Author's response to reviews

Title: Health problems account for a small part of the association between socioeconomic status and disability pension award. Results from the Hordaland Health Study.

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Version: 3 Date: 25 November 2010

Author's response to reviews: see over
Dear Scott Edmunds,  
Oslo, October 2010

Re: Resubmission of “Health problems account for a small part of the association between socioeconomic status and disability pension award. Results from the Hordaland Health Study”.

Thank you for the thorough reviews of our paper, and for giving us the opportunity to resubmit a revised manuscript. We found the reviewers’ comments very helpful, and have now uploaded the revised version of the paper with major changes marked with comments. We believe the manuscript is much improved on the basis of these revisions.

In this cover letter we will address the reviewers’ comments point-by-point.

We hope you will find the revised version of the manuscript satisfactory and are looking forward to your response.

Best regards

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Reviewer 1:

Major compulsory revisions:

1. If the requirement to be awarded a disability pension is that “your earning capacity must be reduced due to permanent illness, injury or impairment”, what makes you ‘a priori’ suggest that it is not the case when explaining socioeconomic differences in work disability? This should be clearly stated in the introduction.

To test this assumption is the aim of this study. It is inspired both by clinical observations and previous findings (i.e. Wikman et al JECH 2005, Øverland BMC Public Health 2006, OECD report 2003, chart 3.9 page 43). These studies have challenged the view that disability benefits are only awarded according to the criteria in the law. We have expanded on this issue in the introduction [under “Background”, Page 2, paragraph 2, line 4].

2. The time range assessing disability pension is not clear; is it 1992-1997/99? I wonder whether it is too long to the assessment of health as an explanatory factor for SES differences in disability since in some cases disability may have been granted in 1992 and health assessment is seven years later, 1999.

We apologize for being unclear on this. The time range assessing disability pension is from 1992 until the time of participation in HUSK, which will vary between 1997-1999 for the various participants. This has now been clarified in the methods section. The problem with the time lapse between the collection of health data and the registration of disability pension (mean time 2.6 years) is discussed under “Limitations” in the “Discussion” chapter [page 9, paragraph 2]. During the time from disability pension award to health assessment, some health problems might have diminished, and this would reduce the apparent effect of health on the connection between SES and disability pension. Also, psychological symptoms triggered by workplace problems would likely be relieved when on disability pension. However, some of our measures, like those of somatic diagnoses, are probably rather stable over time. Although the scientific documentation is ambiguous in this area, some studies indicate that health problems may actually increase after disability pension [35, 36], whereas a previous study based on the HUSK data indicated improvement in global health after a disability pension had been granted [37]. To the extent that a disability pension award increased or produced health problems we may have overestimated the proportion of the socioeconomic gradient in disability pension award that can be attributed to health. Finally, if health problems actually did diminish after disability pensioning, the result of our study
would at least indicate that the *sustainment* of some disability pensions can not be justified on the argument of health.

3. About the disability pension: were all awarded pensions granted permanently? 
*In many Scandinavian countries a substantial part of disability pensions are granted on a fixed-term basis. Therefore the status may have changed in some cases. How would this affect your results?*

In this study, we have included only awards of permanent disability pension. Temporary disability benefits was introduced in Norway in 1992, but has not been widely in use. We have clarified this issue in the methods section [Outcome: Disability pension, page 4, paragraph 5].

4. Results: it would be important to see whether there were socioeconomic differences in health indicators and whether health indicators were associated with disability pension. That is crucial because in order to test a mediator, associations should be found with these respects.

We agree, and we have included description of bivariate analyses on this in the methods and results section [Page 7, paragraph 4 + paragraph 4].

In bivariate analyses, all examined health problems were increased in those receiving DP (all p<0.01). All examined health problems were also associated with educational level in directions as expected (all p<0.02), the exceptions being the two variables on number of somatic diagnoses and number of medicated diagnoses, whose associations were not statistically significant.

