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**ARTICLE DETAILS**

<table>
<thead>
<tr>
<th><strong>TITLE (PROVISIONAL)</strong></th>
<th>Age differences in the associations between sick leave and aspects of health, psychosocial workload and family life: A cross-sectional study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AUTHORS</strong></td>
<td>Donders, Nathalie; Bos, Judith; van der Velden, Koos; van der Gulden, Joost</td>
</tr>
</tbody>
</table>

**VERSION 1 - REVIEW**

| **REVIEWER** | Tuula Oksanen, MD, PhD, Team Leader in the Research Unit for Psychosocial Factors in the Finnish Institute of Occupational Health, Finland.  
No competing interests. |
<table>
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</thead>
<tbody>
<tr>
<td><strong>REVIEW RETURNED</strong></td>
<td>21-Mar-2012</td>
</tr>
</tbody>
</table>

**THE STUDY**

The rationale for the study is not clear; why would there be an age-interaction in the associations studied. No hypothesis is given nor any references to literature to back up this. The choosing of the explanatory variables reflects a data fishing experience (data dredging): no literature or anything is given why a huge number of the variables were chosen. Additionally, most of them are not adequately described how they were measured and neither clear whether there was an age-interaction. This confusion has led that it is very difficult to understand what is the main result of this study.

The main result of the study is not reported in the abstract (no exact result is given) or in key messages nor in the first para of discussion. Furthermore, the response rate is <50%, and the generalizability of the results is questionable (only employees in a university). The validity of the outcome measure can be questioned. Not only because it is based on self-report but also because it is derived from open answers and categorized (supposedly a lot of variation and missing data). Actually, by dichotomizing both exposure and outcome variables you lose the variation in the data.

**GENERAL COMMENTS**

Provide a rationale for the age-interaction in the associations based on literature; examine a given hypotheses. Choose exposure variables according to literature. Be clear which have age-interaction. The whole paper should be more concise and shortened in length. Limitations of the study need to be addressed: low response rate, unclear generalizability, validity of the outcome measure questioned. what do you mean by age-related means to reduce sickness absence?

Minor issues: give examples of occupational groups. In table 2; when a scale ranges from 1-5, how can a mean be less than 0.5? Minor issue, but of importance: you do not totally comply with the recommendations of the journal.
GENERAL COMMENTS

Although this study is limited by its cross-sectional design and non-representativeness of the study sample, it offers a valuable contribution to the literature. The paper is well written and results and conclusions are clearly presented.

Some minor comments:
- Although the authors pay attention to the differentiation of sickness absence duration and frequency, some important aspects relating to this issue are missing. I recommend to consider differences between both outcomes in terms of voluntary vs. involuntary behavior, as has been outlined in Derycke H, Vlerick P, Van de Ven B, Rots I, Clays E, The Impact of Effort–Reward Imbalance and Learning Motivation on Teachers' Sickness Absence, Stress and Health; published online first on 15 FEB 2012 (DOI: 10.1002/smi.2416)
- Second paragraph of the discussion: I recommend avoiding references to table numbers and p-values in the discussion section.
- In the discussion section, the authors suggest that age differences in health are not important after controlling for sex. However, in order to make a sound statement about this issue, one should investigate age differences in health separately in men and women.

VERSION 1 – AUTHOR RESPONSE

Responses of the Authors on the Reviewer(s)' Comments:

We thank the reviewers for their valuable remarks. The remarks are numbered and below we respond to each of the remarks. The changes are also marked in the manuscript.

Reviewer: Els Clays, assistant professor Ghent University Department of Public Health University Hospital - Block A (2nd fl.) De Pintelaan 185, B-9000 Ghent, Belgium

Although this study is limited by its cross-sectional design and non-representativeness of the study sample, it offers a valuable contribution to the literature. The paper is well written and results and conclusions are clearly presented.

Some minor comments:
1. Although the authors pay attention to the differentiation of sickness absence duration and frequency, some important aspects relating to this issue are missing. I recommend to consider differences between both outcomes in terms of voluntary vs. involuntary behavior, as has been outlined in Derycke H, Vlerick P, Van de Ven B, Rots I, Clays E, The Impact of Effort–Reward Imbalance and Learning Motivation on Teachers' Sickness Absence, Stress and Health; published online first on 15 FEB 2012 (DOI: 10.1002/smi.2416)

We shortened the paragraph but took over this recommendation and added the following sentence in the introduction:
"Moreover, frequent sick leave may have to do with motivational aspects or unwillingness to work, whereas sick leave duration can be considered as an indicator of involuntary absenteeism (inability to work). [17]"
2. Second paragraph of the discussion: I recommend avoiding references to table numbers and p-values in the discussion section.

