Author’s response to reviews

Title: Workplace gender composition and psychological distress: The importance of the psychosocial work environment

Authors:

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Author’s response to reviews: see over
Dear Editor

We would like to thank you for considering our manuscript for publication in BMC Public Health. We have attended to your comments and suggestions. We have numbered and responded to each comment below.

Sincerely

Sofia Elwér

**Bold font**=comments from the editor

**Plain font**= authors’ response

**Indented, italicized font**= sections from the revised manuscript

**Comments and responses to the editor**

Comment 1: My major concern is related to the statistical analysis performed by the authors. A stratified analysis has been done according to the 3 groups of gender composition at the workplace and the results have been interpreted according to these 3 strata. No results have been provided for the whole sample and for interaction tests. Consequently, the interpretation of the results is done without caution and the differences between strata may be over-interpreted in case of non-significant interaction terms. My advice would be to perform and present the results of logistic regression analysis for the whole sample and test the interaction terms. The interpretation of the results should be done accordingly. Both result and discussion sections should be revised. As gender is adjusted for in the models, interaction terms may also be tested for gender, and thus information could be given on this point too.

Response: We agree that it is of interest to include the analyses for the full sample and have complemented table 3 (table 2 in the former version) with the analyses for the whole sample.

The editor has also pointed out an important issue regarding interaction. We have therefore performed multiplicative interaction analyses of gender composition in combination with each of the work environment variables as well as with gender. The multiplicative analyses returned no significant interaction between the variables in the full model. The interaction analyses are included in the manuscript as a new table 2 and the text below has been added to explain these analyses. In addition to the new included sections below we have edited the discussion and clarified when the results from the stratified analyses are presented and that comparisons between the strata should be made with caution as no interactions were found.

*Method section, page 8, paragraph 1*

*Crude and multivariate logistic regressions, with psychological distress age 42 as outcome, were performed for all work environment factors in the full sample including interaction terms for gender composition in combination with each*
work environment factor as well as with gender (table 2). Workplaces with more men were used as reference categories as they represented the lowest prevalence of psychological distress. As no interactions were found the population was stratified according to gender composition of the workplace and analyzed with logistic regression to further explore possible connections between the work environment factors and psychological distress within each gender composition the population.

(Results section, page 9, paragraph 2)
Table 2 provides the results from the multivariate logistic regression analysis for psychological distress in the full sample with included interaction terms for gender composition and each of the work environment factors. With interaction terms included in the model, high demands, low control and low support was associated to psychological distress, adjusted for confounders. In these analyses, mixed workplaces also represented a higher OR for psychological distress for all work environment factors except being looked down upon. No significant interactions were found in any model for the work environment factors. The results indicate that there were no interactions between any of the work environment factors and gender composition in relation to psychological distress. Table 2 also includes corresponding analysis including an interaction term for gender composition and gender in which no significant interaction was found in the full model.

(Discussion section, page 10, paragraph 2)
The results showed that no interaction was found between gender composition and either of the work environment factors. The stratified analyses showed that different psychosocial work environment factors were related to psychological distress in the different gender composition strata, which, to our knowledge, this study is the first to show. However, comparisons between the strata should be made with caution as no interactions were found between gender composition and either of the work environment factors.

(Discussion section, page 10, paragraph 2)
The indication from the stratified analyses of different associations between psychosocial work environment and mental ill-health in the different strata support an understanding of the workplace gender composition as important in shaping the mental ill-health consequences of the psychosocial work environment.
Comment 2: The presentation of the results from Table 1 (first paragraph of the result section) should also be revised, the authors interpreting non-significant tests. The differences should be interpreted for significant tests only.

Response: We have edited the first paragraph of the result section to ensure that only significant differences are discussed. To present significance test for the change in psychological distress between ages 21 and 42 we have also added the variable “Change psychological distress” to table 1.

(Page 8 paragraph 2)
The gender composition of the workplaces was significantly associated with psychological distress in the total population as presented in table 1. The highest prevalence of psychological distress at age 42 was found among women in workplaces with a mixed gender composition, whereas workplaces with more men had the lowest prevalence among both women and in the total population. In the gender stratified analyses, significant differences between workplace gender composition and psychological distress was found for women but not for men at age 42 (table 1). At age 21 significant differences in psychological distress was found among men but not among women or in the total population. The prevalence of psychological distress increased considerably between ages 21 and 42 in the full sample at mixed workplaces (though men started out and remained at a significantly lower prevalence compared to women), increased moderately at workplaces with more women and remaining stable at workplaces with more men.

