Author's response to reviews

Title: Determinants for return to work among sickness certified patients in general practice

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Author's response to reviews: see over
Dear Sir,

Thank you for yours and the reviewers’ comments on the manuscript. These have now been carefully considered and the following actions have been taken.

**Editor**
1. **Comment:** Figures: Please ensure that the order in which your figures are cited is the same as the order in which they are provided. Every figure must be cited in the text, using Arabic numerals. Please do not use ranges when listing figures.
   **Response:** Done.

**Reviewer #1**

**Major compulsory revisions**

1. **Comment:** Words like effects of, affected by, influential, influence, explain, facilitate, must be used carefully when put in a setting of factors that may be associated with future events.
   **Response:** In a cross-sectional design your comment would be well taken. However, this study has a longitudinally prospective design, which provides a timing perspective regarding exposure-outcome allowing conclusions on exposure-outcome effects. Moreover, measures were taken to minimise the risk of erroneous conclusions due to confounding. For this reason terms mentioned in the comment may very well be used according to scientific, statistical, and epidemiologic standards. The term explanation is often used even in cross-sectional studies where no time dimension is available. One of the authors of this manuscript is a biostatistician and one is a former professor of epidemiology and they have seen to it that we have been careful in this respect and overuse of terms has been avoided.

2. **Comment:** Do aims and conclusions “fit” – in abstract and in main paper?
   **Response:** The aims and conclusions have been harmonised in the abstract and main paper, even though the conclusion of the abstract is a short version of that in the main paper (page 5, paragraph 3, and page 14, paragraph 2).

3. **Comment:** In analyses: Rearrange groups of diagnoses when observations are less than 7? (Table 1 and 2).
   **Response:** We prefer to keep the diagnosis list as it is for three reasons. First, some readers may have an interest also in infrequent diagnoses. Second, using 7, or 6, or 8 as cut-off level implies an element of arbitrariness, which we would like to avoid. Third, in the analyses we used the variable ‘diagnosis’ with the 16 responses, classified as a discrete variable, allowing each diagnosis to be evaluated. The interpretation of results based on amalgamated diagnostic groups may be difficult and hazardous, since variables with the same type of effect, for instance facilitating or delaying return to work, might reinforce each others effects to significance, even though none is significant by itself. Vice versa, grouping of independently significant variables going in different directions might cause a non-significant result.

**Minor compulsory revisions**

3. **Comment:** Use sickness certified patients, or patients certified sick? I prefer the latter.
   **Response:** We prefer to use “sickness certified patients”, in accordance with the suggested wording in the title (see comment 5).
4. **Comment:** Discuss how former sick-leave may be an indicator of a chronic health problem, or deteriorating health.  
**Response:** The text has been changed in accordance with the comment (page 12, paragraph 2).  

5. **Comment:** Title: Effects of potential determinants for return to work among sickness certified patients in general practice. Better: Determinants for return to work among sickness certified patients in general practice.  
**Response:** The title has been changed in accordance with the comment.  

6. **Comment:** Abstract: The aim of this study was to analyse possible determinants (of what?) and their relative impacts on return to work. Half of the study population returned to work within 14 days after baseline, and after three years (only) 15 subjects were still on sick leave. Return to work was positively or negatively affected by (affected by?) a number of variables easily accessible in the GP’s office. Track record data in the form of previous sick leave was the most influential variable.  
**Response:** The wording of the aim has been changed (page 2, paragraph 1). See also the response to comment 1.  

7. **Comment:** Background: Long-term sickness absence is one of the main risk factors (for ending up with a disability pension. There is no generally established definition of the condition (of what condition?), but in Swedish official…. Unclear: Long-term sickness absence may also be expressed in terms of return to work.  
**Response:** The condition refers to long-term sickness absence. The text has been clarified (page 3, paragraph 2). The relation of ‘long-term sickness absence’ and ‘return to work’ is explained in the text (page 3, paragraph 2).  

