response: We tried to be more precise and accurate with this issue. As was suggested, we have conducted additional tables for models of both insomnia (additional file 1) and stress (additional file 2), adjusted for depression. These adjustments are explained in text as following:
Page 10, last paragraph: Finally, as insomnia is included in the diagnostic criteria for depression with well-known co-morbidity [26], we used self-reported depression (measured by a single-item question) as a covariate in additional analyses for total study-period 1979-2002 for insomnia and extremely high stress (see Additional files 1 and 2).
Page 12, first paragraph: Additional adjustment for self-reported depression was conducted in both age and fully adjusted models for total study period 1979-2002. Following this adjustment, socio-economic differences attenuated but existed statistically significant among men, however, the lowest educational and household income levels were no longer associated with higher odds for insomnia among women (see Additional file 1).

Rewier comment:
I am not happy with this response as it is a rather disingenuous interpretation of the findings presented in Additional file 1. It is not just that lower household income levels were no longer associated with higher odds for insomnia among women; they were associated with LOWER levels of self-reported insomnia in both sexes i.e. lower income was protective and the effect was statistically significant. This cannot just be glossed over; it presents a serious challenge to
the findings reported in the Abstract.

Author’s most recent response: Re-written results and discussion are presented in total in the sections above, including adjustment for depression in tables 2-5.

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COMMENT 4:

Author response: Page 13, first paragraph: Additional adjustment for self-reported depression as a covariate in the models slightly attenuated educational, employment status and household income level differences in extremely high stress among both sexes. However, statistically significant associations vanished only for the lowest income level in the fully adjusted model among men (see Additional file 2).

Rewier comment:
As above, this is a rather partial report of the findings in Additional file 2. Not only did statistically significant associations vanish for the lowest income level in the fully adjusted model among men, but also for intermediate education in men and low education both sexes.

Author’s most recent response: These comments have also considered above.

Level of interest: An article of importance in its field
Quality of written English: Acceptable
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