Although we believe that it might be helpful to remind the reader where the discussed results can be found, we took over this suggestion. This is not marked in the new version of the manuscript.

3. In the discussion section, the authors suggest that age differences in health are not important after controlling for sex. However, in order to make a sound statement about this issue, one should investigate age differences in health separately in men and women.

We totally agree with this remark. However, the power of the study was not sufficient to investigate the age differences in health separately in men and women. We changed our sentence according to your suggestion:

"This indicates that it is important to do separate analyses for men and women to obtain a good understanding about age differences. However, the power of our study was not sufficient to perform this."

Reviewer: Tuula Oksanen, MD, PhD, Team Leader in the Research Unit for Psychosocial Factors in the Finnish Institute of Occupational Health, Finland.

No competing interests.

1. The rationale for the study is not clear; why would there be an age-interaction in the associations studied. No hypothesis is given nor any references to literature to back up this.

There is not much research done on age differences in determinants of sick leave. Therefore it is difficult to include references to literature to back up any hypothesis. We made adjustments in the second paragraph of the introduction (see below), so hopefully the rational for the study is now clearer.

"Due to the tight labour market, it is important to keep employees of all ages well-motivated and healthy on the job. Although some studies included factors from various domains to explain sick leave,[1] to date, it is unclear whether there are differences between age groups in the relationships between psychosocial workload, family-related factors, and health and sick leave. Since dissimilarities between workers from different age groups are present, it is quite possible that determinants of sick leave vary between different age groups. For example, the presence of chronic disease is associated with increased sick leave [2] and is more prevalent in older people.[13] Perhaps the presence of a chronic disease is an important determinant for sick leave only in older employees. Work-family balance is experienced differently between age groups.[14] and is found to be associated with sick leave. [10] Therefore, work-family interference or characteristics pertaining to domestic tasks and childcare might be more strongly associated with sick leave in younger employees."

2. The choosing of the explanatory variables reflects a data fishing experience (data dredging): no literature or anything is given why a huge number of the variables were chosen. Additionally, most of them are not adequately described how they were measured and neither clear whether there was an age-interaction.

This confusion has led that it is very difficult to understand what is the main result of this study.

Unfortunately, Reference Manager was not working well and because of that many references were
not correct in the previous version of our manuscript. This may have led to misunderstanding regarding the rationale to include the mentioned variables. Indeed many variables were included, but as mentioned in the introduction: sick leave is associated with health, work-related characteristics, family-related characteristics and work-family interference. We are able to explain why these variables were included in the questionnaire, but it goes too far to do this in this manuscript. In a thesis (available at: http://repository.ubn.ru.nl/bitstream/2066/27030/1/27030.pdf) more details about the questionnaire can be found. This thesis was one of the many references that was positioned incorrectly in the previous manuscript. We did not know which independent variables would interact with age. In fact, that was the main motive to conduct this study. Therefore we investigated that for all independent variables. Only a few interaction effects were found. This is indicated at the bottoms of Tables 4 and 5 by means of the significance level of the interaction terms. The point about confusion and difficulty in understanding the main result will be addressed in the next point.

3. The main result of the study is not reported in the abstract (no exact result is given) or in key messages nor in the first para of discussion.

We agree with the reviewer that no exact result is given in the abstract as we summarized those results with the sentence “Age moderates several associations between work- and family-related characteristics and FSL and PSL”. That sentence has been changed as follows: "Age moderates the associations between career opportunities, partner’s contribution in domestic tasks and gender, and FSL. Job security and pay, supervisory support, challenging work and being breadwinner have different associations with PSL.” It is true that the specific associations that are moderated by age are not mentioned in the first paragraph of the discussion. However, they are described extensively somewhere else in the discussion. The first part of the results section in the abstract regarded a research question that was not mentioned. We added this question in the section ‘primary outcomes’ to give more structure to the abstract.

The third key message is omitted and the second key message has been changed into: "Age is important to take into consideration when investigating the associations between psychosocial workload, family-related characteristics and frequent and prolonged sick leave.”

4. Furthermore, the response rate is <50%, and the generalizability of the results is questionable (only employees in a university).

See our responses to these remarks at point 9.

