Author's response to reviews

Title: The predictive effect of fear-avoidance beliefs on low back pain among newly educated health care workers with or without previous low back pain. A prospective cohort study

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Author's response to reviews: see over
The predictive effect of fear-avoidance beliefs on low back pain among newly educated health care workers with or without previous low back pain. A prospective study.

Reviewer: Charlotte Leboeuf-Yde

General: Thank you for your useful and constructive comments. We have now ‘re-thought’ and ‘re-written’. (ad. data sound, comment 2). Compared to the previous draft, we have increased the focus on physical work load and decreased the focus on individual and psychosocial work related factors. Therefore the first of the three research questions is changed from “examine the association between individual and work environment factors on the one hand and LBP on the other” to “examine the associations between physical work load and the development of LBP”. Accordingly, we have performed some new analyses. Because fear-avoidance beliefs about work were not normally distributed but had a left skewness, we considered that it would be better to use fear-avoidance beliefs as a continuous variable instead of dividing it into two groups. Also in the previous draft, we only found an effect of fear-avoidance beliefs on cases without LBP, but in the present draft, we have now found an effect of fear-avoidance beliefs in both cases with and without LBP. This finding is more in accordance with previous findings. The new results have changed the result and discussion section a lot.

The numbers refer to the comments in the reviewers report

Reviewers report

Ad.1) No, the outcome variable was only measured at follow-up, not at baseline. But we can see that we did not make that clear in the manuscript. Our out-come variable – at follow-up – was the number of days with LBP within the previous 12 months with four response categories: 0 days, 1-7 days, 8-30 days, >30 days. Based on another question from the baseline data we stratified the respondents into two groups, cases with and without previous LBP.

Added to the text (statistical analyses): The stratification was based on a question from the baseline questionnaire: “Have you ever had low back pain (pain or discomfort)?” There were two response categories: “Yes” (cases with LBP) or “No” (cases without LBP).

Ad. 2)
Yes, that is correct. We could make an additional file, but due to space limitations we chose not to do so, as the questions are similar to the original questions made by Waddell et al. 1993. Instead, we have included an example of an item from the FAB-work scale and an item from the FAB-physical activity scale.

Added to the text (methods – determinants): Each item was scored on a rating scale from 0 to 6 points: 0 = disagree, 3 = unsure, and 6 = agree. An example of an item from the FAB-work scale is: “I should not do my normal work with my present pain”. An example of an item from the FAB-physical activity scale is: “My pain was caused by physical activity”. Because FAB-physical activity and especially FAB-work had an asymmetric distribution (skewness 0.254 and 1.604, std.error of skewness 0.056 and 0.063, respectively), z-scores were computed for both and standardized so the mean was zero. Converting scores to a z-score is a way of standardize them. High scores indicated increased levels of fear-avoidance beliefs. A factor analysis confirmed the 2-factor structure of the fear-avoidance beliefs questions and Cronbach’s alpha for FAB-work and FAB-physical activity was 0.80 and 0.73, respectively

**Ad. 3)**
Physical work load is a central variable in this study. In order not to miss too much information we divided it into three categories: low, medium and high physical work.

**Ad. 4)**
As we have changed one of the three research question, we have also moved focus away from individual and psychosocial variables.

**Ad. 5)**
Yes, we agree. Please, see “added to the text” ad. 1

**Ad. 6)**
Yes, we have moved it to the result section.

**Ad. 7)**
i) + ii) We have changed the text

Added to the text (methods – statistical analysis) In a preliminary analysis we tested for significant associations between psychosocial work-related variables and LBP. The two psychosocial variables that reached significance were emotional job demands and influence at work (p ≤ 0.05). They were included in the main analysis together with individual variables, physical work load and fear-
avoidance beliefs. Non-associated psychosocial factors were social support, meaning at work, role clarity, role conflicts, demands for hiding emotions and predictability (p ≥ 0.05).

iv) added to the text (methods – statistical analysis), In the present study, LBP was categorized into four groups (0 days, 1–7 days, 8–30 days, >30 days) to investigate the main and moderating effect of fear avoidance.

