**Author’s response to reviews**

**Title:** Neck and back problems in adults with idiopathic scoliosis diagnosed in youth. An observational study of prevalence, change over a mean four year time period and comparison with a control group.

**Authors:**

Christos Topalis (christostopalis@yahoo.gr; christos.topalis@ki.se)

Anna Grauers (anna.grauers@lvn.se)

Elias Diarbakerli (elias.diarbakerli@karolinska.se)

Aina Danielsson (aina.danielsson@vgregion.se)

Paul Gerdhem (paul.gerdhem@karolinska.se)

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**Author’s response to reviews:**

Reviewer reports:

Reviewer #1: This is an interesting paper reporting the prevalence of neck and back pain in scoliosis patients.

Some points can be improved.

First of all, it would be interesting to report the results of the regression. Controlling for confounders is really relevant, and only a part of possible confounders have been addressed. Other features could be connected to neck and back pain, for example the sagittal profile. Did the authors collect data also about this? Otherwise this should be listed as a limitation.

The question used to assess neck and back problem doesn't allow to differentiate between acute, subacute and chronic pain. This must be disclosed and discussed, and limits also the comparability with literature data that are cited by the authors. Please discuss also this point.

The main limit, as already discussed, is the low response rate that make it possible a selection bias. I suggest the authors to be more cautious when interpreting their data. Moreover, the control group is really small. It would have been worth to select a larger sample.

Remark 1. “First of all, it would be interesting to report the results of the regression”.

Answer: We thank the reviewer for the comments and questions. Table 2 and 3 contain now the appropriate measures and results from the regression analysis.

Remark 2. “Controlling for confounders is really relevant, and only a part of possible confounders have been addressed”.

Answer: It is possible that other (unmeasured) confounders than sex, smoking and age could have a role. We found it reasonable to adjust for these variables. Other possible covariates could have been employment status and occupational strain, but these did not differ between individuals with and without scoliosis. No change made in the manuscript.

Remark 3. “Other features could be connected to neck and back pain, for example the sagittal profile. Did the authors collect data also about this? Otherwise this should be listed as a limitation”.

Answer: Unfortunately, we do not have sagittal radiograph data on the patients in this cohort. We have added a sentence in the discussion section, page 12, paragraph 2, line 207.

Remark 4. “The question used to assess neck and back problem doesn't allow to differentiate between acute, subacute and chronic pain. This must be disclosed and discussed, and limits also the comparability with literature data that are cited by the authors. Please discuss also this point”.

Answer: Arguably the question might look at first vague regarding neck and back problems but we would like to stress that our focus was on problems in general where pain is certainly a big component of this issue – problems- but not the only one. Pain specific questions were neither addressed to this cohort nor analyzed. The interesting point of this survey was to cast a light whether scoliosis has any association with disturbance in the cervical portion of the spine and if that is associated with any kind of activity levels. We have mentioned that in the text, line 114. Data is also available in table 3.

Remark 5. “The main limit, as already discussed, is the low response rate that make it possible a selection bias. I suggest the authors to be more cautious when interpreting their data. Moreover, the control group is really small. It would have been worth to select a larger sample”.

Answer: The response rate has been pointed out in the discussion section as a limitation, page 12, paragraph 3, line 211. Comparisons though of chronic neck pain between controls and another population study showed similar numbers. Moreover, with regards to the scoliosis group a
separate non-response analysis that has been carried out by us, page 9, paragraph 5, line 145, has shown that the prevalence of neck and back problems did not differ between responders and non-responders, and the differences in other descriptive variables were small. We therefore believe that the responders were representative. No changes made in the manuscript.

Reviewer #2: This paper is able to fill a gap in the adult scoliosis field. I want to congratulate the authors for their very good job.

I have few comments on the paper, why didn't you assess the sports activities or exercises? Physical activities and exercises can compensate pain issues in adults with scoliosis, and in those patients these activity can really influence the level of pain. Can you comment on this in the discussion chapter?

Another limitation of the study, which could be addressed better in the discussion is the lack of clinical objectively assessed data. If I understood well you had the declared Cobb angle and no informations about curve's type and no clinical assessment at the moment of survey collection. This could be a threaten to the generalizability of the results and therefore an important limitation to be considered.

Remark 1. “I have few comments on the paper, why didn't you assess the sports activities or exercises? Physical activities and exercises can compensate pain issues in adults with scoliosis, and in those patients these activity can really influence the level of pain. Can you comment on this in the discussion chapter?”

Answer: We would like to thank you for your warm words. In the following lines we will try to respond point by point to the matters that need changes or clarifications. It is possible that physical activity can compensate pain issues in patients with scoliosis. However, a recently published study on the same cohort indicates that adults with idiopathic scoliosis have similar levels of self-reported physical activity as individuals without idiopathic scoliosis (Diarbakerli E, Grauers A, Danielsson A, Gerdhem P: Adults with Idiopathic Scoliosis Diagnosed at Youth Experience Similar Physical Activity and Fracture Rate as Controls. Spine (Phila Pa 1976) 2016), even though individuals with idiopathic scoliosis report more neck and back problems than individuals without scoliosis. We have added a sentence and the reference in the discussions section, page 12, paragraph 1, line 199.

Remark 2. “Another limitation of the study, which could be addressed better in the discussion is the lack of clinical objectively assessed data. If I understood well you had the declared Cobb angle and no informations about curve's type and no clinical assessment at the moment of survey
collection. This could be a threat to the generalizability of the results and therefore an important limitation to be considered.”

Answer: We did not have a clinical assessment at the time of the survey. Even if this would have been interesting, we believe that this study has its value in indicating the long term prognosis regarding back and neck problems, which is valuable for the clinician and the patient. We also believe that it is likely that the curve changes would be minor. The curve sizes have been although measured and reported as Cobb angles and could be found in footnote (b) in Table 1 with all necessary information and degrees for ages and different scoliosis types. A sentence has been added on page 12, lines 206-209.