8. **Comment:** Reformulate: The purpose of this study was to arrive at a simple model based on previously identified long-term sickness absence determinants by which return to work might be estimated (predicted?) early in the sick leave process in a cohort of sickness-certified patients followed for three years. (Better use the abstract’s: The aim of this study was to analyse possible determinants (of what?) and their relative impacts on return to work,)?  
**Response:** The purpose was not only to ‘analyse possible determinant and their relative impact …’, but rather to identify these variables and to order them according to their impact on outcome, that is to pinpoint the most important ones in order to present a simple model by which the risk of long-term sick leave may be predicted. (The prediction instrument will appear in a coming paper)  

9. **Comment:** Page 4…. capacity, and a number of other items (what items). Leave out?: … health care centres(, at the time of the study the vast majority,.) or at subcontracted private…  
**Response:** The text is written not only for Scandinavians but also for readers in countries with other types of health care systems. Even within the Nordic countries there are large differences. To readers from other parts of Europe and from America or Australia this paper might be completely impossible to interpret, unless a short description of the social insurance system is given. Furthermore, the Swedish social insurance has been changed dramatically and continuously during the last 5-6 years with the present Swedish government, so that even Swedish readers might be helped by knowing what the system looked like at the time of the study.
10. **Comment:** Page 5: Language: During the recruitment period copies of all sickness certificates, unclear: whether new or continuation, (better?: new or prolongation certificates) issued at the primary health care centre, were obtained.

**Response:** The text has been changed in accordance with the comment (page 5, paragraph 5).

11. **Comment:** Page 6: Hard to grasp the essence here: …or if the initial sick spell was followed by a sick leave free interval of more than 7 days, and that interval was longer than the next sick spell. If so, return to work was presumed to occur on the first non-sick leave day. If the initial sick spell or the sick leave free interval did not satisfy the return to work criteria, these were tested on the next sick spell and its sick leave free interval, etcetera, until return to work was obtained or end of follow up was reached.

**Response:** The text has been clarified (page 7, paragraph 2).

12. **Comment:** Page 8: Slightly more than half the subjects were women, mean and median age (were) was? 39 years,… Use in abstract?: At end of follow-up 6 (1.3%) men and 9 (1.9%) women were still on sick leave. Better to use association?: Annual salary had no significant (influence) association.

**Response:** The abstract text has been changed in accordance with the comment (page 2, paragraph 2). Regarding use of terms see comments 1 and 6.

13. **Comment:** Page 9: In multivariate analys(is)es previous sick leave, age,…

**Response:** The text has been changed across the manuscript in accordance with the comment.

14. **Comment:** Page 10: Discuss more why age did not seam to have a significant effect concerning return to work. ?? (Age is significant in Table 2, and is “graphed” in Figure 1 A)) Explain/unclear: The 10% unexplained return to work proportion indicates that no major determinant was overlooked.

**Response:** Age had a significant effect, even though it was marginal, as indicated by Wald’s chi-square (6.9 for age as compared with >50 for previous sick leave, psychiatric disease and musculoskeletal disease). A note on the 10% unexplained return to work has been inserted in the Discussion section (page 12, paragraph 3).

15. **Comment:** Page 11: Explain novel here: In this study a number of other diagnoses proved to be significant determinants, some facilitating, others delaying return to work, a novel finding.

**Response:** The ‘novel’ text has been expanded (page 12, paragraph 1).

16. **Comment:** Page 12. Explain how: The implications of the result of the present study might be that the existing difficulties in assessing the possibilities for return to work are relatively easily overcome.

**Response:** The text has been revised (page 13, paragraph 5).

17. **Comment:** Conclusions (in accordance with aims and abstract??): Reformulate?: A number of variables (facilitated or delayed) were associated with return to work. Together they explained 88-90% of the return to work variation during follow-up. However, the two most important determinants together explained approximately 85% of the return to work. It might therefore be possible to (relatively simply) assess the possibilities of return to work based on data available at the time of sick certification, thereby avoiding unexpected (unexpected?) long-term sickness absence.
Response: The text has been changed in accordance with the comment (page 14, paragraph 2).

18. **Comment:** Legends for figure 1. Explain groups of age. 60 =? (56-65? 56-95?) Explain groups of days. 180 =? (91 – 180+??)

**Response:** We did not group subjects into age groups, but rather used the analysis model to compute the effects at age 20, 30, etc. on return to work adjusting for the effects of all other variables in the model. The same was done for the effect of previous sick leave and diagnoses. Grouping of age and previous sick leave can be done in proportional hazards regression but causes (sometimes severe) loss of statistical power, and was therefore avoided. The text in the Statistical methods section on the modelling and processing of the figures has been clarified (page 8, paragraph 3).

19. **Comment:** Figure 1 C and D. just use: Psychiatric diagnoses / No psychiatric diagnoses Respiratory diagnoses / No respiratory diagnoses

**Response:** For a Scandinavian audience psychiatric diagnosis might be OK, but our English language consultant strongly indicates that psychiatric disease diagnosis is the correct term when approaching a British or an American audience.

20. **Comment:** Delete Figure 1 E?