Data sound

Ad. 1)
We have rewritten the description of the steps in our analysis

Added to the text (statistical analysis): The association between physical work load, fear-avoidance beliefs, and LBP and the moderating effect of fear-avoidance beliefs was estimated in the following three models: first (model A1 + A2), we made two simple tests without covariates of: (1) FAB-physical activity and physical work load, and (2) FAB-work and physical work load to test for their associations with LBP. Second (model B1 + B2), we tested for the same associations as in model A, but controlled for the individual factors: age, leisure time physical activity, smoking and body mass index and the psychosocial work-related factors emotional demands and influence at work. Third, (model C), we tested for a moderating effect by creating the interaction terms physical work load x FAB-work, and physical work load x FAB-physical activity. All analyses were stratified into two groups: cases without LBP and cases with previous LBP.

Ad. 2)
Yes, there were (too) many results reported in the previous draft. As mentioned, we therefore decided to narrow our focus to include only physical work load and not to examine individual and psychosocial work related factors as there would be too many test and too many chance-findings.

We have rewritten the result and discussion section

Ad. 3)
We are aware that we should not write about effects and risk factors when data are cross-sectional.

We have written ‘multinomial logistic regression analysis’ in our tables

Ad. 4)
Yes, we can see that the figure was difficult to read and maybe not so useful. We have discussed it and replaced it with a flow-chart of the study population as it seems to give more useful information to the readers – though different from the previous figure - and moreover, gives a better understanding of this unique study population.

Figure 1: Flowchart of the study population

N=6365 All 2004 classes of newly qualified health care students in Denmark

<table>
<thead>
<tr>
<th>2004 Baseline</th>
<th>2005 1. follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=5696 Respondents</td>
<td>n=3708 respondents</td>
</tr>
<tr>
<td>Women (5379)</td>
<td>n=3541 female health care qualified</td>
</tr>
<tr>
<td>Helpers (3984)</td>
<td></td>
</tr>
<tr>
<td>Men (317)</td>
<td>n=167 men</td>
</tr>
<tr>
<td>Assistants (1712)</td>
<td></td>
</tr>
<tr>
<td>n=5696 (10%) non-respondents</td>
<td>n=1988 (35%) non-respondents</td>
</tr>
</tbody>
</table>

n=669 (10%)
non-respondents
n=13 missing LBP information
n=2690 employed in the SOSU sector
n=882 not employed in the SOSU sector at the moment
n=29 missing job status
n=13 missing LBP information
n=2677 respondents with or without previous LBP
(1111 cases without LBP, 1566 cases with previous LBP)
Acknowledgement of previous work

Ad.1 + 2) We have rephrased the first section, so it fits the aim better and deleted the earlier section, hereby the incorrect references.

Added to the text (background): The prevalence of low back pain (LBP) among health care workers is high; studies have found that the 12-month prevalence is above 60% compared with 50% among employees in general. When health care students (health care helpers and assistants) begin their studies they do not have a higher prevalence of LBP than that of the same age range in the general Danish population. Among 5700 health care students in Denmark, 51% reported LBP trouble at the end of their education. However, this prevalence increased to 65% one year later when they were in employment as health care workers [1]. This difference between those under education and those in employment indicates that the high prevalence of LBP may be caused by factors experienced in the job.

Ad.3) Yes, of course. We have put in another reference: Staal et al 2002, who have compared international guidelines dealing with the management of LBP in occupational health care settings, and found that most guidelines encourage persons with LBP to ‘return to ordinary activity as normally as possible’

Ad. 4) Yes. We have checked our references.

Ad.5) Yes, we can see that we need to explain why a multinomial regression analysis is the best suited for this study. We believe that the grouping (0 days, 1-7 days, 8-30 days and > 30 days) gives us more valuable information than only two groups, which we have tried to explain in the text.

Added to the text (methods – statistical analysis): In the present study, LBP was categorized into four groups (0 days, 1–7 days, 8–30 days, >30 days) to investigate the main and moderating effect of fear avoidance. We used four levels of the outcome because categorizing LBP-cases into only one group regardless of the acuteness or chronicity of their LBP may cover a multitude of underlying conditions. In one epidemiologic study it was found that various variables associated differently with LBP and differed depending on the subdefinitions of LBP in the previous
year. By categorizing LBP into four groups we were able to explore whether fear-avoidance beliefs were differently related to different durations of LBP.