Comment 3: There are also a number of erroneous interpretations of potential biases of the study. (a) Regarding response rate, the authors should be clearer. The initial response rate may be high, but the final sample used is restricted to 795 subjects, i.e. to 73% of the initial sample size. (b) The use of a self-reported mental ill-health may not be seen as a strength, given a potential reporting bias, especially in this study in which both exposures (psychosocial work factors) and health outcome have both been measured using self-reporting. In addition, I do not see why this measure of mental ill-health would be more independent of working conditions. (c) The limitation related to limited sample size would make the separate analysis of men and women impossible according to the authors, but in fact they performed a stratified analysis using three groups of gender composition; this point appears inconsistent. (d) Finally, the generalization of the results may be limited given the survey protocol. All these points should be revised and discussed appropriately.

Response: We have divided this comment into a, b, c and d (as indicated in the comment above) and respond to each comment separately below.

a) The following section has been edited to clarify the response rate:

(Page 5, paragraph 4)
In this study, we used data from when the participants were 21 (1986) and 42 (2007) years old. The participation rate of those still alive from the original cohort was 98% in 1986 and 94% in 2007. Only participants who were registered as connected to a workplace in Sweden with more than one employee in 2007 were included in this study (N = 795; 375 women and 420 men) which
represents 74% of those still alive in the cohort \((N = 1071)\) and 79% of the participants in 2007 \((N = 1010)\).

b) We agree with the editor and have therefore deleted the sentence in the method discussion where we described self-reported health as a strength and edited the following section concerning the limitation of self-reported exposure and outcome:

\[(\text{page 13, paragraph 2})\]

Another limitation is that both exposures (work environment factors) and the outcome (psychological distress) are self-reported. However, although it is possible that respondents with poor mental health also report worse psychosocial work environment, there is little reason to believe that such “over reporting” would differ between the gender composition strata which is the main focus of this study. Both severe and less severe complaints of psychological distress have been shown to be related to later ill-health and all-cause mortality [33].

c) We agree that this appears inconsistent. The following section in the method section has been edited to clarify this:

\[(\text{Page 8, paragraph 1})\]

As no interactions were found the sample was stratified according to gender composition of the workplace and analysed with logistic regression to further explore possible connections between the work environment factors and psychological distress within each gender composition the population. It would have been preferable to stratify for both gender composition and gender in the analyses. However, the limited sample size, with few women and men at workplaces where they were in minority, made this impossible.

d) Thank you for making this point. We hope that we have interpreted the editor correctly, that we need to discuss the generalization of the results more thoroughly in the light of the sampling frame. Therefore the following section in the method discussion has been edited and developed to discuss this issue:

\[(\text{Page 14, paragraph 3})\]

The Northern Swedish Cohort is a homogenous group in terms of age and geographic location although 41 per cent lived elsewhere than Luleå at the latest follow up. However, the labour market structure of Luleå is representative of Sweden as a whole in regards to the distribution between branches of business in 2007 at the latest follow up [45] and the cohort has also been proven to be comparable to the country as a whole with regard to socio-demographic factors as well as health status and health behaviour [30]. The sample in the present study is comparable to Sweden regarding socioeconomic position in the age group between 25 and 44 years [46]. The workplace sample (all employees at the participants workplaces, which are used to calculate the gender composition exposure) have a similar age structure as the general population in Sweden, but a higher educational level [46]. The generalization of the results may be limited to similar age groups and workplaces as well as to
other countries with similar gender segregated labour market with a high labour market participation for both women and men.

Comment 4:
4a) Regarding Table 1, a description of the total sample may be useful.

Response:
4a) We have added a description of the total sample is added to table 1.

4b) Type of work is among the potential confounders in the method section, but not included in Table 2.

Response:
4b) Thank you for pointing this out. We have used type of work as a descriptive variable but not included it in the analyses. “Type of work” has therefore been moved to the new heading “Descriptive variables” in the method section.

Comment 5: Minor comment: country instead of county, first line of method section.

Response:
We have corrected this typo accordingly.