**Response:** There is no Figure 1E.

**Reviewer #2**

**Major Compulsory Revisions:**

1. **Comment:** The use of terms like "effects" and "determinants" should be avoided. Terms like "predictors" and "associations" are more adequate. (Revise title and search the text for these terms).

**Response:** See Reviewer #1, comment 1.

2. **Comment:** "Disability pension" (DP) should not be addressed in the Abstract or the Background section. The paper is about RTW and there are other pathways out of the labour market besides DP. The correct addressing of the problem would be that "prolonged sickness absence increases the risk of permanent exit out of the labour market". This and the statement in the Background section, second paragraph "Early detection of patients at risk for long-term sickness absence is essential" should be backed up with references.

**Response:** The text has been revised (page 2, paragraph 1 and page 3, paragraphs 2-3).

3. **Comment:** Explained variance (in percent) in the kind of regression analysis conducted is not as straightforward as is the R2-value in linear regression. To my knowledge the use of such measures are in open debate and should not be used. The size of the hazard ratios should suffice in determining the relative importance of different factors. Should the authors maintain this information in the paper the rationale for this should be clearly stated together with proper references.

**Response:** The HR cannot be used to assess impact of a determinant on the outcome variable, since the ratio depends on how the variable is graded. HR is a measure of effect, not of impact. If for instance HR for age graded in years is 5% (that is 0.95 or 1.05), then HR for age graded in decades is ten times larger, 50% (0.50 or 1.50). As a matter of fact age graded in years has always a HR in the range 0.90-1.10, irrespective of the hypothesis, which is used by biostatisticians to check data quality. If the age HR is outside this range there is a data quality
problem. The reviewer is right regarding the discussion on measures of explanation. However, the measure under debate is the R2-value, because it is heavily biased by random variation. As a result 100% cannot be explained, since random variation may account for 30-50% of the variance variation. In that situation R2 should be avoided. The measures recommended in logistic regression are the c index obtained from the ROC curve statistics and degree of concordance (agreement between observed values and values obtained from the analysis model). We used the c index, in accordance with state-of-the-art.

4. **Comment:** The Methods section needs revision. The section about the PIN seems unnecessary and if retained it should incorporated with the rest of the methods section.

**Response:** We disagree that the section on PIN is unnecessary. In Scandinavia PIN is well-known and broadly used, but in other parts of Europe and in America record linkage is usually based on names only, possibly also addresses, but since Americans move on average every five years this type of record linkage is uncertain. PIN codes exist also in other countries but PIN code use is usually so restricted by law that they cannot be used scientifically. For this reason the PIN code description is vital for the understanding of the record linkage procedure used. However, parts of the ‘Requirements for sickness compensation’ section have been moved to the Introduction section (page 4, paragraph 3).

5. **Comment:** The text on the Swedish sickness insurance system should be removed from the Methods section and incorporated in the Background section. Hopefully this could give the authors a better chance of a clear statement on the research issue.

**Response:** Done (page 5, paragraph 2).

6. **Comment:** "Sickness compensation" refers to Disability pension in the Swedish system. The correct term is sickness (cash) benefit and rehabilitation (cash) benefit. Please correct throughout the paper.

**Response:** Sickness (cash) benefit and rehabilitation (cash) benefit appears to be translations of the Swedish terms. However, for an international audience they are probably unintelligible. For this reason we keep the English term disability pension.

7. **Comment:** "...sickness compensation for income loss in the case of reduced work capacity, ..." The sentence should be supplemented with "...due to injury or disease."

**Response:** Done (page 4, paragraph 2).

8. **Comment:** The definition of RTW should be discussed in the Discussion section and addressed as a shortcoming if RTW is the intended outcome. Conclusion or termination of a period with sickness benefit is not the same as going back to work, this needs to be discussed (see for instance different health implications of RTW and simply moving off benefits in: Waddell, G., & Burton, A. K. (2006). Is work good for your health and well-being? Norwich: The Stationery Office.).

**Response:** A note on RTW has been inserted in the Discussion section (page 11, paragraph 2).

9. **Comment:** The variable sex has to be more thoroughly assessed and discussed since the differences in long-term sick leave between women and men are well known. The variable sex being insignificant is not the same thing as there being no gender differences. I would prefer a stratified analysis by sex possibly revealing interesting differences. If there is no differences, that would be an interesting finding as well which also needs to be discussed. A relevant reference is: Messing, K., Punnett, L., Bond, M., Alexanderson, K., Pyle, J., Zahm, S., et al. (2003). Be the fairest of them all: challenges and recommendations for the treatment
of gender in occupational health research.