Added to the text (discussion): We believe that our categorization of LBP in four groups was useful in elucidating different relations with fear-avoidance beliefs. The results demonstrated clearly that fear-avoidance was predictive for the two groups with 8–30 days of LBP and > 30 days of LBP but not for the groups with only 1–7 days of LBP. This emphasizes the relevance of making subgroups when dealing with low back pain because future intervention programmes may be more effective if they aim to reduce fear-avoidance and LBP among those with relatively many days with LBP a year.
The predictive effect of fear-avoidance belief on low back pain among newly educated health care workers with or without previous low back pain. A prospective study.

Reviewer: Jens Ivar Brox

Generel: Thank you for your fine comments. We have tried to incorporate them in the text.

Compared to the previous draft, we have increased the focus on physical work load and decreased the focus on individual and psychosocial work related factors. Therefore the first of the three research questions is changed from “examine the association between individual and work environment factors on the one hand and LBP on the other” to “examine the associations between physical work load and the development of LBP”. Accordingly, we have performed some new analyses. Because fear-avoidance beliefs about work were not normally distributed but had a left skewness, we considered that it would be better to use fear-avoidance beliefs as a continuous variable instead of dividing it into two groups. Also in the previous draft, we only found an effect of fear-avoidance beliefs on cases without LBP, but in the present draft, we have now found an effect of fear-avoidance beliefs in both cases with and without LBP. This finding is more in accordance with previous findings. The new results have changed the result and discussion section a lot.

Ad.1)  
As mentioned above, we have changed the first research question

Ad.2a)  
Only respondents with neck, shoulder and back pain at baseline were requested to answer the fear-avoidance beliefs questions. Those without musculoskeletal pain should not answer the fear-avoidance beliefs questions. Therefore we were only able to do our analyses on respondents, who had experienced neck, shoulder or back pain within the last 12 months at the time they filled out the baseline questionnaire. All respondents had experienced musculoskeletal pain during the last 12 months, but 1111 respondents had never experienced LBP. To make this clearer in the article we have made some adjustments (italic):

Added to the text (methods – study population): Of the 3708 respondents who returned the follow-up questionnaire, a total of 2677 health care workers were included in present analyses due to our exclusion criteria, were we only included: 1) female respondents as they constituted 95% of the entire study population, 2) those who were in employment as health care workers at follow-up, 3)
those with musculoskeletal pain (neck, shoulder and upper or low back pain) during the last 12 months at baseline, as only healthcare students with musculoskeletal pain were requested to answer the questions on fear-avoidance beliefs. Those who were without a job, in another type of job than health care, ill or under continued education at follow-up were excluded from the analysis as they could not answer the questions about their working environment. “The remaining 2677 respondents were divided into two groups: the 1111 participants who did not have present or previous experiences with LBP at baseline were defined in this article as “cases without LBP” and the 1566 respondents with previous or present LBP experience at baseline were defined as “cases with LBP”.

Furthermore, a flow diagram of the study population was made
Ad.2b)
Yes, it is correct that our studied population may not represent the whole population. We have compared those who were included in the study with those who was excluded on the following variables: fear-avoidance beliefs work and physical activity, low back pain within the last 12 months and sickness absence within the last 12 months. No differences were found. In the
discussion section we evaluate whether neck, shoulder or upper back pain increased the risk for developing LBP.

Added to the text (discussion): Another study of van Nieuwenhuyse et al. (2004) found that upper limb complaints increased the risk of LBP [32]. Therefore it could be argued that our study population had a higher risk of developing LBP compared with a study population without any musculoskeletal pain experience, which would give fear-avoidance beliefs and physical work load more strength than in a population with out any musculoskeletal pain.

Ad.2c)
No, it is probably not relevant to consider LBP lasting 1-7 days a medical problem. 1-7 days of LBP is relevant in a preventive perspective because it could be hypothesised, that it may be useful to reduce fear-avoidance even at a very early stage, so they do not think, they should protect themselves from physical activity and stay at home instead of going to work.
If we only studied chronic LBP individuals, we would gain very little information about the transition from acute to chronic and the potential role of fear-avoidance beliefs in this process.

