Author’s response to reviews

Title: Do the SRS-22 self-image and mental health domain scores reflect the degree of asymmetry of the back in Adolescent Idiopathic Scoliosis?

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Author’s response to reviews:

Dear Editor and Reviewers,

We thank you for taking the time to review our manuscript entitled “Do the SRS-22 self-image and mental health domain scores reflect the degree of asymmetry of the back in Adolescent Idiopathic Scoliosis?” and are grateful for the constructive feedback provided by the reviewers that we believe will strengthen our manuscript. We have addressed each of the three reviewers’ comments in turn below. All changes made to the revised manuscript have been tracked.

Reviewer 1

Methodology:

1) Any need to demonstrate the correlation between Cobb angle and the asymmetric parameters in this study group?

Response: Members of our research team have previously investigated whether there is a correlation between Cobb angle and lateral asymmetry obtained from ISIS2 surface topography. In a sample of 72 untreated scoliosis patients they demonstrated poor ability in being able to predict the Cobb angle from ISIS lateral asymmetry with 95% confidence intervals of -13.3 degree to +13.5 degrees and as such should not be used alone for monitoring spinal curvature.
The reference for the above study’s abstract is:


Results:

2) The method of retrospectively identifying subjects - was it by convenience sampling out of a pool of subjects, was the recruitment by random order? The reason for this question is that whether the gender ratio of male: female in this study population be any different to that of the general AIS population? If females (94.1%) are over-represented relatively in this study, whether that females may have a higher aesthetics concern? Or no gender difference that will influence the Self-image scores for instance?

Response: We agree that there does appear to be a female bias. Subjects for this study were a consecutive series of patients presenting at our institution’s spinal clinic that fitted the inclusion criteria. We will clarify this in the methodology section (LINES 119-121).

Additionally we acknowledge that consequently the over-representation of females within our cohort could have caused a distortion of the results due to females being more likely to have greater aesthetic concerns. We will acknowledge this in our discussion section under limitations of the study (LINES 310-317).

3) Is there any results regarding the correlation of total SRS-22 score with the asymmetry parameters? after all the title of the manuscript mentioned 'SRS-22 score' but not specifically stating the domains which were focused on in this study

Response: Whilst we acknowledge the reviewers comments, as discussed earlier, prior research has already demonstrated the weak correlation between the ISIS2 asymmetry parameters (lateral asymmetry and volumetric asymmetry), the Cobb angle and the scores of the SRS-22 (total and individual domains). The correlation between ISIS2 parameters and SRS-22 was stronger than that between Cobb angle and SRS-22 but is still weak.

Additionally we have amended the title to “Do the SRS-22 self-image and mental health domain scores reflect the degree of asymmetry of the back in Adolescent Idiopathic Scoliosis?” to more accurately reflect the work within the paper.

References:


Discussion:

4) Line 208, page 9: perhaps the terms are '..use of disease-specific, patient-reported questionnaires...'

Response: This has been subsequently amended throughout the manuscript and the changes highlighted.

5) Is it possible to give some details regarding the limitation of this study in the Discussion section?

Response: We acknowledge that the manuscript would benefit from a limitations section and have subsequently included one within the discussion section (LINES 310-320).

Reviewer 2

Background:

1) l65-66: The term "associating" seems to be more accurate than "resulting" because there is no correlation between Cobb angulation and surface topography

Response: This has been subsequently amended in the manuscript (LINE 66).

