Author's response to reviews

Title: Years worked at night and body mass index among registered nurses from eighteen public hospitals in Rio de Janeiro, Brazil

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Author's response to reviews: see over
Dear Dr. Flory Mae Calumpita  
Thank you very much for the valuable comments. We are pleased that our manuscript will be improved. You will find our explanation on the comments and suggestions below, point by point. The corrections were incorporated directly into the revised version of the manuscript. All changes were highlighted in red. 

Kind regards.  
Referee #1 Dr. Paul J Nicholson  

Major compulsory revisions:  
1. The text in the results section does not make clear the level of impact by years worked. On trying to gather this information from figures there are inconsistencies between tables and graphs and lack of transparency in graphs. The tables show that duration was defined by 3 groups <1 yr; 1-9; 10+ years, yet the graph has a scale of 0/10/20/40 and no discrete data points on the graph lines.  
R: We agree with the reviewer. We included an explanation in the first paragraph of “statistical analysis”. We reviewed the graph as well and we included sugestions of Review 2.4 below.  

Minor Essential Revisions  
2. I think the term 'duration' is confusing in that it can be interpreted as 'length of shift' of 'years worked'. I think 'years worked' is a better description.  
R: Yes, we agree with the reviewer’s suggestion, and we included the term “years worked” throughout the manuscript, including the tables.  

3. The discussion is much longer than the results giving the impression that more effort has been invested in reviewing other papers than presenting the data of this study. I think there could be a better balance to emphasize the results with more detail and clarity.  
R: We reviewed the results according to this suggestion, which was also mentioned by another reviewer.  

4. What is an alcohol 'dose'? Needs defining.  
R: We included the alcohol dose definition in methods section.  

5. What good reliable evidence is there for the statement "shift work and atypical working hours has increased substantially"?  
R: we included a recent reference related this topic.  

Reviewer #2: Dr. Samps Puttonen  

Reviewer's report:  

Thank you for this interesting and well-written study. Although the study is cross-sectional and relies on self-reported data, the aim to assess cumulative effect of night shift work on
BMI is welcome. Focusing on a homogenous and large group of workers (nurses) and the use of several covariates may reduce confounding due to socioeconomic and other factors known problematic in shift work research.

**Major Compulsory Revisions**

1. Clarify how earlier shift workers were treated in the analysis. In page 11 you write (last para) “.. group consisted of night and day workers, with the latter group sub-divided by previous experience in night work”. This is rather puzzling and not in line with earlier writing in methods.

   R: We agree with the reviewer; the sentence was removed.

2. You spend quite a lot of space to discuss sex differences. As you mention the number of men is rather small (e.g. only 33 day workers). I think that the question of sex differences cannot be very reliably studied in the dataset. In addition, it appears that you have not tested whether significant sex differences exist: do the regression lines (slopes) differ significantly between men and women and do you see possible interaction of sex in predicting BMI?

   R: Analyses were stratified by sex considering that different factors favor weight gain for men and women, despite results from interaction models, that did not indicate a significant influence of sex on the association between years of work at night shift and BMI (p = 0.752). We decided to keep the stratification because the absence of statistics evidence does mean no gender difference. It’s possible that the low number of men (compared to the number of women) may have influenced our statistics results. We reinforced this argument in the discussion.

3. Diet is a relevant mediating factor between shift work and obesity. However, the lengthy discussion on eating habits/rhythms goes a somewhat beyond the results of the study. You included several possible behavioral mediators of effect in the analyses, but not eating habits. Do you think that lack of measure on diet can been as a slight limitation to the study? I suggest that you put more emphasis on earlier studies between shift work and obesity in the discussion.

   R: We agree and included this aspect in study limitations.

4. You do not make reference to the Figure 1. I received a version with two copies of the figure in the end of the document. I do not see the figure as of being very informative (see my earlier comment on low number of men and lack of testing sex differences). I think that a figure showing the regression lines for day and shift workers would be more informative.

   R: Thanks for the suggestion. We included a new figure showing the regression lines for day and night shift workers.

5. Finally, discuss the reliability of self-reported BMI.

   R. We included the discussion related to reliability and validity of self-reported BMI.
Minor essential revisions

Measures. Describe more in detail shift arrangement of the nurses in the study. Classification of working times also needs more specification “a night shift was considered working at night at least once a week or 4 times a month 12-h shift. It appears that all night shift workers did 12-hour shifts but what were the working times of day workers? Were all participants full-time workers? If a person did less than 4 nights per month was he/she coded as a day worker.

