Author’s response to reviews

Title: The relative impact of smoking, alcohol use and drug use on general sickness absence. A cross-sectional study from Norwegian workplaces

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Author’s response to reviews:

Dear Editor

Below are our response to the reviewers. The response letter is also submitted as a supplementary file where the changes to the text is in red letters.

We would like to thank the reviewers for their relevant and constructive comments on our manuscript. We believe that we have addressed all your key concerns while preserving the scientific aims of the original submission. It is our opinion that the revised manuscript has been significantly improved in terms of quality and clarity thanks to your constructive feedback.

All substantive changes made to the manuscript are also included in our response, so that you can easily see how we have incorporated your suggestions.

A detailed item-by-item response to the Reviewers’ comments follows. Our replies are marked in italic, and new/revised text is included below and marked with red colour.

Reviewer(s)' Comments to Author:

REVIEWER #1:

Reviewer reports:

1. Evangelia Demou (Reviewer 1): This is an interesting study that makes use of a unique dataset containing information on both sickness absence and alcohol, smoking and drug use and this makes it an important contribution to the literature around sickness absence.
This is a cross-sectional dataset and the analysis plan makes good use of the data that are available. However, there are some points that require clarification.

- We thank Reviewer #1 for the positive comments regarding our manuscript.

2. Abstract: The statement "According to this study, daily smoking and use of medical drugs are the lifestyle habits most closely associate with sickness absence" is somewhat misleading. I would suggest the authors rephrase to correctly represent their findings.

- Abstract: We agree with the comment of reviewer #1, and have replaced “lifestyle habits” with “substance use habits”.

3. Background: the authors should give some more background/description of snus, what it is, possible health effects etc, as readers may not be familiar with this

- Background, page 3: Regarding the health effects of snus use, we consider the existing description on page 3 (line 31-45) sufficient. However, we agree with the reviewer that readers may need more information about the product itself and its prevalence in Norway. Therefore, we have added the following text on page 3, line 25: “(Swedish moist snuff, a non-combustible oral tobacco product), and page 3, line 26: “In recent years, Norwegian snus use prevalence is approximately similar to smoking prevalence, at about 20% (6)”. A reference has been added to substantiate this statement, i.e., Vedøy, T. F., & Lund, K. E. (2018). Utbredelse av snus i Norge [the prevalence of snus use in Norway]. In Lund KE (ed). Tobacco in Norway. Oslo: Norwegian Institute of Public Health.

4. Some of the 'definitions' used in the study are confusing and possibly not appropriate representations of the variables/outcome you are trying to explain. For instance, would smoking and drug (medicinal or illicit) be considered polydrug use? I would also question the definition of 'long and lasting sickness absence' for those with 3 absences and last one more that 3 days. I appreciate absences over 3 days in Norway may require a medical certificate but not knowing the actual length feels misrepresenting, considering long term sickness absence in many countries would be considered when occupational health needs to intervene.

- Page 8, line 9, Definition of polydrug use: Thank you for your comment regarding the definition of polydrug use. In the literature, the definition of polydrug use is not consistent. Concerning our paper, two of the three variables under the heading ‘polydrug use’ include three substances (i.e., smoking and two types of drug categories or drinking and two types of drug categories). The last variable includes two substances (i.e., cigarettes and alcohol). We have changed the heading from ‘polydrug use’ to ‘poly- and dual drug use’.

- Page 7, from line 1, definition of ‘long and lasting sickness absence’: Thank you for pointing this out. We agree that this could have been more clear, and have added the
following text: High-level absence group: The distribution of sickness absence is highly skewed, with a small group of employees accounting for a large proportion of the absence [29]. A high-level absence group was defined as employees reporting both a minimum of 3 sickness absences and a last sickness absence that lasted more than 3 days, i.e., around 5% (N=75) of the sample. To separate this group from the rest, a dummy variable was calculated, with categories representing both requirements fulfilled (1), vs. all others (0). Individuals who reported no sick leaves last 12 months and proceeded to not respond to the question of length, was coded as zeros. The following reference has been added: Markussen, S, Røed, K, Røgeberg, O.J, & Gaure, S. The anatomy of absenteeism. Journal of health economics, 2011: 30(2), 277-292.

- The previous terms ('polydrug use' and 'long- and- frequent sickness absence') have been replaced by the new and more precise terms ('poly- and dual drug use’ and ‘high-level absence group’) throughout the manuscript (see pages 8, 10-12).

5. Your discussion does not make mention of the limitations of having a cross sectional dataset

- Page 13, line 27, Limitations and suggestions for future research: Thank you for pointing this out. We have added the following sentence to this section: “As this is cross-sectional data, no inferences can be made regarding causality.”

6. In your discussion you note that "...daily smoking is the tobacco habit most detrimental to health for people in their pre-retirement age...". These results were not shown. In your table 3 older employees had less chance of sickness absence than younger employees. What was pre-retirement age?

- Page 12, line 37, discussion: We agree with Reviewer #1 that the term ‘pre-retirement age’ might be misleading. Our study concerns individuals currently working, i.e., employees. Thus, we have changed the term ‘pre-retirement age’ to ‘people in the workforce’.