**Response:** A note on this issue has been added to the Statistical analysis and Discussion sections (page 8, paragraph 2 and page 11, paragraph 3).

10. **Comment:** For some of the variables the n (use n not N in table 1) is very small leading to loss of power. A straightforward way to address this is to create broader categories. I strongly recommend this for Diagnoses, which could be categorised in four groups musculoskeletal/psychiatric/respiratory/other physical diseases. (No tumours?)

**Response:** Broader categories do not improve statistical power. See Reviewer #1, comment 3. Uppercase N has been changed to lowercase n.

**Minor Essential Revisions:**

11. **Comment:** In the Abstract/Methods please provide the year the study was conducted and information about the regression technique applied.

**Response:** Done (page 2, paragraphs 2 and 3).

12. **Comment:** In the Abstract/Results section please do not give information on negative findings unless they contradict previous research.

**Response:** The information was provided for the sake of completeness (in a web based Journal space is not a limiting factor).

13. **Comment:** In the Background section the research problem should be stated more clearly (see above regarding DP!) and the scientific contribution of the paper should be addressed.

**Response:** The text has been revised. See also Reviewer #1 comments 2 and 15.

14. **Comment:** In the Background section, fourth sentence on definition of "long-term" the reference is incorrect. To my knowledge this has only been addressed in my own dissertation on Long-term sickness absence (Lidwall 2010). Still different time-limits have been used in the sickness insurance legislation. If these are referred to please provide the proper reference.

**Response:** The text has been revised (page 3, paragraph 2).

15. **Comment:** The text on the Swedish sickness insurance system needs some references. The comparison between Swedish county councils and US states is irrelevant and to my knowledge incorrect.

**Response:** References are limited to Government and Parliament Acts, and to texts from the National Social Insurance Board, which are not very easily available for readers outside Sweden. Moreover, they are usually in the Swedish language, and are not peer reviewed. The comparison between Swedish counties and the US states concerns health care, not the national social insurance system. One of us has been working in American health care and is very familiar with similarities and differences between Sweden and the USA. However, to avoid confusion the comparison with the US states has been taken away.

16. **Comment:** the Heading "Setting" is unnecessary.

**Response:** It might be so but we prefer to keep subheadings it to improve readability.

17. **Comment:** in "Study population" third sentence the concept of "rehabilitation" should be explained and the rationale for exclusion should be declared.

**Response:** Rehabilitation was defined as being included in a rehabilitation programme. The text has been revised accordingly (page 6, paragraph 1).
18. **Comment:** The regression technique applied use to be referred to as "cox proportional hazard regression" and I assume the PROC PHREG in SAS was used. The SAS PROC used could be provided in the Methods section.

**Response:** Done (page 7-8).

19. **Comment:** In the Results section the provision of both bivariate and multivariate results seem inappropriate. To my knowledge the bivariate analysis is conducted in order to assess which variables qualify for a multivariate analysis. If no bivariate association is found the variable should be omitted. Another rationale is the correlation between variables giving spurious relationships, with marital status and age being the most obvious. With the current aim of the study I would prefer a more stepwise introduction of variables with the same character such as demographic variables, health variables and demographic variables. Changes in parameter values between steps could provide valuable information and variables could be omitted if there is a lack of (interpretable) association.

**Response:** First of all, variables were selected on the basis that they intuitively might be associated with outcome, which eliminates the problem of interpretability. Second, if bivariate result had not been presented a number of readers would have wondered why we did not take variable x into account. The presentation of bivariate results served the purpose of presenting the variables entered in the analyses, and their bivariate relationship to outcome. The same variables were entered in the multivariate analyses. No selection was done since it is not unusual that non-significant variables in bivariate analyses prove to be significant in multivariate analyses due to confounding and variance reduction (the opposite of confounding). We did not use stepwise entrance or backward elimination of variables, first because the variables were rather few, second because we wanted a fair competition between variables from different areas.

20. **Comment:** In the Discussion section the discussion of the results in relation to previous findings should be moved before strengths/limitations and after summing up the findings.

**Response:** in the last 200 published papers we have done the reverse, first a short summary, then strengths and limitations, then results discussions, and the conclusions. We now try the reviewer’s model (page 13, paragraph 4).

21. **Comment:** To my knowledge stakeholders in sickness insurance seldom lack information regarding factors influencing RTW or ability to perform in the labour market. Rather underutilization of information is the problem. Do the authors have any comments on such organizational shortcomings?

**Response:** A note on this issue has been added to the Discussion section (page 14, paragraph 1).

On behalf of the author group

Anna-Sophia von Celsing