R: we described more details related shift arrangements of the nurses in the study.

Results first para. + values after the means. Are these SDs?

R: yes, we revised the text.

End of third para of Results, reference to table 3 -> table 4.

R: Thanks, we changed.

Reviewer #3: Beata Peplonska

Reviewer's report:
The manuscript reports results of a cross-sectional study among 2372 nurses (predominantly women) from 18 hospitals in Brazil. The aim of the study was to examine association between night shift work duration and BMI, by gender. The topic is of importance for public health. Since the epidemiological evidence on this issue is relatively limited and inconsistent, the results from this study would contribute to epidemiological knowledge about links between night shift work and BMI. The major problem with the study is that the main outcome and main covariate – current BMI, and BMI at age 20 yrs may have been biased. This is because current BMI was calculated based on the self reported data on weight and height. No anthropometric measurements have been performed. As reported, by authors, also BMI at age 20yrs was reported – this measure could be biased in particular, due to poor recall – participants may not know what their BMI was in the past.

Major Essential Revisions
1. Abstract-
Methods – covariates should be listed, since various models are applied these should be described and Results – second sentence may be omitted, is not relevant, instead description of comparison of the results from various models may be extended
R: The second sentence was omitted. We included results of Figure 1

2. Background
3rd paragraph – last sentence- citation 6 – the statement needs to be rephrased, since this is part of the true – van Drangelen et all found strong evidence for crude association, which become insufficient was when confounders have been controlled for
R: We agree with the reviewer. The text was corrected.

3. Methods – study population -last sentence – “Participants loss....” is not clear, should be clarified
R: The sentence was removed.

4. Term “covariables” is used through the text of the manuscript – sounds awkward – I suggest to replace it with term covariates.
R: We agree and the term was changed.

5. Methods - professional work hours is used as one of the covariates in the models – this includes hours worked at night – may introduce overadjustment
R: In Brazil, most health workers have 12 hours shifts – either at daytime or at night. So, the two variables (professional work hours and years worked at night) measure different aspects of work conditions. We didn’t include hours worked at night, but years of night work. We improved the explanations in measure section (Methods).

6. Methods – unit for alcohol consumption is not clear – what does “dose” mean?
R: We included the alcohol dose definition in methods section.

7. Covariates – categories, units should be better described
R: We revised the text. The description of covariates was included.

8. Statistical methods – 2nd sentence needs to be clarified – chi2 used for categorical and ANOVA used for categorical
R: We agree and changed the sentence. Chi2 was used for categorical and ANOVA was used for continuous variables.

9. Statistical methods - Justification for considering some of the characteristics as mediators should be provided, based on the data from literature
R: We included references from the literature.

10. Statistical methods – formal test for effect modification by gender should be applied to assess whether differences of the associations by sex are meaningful statistically
R: Please, see answer to reviewer 2.2.

11. Results – there is no need to report to 2 decimal points up to 1 suffices
R: We maintained decimal points just in the last two tables.

12. Results – the percentage of males working between 1 and 9 years is misspelled – should be 38.9 instead of 39.8
R: Yes, we corrected this mistake.

13. Discussion – 8th paragraph, starting with “Since we consider....”
The authors state that day workers were “subdivided by previous experience in shift work.” Neither methods nor results sections shows that. As I understand, total (current and former night shift workers) was categorized according to their
night shift work duration.
**R:** We agree with reviewer and the sentence was removed.

14. Discussion - 8th paragraph, 3rd sentence starting with “This procedure differs from the norm.....” Using word “norm” in the context of the sentence is disputable, and inappropriate. Sentence needs to be rewritten.
**R:** Yes, we replaced the word “norm” for “usual”

Table 1,2 values for categories by night shift duration are provided, while according to methods description “p” is determined from analysis where night shift work duration is on continuous scale. Should be consistent or if different, for clarity, explanation for how ‘p’ was determined should be provided under the table.
**R:** we explained the use of categorical and continuous variables concerning the years worked at night in the Methods section.

Figure - units should be provided
**R:** The figure was modified.