5. Discussion: I think you should also discuss the possibility that people with low socioeconomic status have more serious health problems which was not exactly examined in your study since you measured number rather than severity of symptoms/diseases

We aimed as much as possible to apply continuous variables for the various health measures to allow for measurement of severity of symptoms, syndromes and disorders. For some conditions we applied dichotomous variables (fibromyalgia, overweight, site specific pain). We have included a discussion of this issue as a limitation in the discussion section [Page 9, paragraph 4, line 9].

*Minor essential revisions:*
6. Introduction, second paragraph: could you please define what is meant by “social factors”?

Clinical experience and results from previous studies indicate that medical conditions are probably not the only decisive causes of disability pensions. With ‘social factors’, we mean factors other than health that may influence on health, like level of education, employment status and occupational factors, which are also of considerable importance [4-8]. For instance, in a report from 2010, Bratsberg et al shows that a large fraction of disability insurance claims can be attributed to reduced employment opportunities. This has now been specified in the “Background” chapter [Page 3, paragraph 2].

7. Methods: you say all Norwegians are given a personal identification number at birth. Doesn’t the HUSK study include any immigrants?

Yes, the HUSK study also include immigrants, and personal identification number are issued to these individuals at the time of immigration. This has now been specified in the methods chapter [Outcome: Disability pension, page 4, paragraph 6].
Reviewer 2:

Major compulsory revisions:

1 - This reviewer thinks that the paper would be improved through the addition of a table to explain the relative contribution of the health variables used to obtain adjusted odds ratios.

We have analyzed the bivariate associations of each health variable and disability pension, and also the association to educational level. We have included the following text in the manuscript: In bivariate analyses, all examined health problems were increased in those receiving DP (all p<0.01). All examined health problems were also associated with educational level in directions as expected (all p<0.02), the exceptions being the two variables on number of somatic diagnoses and number of medicated diagnoses, whose associations were not statistically significant [Page 7, paragraph 4].

To examine the relative strength of associations between various health problems and disability benefits is beyond the scope of this publication, and it is also conflicting with other ongoing projects in the HUSK collaboration.

2 - a. There should be a citation for the ratio formula used:

\[ 1 - \frac{\ln(\text{OR}_{\text{adjusted}})}{\ln(\text{OR}_{\text{crude}})} \]

We have consulted statisticians and experienced researchers within the field of epidemiology, who generally support the rationale for applying this formula when quantifying the proportion of the association of interest ascribed to differences in health. It rests, of course, on the same assumptions as for regression models in general. For example, when we use continuous scales for symptom load, we assume the association to be linear. We have, unfortunately, not been able to provide any reference for this formula.

\( \ln(\text{OR}) \) corresponds to the beta-value, which is linear. The formula used is the equivalent of comparing the ratio between the \( \beta \)-values of the adjusted and the unadjusted ORs. To make this clearer, we have rephrased the formula to the following:

\[ \frac{\beta_{\text{crude}} - \beta_{\text{adjusted}}}{\beta_{\text{crude}}} \]

We have rewritten the formula and clarified its use in the methods chapter.

2 - b. Citations are needed regarding treatment of missing data.
We have now included such citations in the methods chapter, along with a more thorough description of the treatment of missing data [Missing values, page 6, paragraph 3].

3 - I have a question about the formula used to determine the contribution of health to disability benefits eligibility and the resulting proportions: (1) has the formula been used before and is it a generally recognized approach to comparing results of crude and adjusted ORs?; (2) since the resulting proportions are the product of estimates that fall within a confidence interval, can the stability of the proportions be estimated? The proportions reported in the paper are presented without question.

The proportions resulting from use of this formula are merely estimates, and are not without uncertainty, as they are indeed based on odds ratios with confidence intervals. We have not been able to provide any formula for calculating confidence intervals for this estimate. We present both ORs with confidence intervals in table 2, and hopefully this reflects some of the uncertainty in the final estimate.

Minor Essential Revisions:

Editing is needed on wording and style (indentation mostly)

We have revised the manuscript critically and corrected errors and changed the indentation where needed.