7. Another limitation to potential under-reporting of sickness absence is recall bias as the sickness absence data are not based on objective organisational records but on self-reported data.

- Page 13, line 40, discussion: The reviewer made a good point in suggesting recall bias as potential limitation. We have adjusted the text and it now reads: “The participants may have underreported their sickness absence, either intentionally or due to recall bias”

8. The statement on the top of page 13 "a plausible explanation ....” I seem hard to believe. What the authors are describing below as an explanation for this statement is flexible working and not sickness absence. If the authors believe that participants are not correctly answering the
survey/questions pertaining to what is and what is not sickness absence, then there are inherent problems with the study and the outcome data on sickness absence.

- Page 13, from line 2: When re-reading our manuscript, we realize that other explanations are better suited to explain the lack of alcohol-absence association. We have changed the text as follows: “Seeing as positive associations previously have been reported from Norway [16, 21], the lack of a significant association of alcohol use on sickness absence is surprising, particularly with regard to sickness absence frequency. Concerning the results for longer absence spells, a possible explanation can be that alcohol use is more closely associated with short-term absences [16]. With the exception of the last absence, the current data did not include information on absence length, making separation between shorter and longer absences unattainable. This might potentially have attenuated any alcohol-absence association. An additional factor that may have influenced the results is that the current study pertain to general sickness absence, not absence ascribed explicitly to substance use.

9. In the discussion the authors state that the lack of associations between alcohol use and illegal drug use and sickness absence was surprising and probably due to weakness in the data. Could it be that the variables used are not appropriate? Is seem the variable for alcohol used is only 'weekly binge drinking' which may not skew the results (e.g. this can occur when not working)

- Response to Reviewer #1: Average weekly binge drinking is uncommon (4% of the sample) and also includes those who drink more often. The distribution of alcohol consumption is highly skewed, with about 20% consuming 80% of the alcohol. Even though a high proportion of the drinking episodes is likely to occur on weekends, weekly binge drinkers must be considered an at-risk group with a high likelihood of drinking also on weekdays. Although we do not have a complete Alcohol Use Disorders Identification Test (AUDIT), the two of the three measurements we do have (drinking frequency [AUDIT 1] and binge drinking frequency [AUDIT 3]) would both place these respondents in the second highest risk group or higher. Other reports using the same data shows that there is a high correlation between self-reported alcohol use last 24 hours and samples from saliva (Edvardsen et al., 2015: reference number 19). However, as sickness absence refers to last 12 months, we chose to use binge drinking frequency past 12 months.

REVIEWER #2:

1. Tuula Oksanen (Reviewer 2): Dear authors, this is a study from Norway that examines the association of smoking (incl snus), alcohol and drug (medications and illegal drugs) use on general sickness absence using self-reported retrospective data on sickness absence.

The study questions and the reviewed literature seem to be Norway-centered, so this paper suits best to be published in a Norwegian medical journal. My other comments are below.
• We thank Reviewer #2 for the comments regarding our manuscript.

2. I am missing the novelty and advancing the science here. The associations of smoking and alcohol use with sickness absence are well-established from prospective cohort studies.

• Introduction, page 4, line 54: Although there exists some studies on the individual effects of alcohol use and smoking on sickness absence, very few have examined the relative impact of alcohol use, smoking, snus use, medical drug use and illegal drug use on general sickness absence. However, we agree that we may have failed to make the readers aware of this distinction between previous studies and the current study. Therefore, we have added the following text: While a recent study analyzed the relationship between obesity, low physical activity, smoking and alcohol consumption, and diagnosis-specific sickness absence [27], we were not able to identify any studies examining the relative effect of several substances on general sickness absence.

• We have added the reference no. 27: Virtanen, M., Ervasti, J., Head, J. Lifestyle factors and risk of sickness absence from work: a multicohort study. The Lancet Public Health, 2018: 3(11), e545-e554. to the reference list.

3. The literature review is lacking the main papers in the field and the recent advancements, such as Virtanen et al. Lifestyle factors and risk of sickness absence from work: a multicohort study. Lancet Public Health 2018.

• We thank the reviewer for the suggested reference, see response to comment no. 2.

4. Drug use is not commonly defined as a lifestyle issue. Of course, drugs are related to illnesses.

• Page 3, line 14: Lifestyle has been defined as ‘the way in which a person lives’. It is therefore our opinion that it is reasonable to include drug use within this umbrella term. However, we have replaced “lifestyle habits” with “substance use habits” in the Abstract.

5. Employees in Norway - who are they? Where do they work? Sickness absence rates differ a lot between occupations and branches of industry.

• Page 3, line 3: Although the larger context might be of interest to some readers, it is our opinion that the design (cross-sectional data from selected industries) and scope of this study (effects of substance use on sickness absence) makes it less relevant.

6. Critical consideration about retrospective use of daily sickness absence from self-reports is needed.
• Page 13, line 40, discussion: We have adjusted the text and it now reads: “The participants may have underreported their sickness absence, either intentionally or due to recall bias”

7. You should not use causal language such as impact.

• Thank you for making this point. We have gone through the manuscript and have removed terms that imply causality when describing the results from our study.