5. The validity of the outcome measure can be questioned. Not only because it is based on self-report but also because it is derived from open answers and categorized (supposedly a lot of variation and missing data). Actually, by dichotomizing both exposure and outcome variables you loose the variation in the data.

In the discussion we already elaborated on the self-report of sick leave. Moreover, the university’s sick leave registration might not be a much more reliable source than self-reports: University employees report their sick leave to the secretary of the department, but we have indications that not all (oral) reports will be included the official registry. Moreover, Flach et al. (Scand J Public Health 2008;36:713-719) stated: “Members of the scientific staff often do not report their short spells of sick-
leave. Their level of autonomy and dedication make them compensate for short periods of sickness by working more hours after they have recovered”.

But the most important reason for not using the university’s registration is that we did not get permission to do so as the Works Council considered the privacy of the respondents as a very important issue.

It is true that we lost variation in the data due to dichotomizing: the more precise accurate the findings, the better the outcome can be explained. Our outcomes were highly skewed. Streiner (2002) stated that in case of highly skewed outcomes dichotomizing is a solution. We added this reference in the discussion. There are other studies in which the independent variables and the outcomes were categorized, e.g. the study the other reviewer is referring to in her comments.

6. Provide a rationale for the age-interaction in the associations based on literature; examine a given hypotheses.

See our comments and adjustments at remark 1.

7. Choose exposure variables according to literature. Be clear which have age-interaction.

See remark 2: We studied the literature extensively, but in our opinion it is not possible to include those findings in this manuscript. We refer to the previously mentioned thesis for more information on the exposure variables. We investigatèd age interactions in the multivariable analyses. We presented the statistically significant findings in Tables 4 and 5.

8. The whole paper should be more concise and shortened in length.

In our opinion this contradicts the remarks from the other reviewer. We are however receptive of shortening if necessary when we receive more pointed suggestions.

9. Limitations of the study need to be addressed: low response rate, unclear generalizability, validity of the outcome measure questioned.

In our opinion we already addressed the low response rate in the discussion. Of course a higher response rate is desirable, but our response of 49.1% is very well comparable to other studies in this research field.

We adjusted the paragraph about the generalizability as follows:

“Our population involved university employees. Although a quarter of the population had only low or middle level education, most of the respondents were knowledge workers. Knowledge workers cover a rapidly growing occupational group in many modern economies. Our results might be relevant for e.g. other research institutes or financial organizations but may be less applicable to blue collar occupational groups, as they may report more sick leave. Future studies should include various occupations.”

The validity of the outcome is addressed at remark 5.

10. What do you mean by age-related means to reduce sickness absence?

With age-related means (or actually we used the word measures) we mean the whole of interventions to maintain (or improve) the workability of employees such as adjustments in tasks or in working
hours, different discussion topics during annual progress interviews, taking the private situation of employees into consideration or simply offer a genuine listening ear every now and then. We have added a sentence in the section “Conclusions”:

"Moreover, adjustments in tasks or in working hours, different discussion topics during annual progress interviews, taking the private situation of employees into consideration or simply offer a genuine listening ear every now and then may be efficacious to maintain or improve the workability of employees."

11. Minor issues:
   o give examples of occupational groups.

Lower-educated non-scientific personnel are e.g. secretaries, catering employees and lower technicians. Higher-educated non-scientific personnel contains HMR advisors, policy makers, higher technicians. Scientific personnel refers to PhD Students, lecturers, (senior) researchers and professors.

We added some information in Table 1.

   o In table 2; when a scale ranges from 1-5, how can a mean be less than 0.5?

We thank the reviewer for this remark. Due to dichotomizing the variables 'conflict with supervisor' and 'conflict with colleagues', the range of the scales was no longer correct. We adjusted this. Now these variables can be found in Table 1 (in red font) where the nominal and ordinal variables are presented per age group. Table 2 presents the means of scales.

12. Minor issue, but of importance: you do not totally comply with the recommendations of the journal.

We are not totally sure what this remark implies, but it might be that the reviewer is addressing the word count? We contacted the journal and we learnt that the limit is not incredibly strict. Due to the adjustments based on the comments by the reviewers we had to add some sentences. To compensate for this, we deleted some other sentences especially in the introduction and in the section 'methodological considerations'.

Age differences in the associations between sick leave and aspects of health, psychosocial workload and family life: a cross-sectional study

Nathalie C G M Donders, Judith T Bos, Koos van der Velden and Joost W J van der Gulden

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