2) l69: Such a phrase could make believe that scoliosis surgery is a cosmetic surgery. In some countries, cosmetic surgery is not supported by health services

Response: We agree that the original phrasing of cosmesis may have wrongly implied that scoliosis surgery is cosmetic surgery. We have subsequently amended the phrasing to “correction of visible deformity” and “reduction of visible deformity” (LINES 69-73).
3) l80: with AIS of more than 70° (Weinstein 2003)

Response: The reviewer refers to Weinstein’s 2003 JAMA paper that provided a 50 year follow up of untreated scoliosis from a cohort seen in the 1930-40s. The mean age of this group at the time of the paper was 66 (54-80 years). Additionally in the paper there is no comparison drawn between curves >70 and back pain/activities of daily living/depression/body satisfaction etc. The only comparison drawn with curves >70 is shortness of breath. In light of this we feel that the cohort of patients in Weinstein’s study is not comparable to our cohort of significantly younger patients and therefore feel hesitant to draw inferences from that paper in this context. Furthermore papers such as Freidel et al. found that in their study compared with the age matched general population; juvenile patients with idiopathic scoliosis reported poorer health-related quality of life independent of Cobb angle and age. Therefore we do not feel it is entirely relevant to include the reviewer’s suggestion “with AIS of more than 70°”.

References:


Methodology:

4) L117 Mean Cobb angle was 66°, and below 70° the functional and aesthetic repercussion is weak

Response: As stated above, the Weinstein paper looked at patients with a mean age of 66 and therefore we feel hesitant to draw similar inferences from this age group given the far younger age of our patient cohort.

5) L141-2 The figure legends should be included in the manuscript file, immediately following the references, rather than being a part of the figure file. The following information should be provided for each figure: figure number (in sequence, using Arabic numerals - i.e. Figure 1, 2, 3 etc); short title of figure (maximum 15 words); detailed legend of up to 300 words

Response: The figure legends have been moved to after the reference section accordingly.
At 14, a teenager is unable to project himself into the future; Self image and mental health are very disrupted, even without scoliosis. For instance item 4 "If you had to spend the rest of your life with your back as it is right now, how would you feel about it?"

Response: We acknowledge that the SRS-22 questionnaire certainly isn’t the perfect tool to do this with and has previously been shown to lack discriminative ability in certain domains in certain subtypes of AIS. Despite this the need to consider health reported quality of life (HRQOL) in patients with AIS is becoming increasingly recognized. Given the reported association between patients with AIS and mental health, we feel that HRQOL must be taken into account when considering intervention. Currently no perfect tool exists to best assess with pitfalls of both the textual and pictorial tools. For this reason we have advocated for the development of a combined pictorial and textual tool to try and address this.

Discussion:
1) 1202-6 Yes for adults and in case of progressive scoliosis. The surgery at 14 years and at 66° is a prevention of these problems.

Response: The reviewer is quite right when he points out that adult scoliosis patients and patients with progressive scoliosis tend to suffer a reduced HRQOL which is what we have stated on Line 202. Furthermore he is right to comment that in some cases surgery at 14 aims to prevent these problems from worsening in later life. Our experience is that often even at 14 these patients have already developed these problems and thus surgery is not only performed to prevent these problems worsening in later life but also to help improve their current symptoms.

2) 1459 The strobe statement is to be cancelled

Response: the strobe statement has been removed (LINES 484-497).

General remark:
3) In teen age, if one considers the aesthetic aspect, it is better to develop treatment by braces that act directly on the torso. Surgery is legitimate to stabilize scoliosis due to the progression risk and functional impairment in adulthood. X-ray, surface topography and questionnaire are complementary. A surgeon does not operate an X-ray or a questionnaire...
Response: We agree with the reviewer’s comment that one should not purely operate on an x-ray or questionnaire and should instead take a more holistic approach when deciding whether an operation is required. We are, in the main, not surgeons who use bracing frequently but acknowledge the role that bracing has to play in the management of AIS.

Reviewer 3

1) In the Methods section, there is no mention of the curve type(s) of these patients. This may be very important to know, as a balanced double curve may appear more symmetrical compared to an unbalanced double curve; a single major lumbar curve may have more waist asymmetry compared to a single major thoracic curve, etc. Also, may be important to discuss female:male ratio in your studied patient population.