Added to the text (methods – statistical analysis): In the present study, LBP was categorized into four groups (0 days, 1–7 days, 8–30 days, >30 days) to investigate the main and moderating effect of fear avoidance. We used four levels of the outcome because categorizing LBP-cases into only one group regardless of the acuteness or chronicity of their LBP may cover a multitude of underlying conditions. In one epidemiologic study it was found that various variables associated differently with LBP differed depending on the subdefinitions of LBP in the previous year [28]. By categorizing LBP into four groups we were able to explore whether fear-avoidance beliefs were differently related to different durations of LBP.

Added to the text (discussion): We believe that our categorization of LBP in four groups has been useful gaining different relations with fear-avoidance beliefs. The results demonstrated clearly that fear-avoidance was predictive for the two groups with 8-30 days of LBP and > 30 days of LBP, but not for the groups with only 1-7 days of LBP. This emphasizes the relevance of making subgroups when dealing with low back pain, because future intervention programs may benefit most if they aim to reduce fear-avoidance and LBP among those with relatively many days with LBP a year.

Ad.2d)
Yes, it is correct that FABQ has been validated for use on patients with LBP. But we were inspired by Linton et al. (2000), who examined whether fear-avoidance belief could predict future episodes of back pain among a low back pain free population. In their pilot study they found that participants
without pain could answer a modified version of the FABQ. In our study, we asked the participants to consider how work and physical activity, respectively affected their neck, shoulder and back pain.

No, there is unfortunately no reference to a validated Danish version. The questions were translated by experienced researcher and tested in a qualitative pilot study.
A factor analysis and Cronbach’s alpha has been made and results from these analyses has been added to the text:

Added to the text (methods – determinants): The questions were translated by experienced researchers and tested in a qualitative pilot study (N = 31). Contrary to the introduction to FABQ made by Waddell et al. (1993), who focused only on pain in the back, this study asked the respondents to state how their work and their physical activity affected pain in their back as well as in their neck and shoulders.

Added to the text (methods – determinants): A factor analysis confirmed the 2-factor structure of the fear-avoidance beliefs questions and Cronbach’s alpha for FAB-work and FAB-physical activity was 0.80 and 0.73, respectively

Ad.2e)
We are not sure of what is suggested

Ad.2f)
We have incorporated the baseline scores for FABQ in the text

Added to the text (results – characteristic of study population): The mean baseline scores for FAB-work at baseline were 16.86 (SD 23.9, n = 1082) and 12.96 (SD 22.28, n = 398) for cases with and without previous LBP, respectively. The mean baseline scores for FAB-physical activity at baseline were 39.66 (SD 25.5, n = 1338) and 33.31 (SD 26.6, n = 545) for cases with and without previous LBP, respectively.

Ad.2g)
Yes, and we have made new analyses and have written the OR in the tables.

Ad.3)
Yes, some studies have linked LBP with depression and anxiety. The reason why, we did not bring it into our analyses, was that it is not a part of the aim of this study, and that it could perhaps be
“over control”. Anxiety and depression may be associated with both fear-avoidance beliefs and LBP, and by controlling for it, we could potentially, at least partly, have shadowed for the effect that we were interested in. We are aware of the importance of depression and have written about the role of depression at early stages of LBP.

Added to the text (discussion): The role of distress and depression has been found to play a role on early stages of LBP due to social withdrawal and reduced activity. Distress and depression may in fact be so intimately linked to LBP and to fear-avoidance beliefs that it might potentially be overcontrol, if we adjusted for it. Therefore we have not included measures of distress or depression in our analyses. However, the possible relationships between depression, fear-avoidance beliefs and LBP may deserve specific attention in future research.

Ad.4) A native English professional has revised the manuscript and linguistically changes are made thorough the manuscript.

Ad.5) The discussion section has been re-written

Ad.6) We have re-written the discussion section, and tried to discuss the following limitations: differential misclassification between cases with and without LBP, lack of control for distress and depression on LBP, the association between other musculoskeletal problems and LBP, the reliability of the FAB-work question

Ad.Major Compulsory Revision)

Reviewer comment: An interaction between self-reported and FABQ and self-reported work load was not found. What did the authors expect?

We expected that high fear-avoidance would increase the effect of physical work load on LBP, which we have mentioned in the discussion.

Added to the text (discussion) it is likely that fear-avoidance beliefs will not increase the negative effect of physical work load on LBP.
Reviewer comment: Other factors for back pain may have influenced results. Was eventual treatment recorded?

No, unfortunately information on LBP treatment was not available.