Response: Of the 102 patients in our cohort, only 54 had an appropriate accompanying radiograph. This was because a radiograph was felt only to be appropriate for inclusion if taken within 6 weeks of the ISIS2 scan and radiographs were not taken at every visit as a routine. This radiographic subgroup comprised Lenke type 1, 3 and 5 curves. There were 39 Lenke type 1 curves, 13 Lenke type 3 curves and 2 Lenke type 5 curves. We agree with the reviewer that inclusion of this detail would add to the manuscript and have thus added this information into the methods (LINES 123-124) and results section (LINES 186-187).

2) Due to this reason above, as a reader I would also be curious to also see the correlations of curve type/balance of curve integrated into the results. Thus, calculations looking at correlation between curve type and SRS-22 domains may add important information your Results section.

Response: When analyses were performed on the Lenke 1 subgroup there was no difference identified compared to the whole group. Due to small numbers the analysis of the Lenke 3 and 5 subgroups was not possible. We have mentioned this in the results section (LINES 206-208).

3) The authors have set their p value to <.05, and in the results section there are 7 values in which the p value is less than .05. Why is this still interpreted as a weak correlation? The values I see that are lower than .05 are: Mental Health - AxDiffHt, AxDiffOff, WaistDiffOff; Self Image - WaistDiffHt, WaistDiffOff, VolDiff, VolSum, ZScapDiff

Response: We would like to clarify any misunderstanding that the reviewer may have had regarding the difference between p value and r value. The p value relates to the statistical
As the reviewer correctly points out, our results have indeed demonstrated that there is a statistically significant association between some of the asymmetric parameters and SRS-22 self-image and mental health score. However, statistical significance does not equate to strength in correlation (their ability to predict SRS-22 scores). In this case, the low p-values simply imply that the correlation value estimated is unlikely to have occurred simply by chance. In the context of this study, the strength in correlation between these parameters and SRS-22 self-image and mental health is of far more use. In our study, the r values were all of weak strength (<0.3) implying no association between SRS domains and the ISIS parameters.

4) In the discussion section, there is short paragraph about the symmetry of faces and that "it is reasonable to assume that this would also be true for the back." I do not believe this paragraph adds value to the discussion of this paper. The authors are not providing research to demonstrate this assumption, thus removing this paragraph may help strengthen the Discussion section.

Response: We accept your comments and have removed said paragraph from the discussion (LINES 256-261).

5) The Discussion section, in general, provides very little discussion about THIS paper and its contribution to the current literature. There is very little discussion about your results other than the mentions of the correlations being weak. There is significant, but important, discussion about the work of others, however, discussing THIS paper and how it is related to current literate would strengthen this section. Also, I do not see a statement about limitations of the study.

Response: To address this, we have added the following paragraph (see below) to the discussion section (LINES 272-281).

“It was interesting to note that WaistDiffHt and ShDiffHt demonstrated a positive correlation with SRS-22 self-image and mental health domains, although only WaistDiffHt with self-image was statistically significant. One would expect that as the difference in relative heights between the shoulder and waist points increases, the self-image and mental health domain scores would decrease, demonstrating a negative correlation. The significant unexpected positive correlation for WaistDiffHt could possibly be explained by the difficulty encountered whilst identifying the waist in some patients with scoliosis. The waist crease on the concave side is often clear while the waist on the convex side is not. The ability of surgeons to reliably determine waist and
shoulder asymmetry in scoliotic patients has been shown to be poor (26). It should be noted that all correlations measured here were of weak strength whether in the positive or negative directions.”

6) I do not believe that this paper cannot conclude that "the development of a combined pictorial and textual scale should be considered...." The purpose of this paper and the experimental design do not lead to this conclusion. I like that it was discussed in the Discussion section, however, and still adds value to the paper.

Response: We accept that the paper should not conclude like this and thus have removed it from the conclusion section (LINES 331-333) and the abstract (LINES 54-55). We feel that developing a combined pictorial and textual scale is an important area for future work and so have kept the section that mentions this in the discussion section (LINES 293-308).