Author’s response to reviews

Title: Correlation between subjective and objective hearing tests after unilateral and bilateral cochlear implantation

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Author’s response to reviews:

Letter to the Editor

Utrecht, The Netherlands

September 26th, 2017

Dear editor,

Please find enclosed our revised manuscript:

“Correlation between subjective and objective hearing tests after unilateral and bilateral cochlear implantation”.

We would like to thank the reviewers for their time and useful feedback on our manuscript.

On the next page, we will address and comment on each of the items that could use improvement or need a further explanation.

We hope that you will consider our manuscript for publication in BMC Ear, Nose and Throat Disorders.

Please do not hesitate to contact us, should you have any questions or comments.
Comments to the reviewers

Reviewer 1: Aaron C. Moberly

Comment 1

The paper could benefit from editing by a native English speaker. It is currently somewhat difficult to read.

Answer:

We thank the reviewer very much for this suggestion. Our manuscript was reviewed by someone who is fluent in English. Please see the revised and edited version of our manuscript.

Comment 2

In the Background, the authors state on page 3, line 31, that "in today's healthcare, the subjective experience of patients gains in importance." I don't disagree, but the authors should expand on why they think this and/or cite papers to support this idea.

Answer:
We thank the reviewer for this suggestion. We cited some papers to support this idea and added some additional information:

“Also, in today’s healthcare, a patients’ subjective experiences gain importance 1,2. For example, when the cost-effectiveness of a treatment is analyzed, health related quality of life questionnaires are often used to measure the effectiveness3,4.” (Background, page 3, lines 13-16)

Comment 3

There are a number of recent studies that the authors do not cite along the lines of this topic, even including a meta-analysis of objective and subjective measures in CI users. These studies should be cited. These include the following:


Answer:

We thank the reviewer a lot for these suggestions. The first and third article were recently published and not yet available when we submitted our paper. All three articles are very relevant for our paper. Therefore, we described and cited all studies in the revised version of our manuscript (Background and Discussion section).

Comment 4

The authors mention a few previous studies along these same lines. What is it that this paper aims to add to the literature? This should be explicitly discussed in the Background. Two things worth noting that are novel about your study is the inclusion of objective spatial hearing tests, and comparison of unilateral vs bilateral CI users.

Answer:

We thank the reviewer for this comment and we made some changes to the Background section:
“The amount of literature on correlations between subjective and objective localization tests is limited.” (Background, page 3, lines 19-20)

“The current literature on correlations between subjective and objective tests however, only includes unilateral and bimodal CI users. Correlations between tests might be different for unilateral and bilateral CI users, due to differences in test sensitivity or differences in indicating their own performance. Therefore, the latter is worth investigating.” (Background, page 3, lines 22-25)

Comment 5

Along those same lines, the authors don't explain why they are comparing correlations of objective and subjective measures in unilateral vs bilateral CI users. This topic is worth examining in this study, but the authors don't make an argument as to why the correlations would be different. They should expand on this in the Background.

Answer:

We thank the reviewer for this suggestion.

“The current literature on correlations between subjective and objective tests however, only includes unilateral and bimodal CI users. Correlations between tests might be different for unilateral and bilateral CI users, due to differences in test sensitivity or differences in indicating their own performance. Therefore, the latter is worth investigating.” (Background, page 3, lines 22-25)

Comment 6

There is a previous report of the results of this randomized study of unilateral vs bilateral CI implants. It would be good for the authors to summarize the findings of this previous report in the Background. A summary of group differences should also be included in the Results. I say this, because we need to know if the two groups (unilateral vs bilateral CI) were equivalent across other measures. If not, could that impact the results of this study?

Answer:

We added a short summary of the previous report to the Background section.

“The current study is a subanalysis of a previous published study on the comparison of bilateral and unilateral cochlear implantation in adult patients with bilateral postlingual deafness. One year after implantation, bilaterally implanted patients performed significantly better on part of the subjective (Speech, Spatial and Qualities of Hearing Scale (SSQ) and the visual analogue scale (VAS) on hearing) and objective (speech perception in noise when noise came from different directions and localization of sounds) tests.” (Background, page 3-4, lines 26-3)
A baseline table was already available in the previous version of this manuscript. We added some more information of group differences to the text.

“Details of the study population are presented in Table 1. Fifteen patients in the bilateral group used HAs before implantation, compared to 19 patients in the unilateral group (p:0.04). All other baseline characteristics did not differ significantly. One year after cochlear implantation, 14 of 19 patients in the unilateral group used a contralateral HA.” (Results, page 7, lines 14-17)

Comment 7

It would be good to provide a bit more detail on the subjective assessments. For example, it is unclear if higher scores represent better outcomes. How are these scored, what are the ranges of performance, etc.?

Answer:

We provided more information for both subjective outcome measures.

“The final subdomain score is computed by the mean of all items on that subdomain, resulting in a range of scores from 0 to 100. A higher score reflects a greater ability.” (Methods, page 5, lines 3-5)

“The answer categories must first be transformed (1=0, 2=25, 3=50, 4=75 and 5=100). Afterwards, the final subdomain score is computed by adding together all the item scores and dividing by the number of completed items, resulting in a range of scores from 0 to 100. A higher score reflects a greater ability.” (Methods, page 5, lines 10-14)

Comment 8

For the objective measures, can the authors describe why sentence presentation levels were randomly selected (page 5, line 29). Most readers will probably not be familiar with the U-STARR and SISSS.

Answer:

We thank the reviewer for this suggestion. A clear and comprehensive description of both the U-STARR and SISSS is available in another publication of our research group. We would like to refer our readers to this publication instead of thoroughly describe these tests in the current paper, because we think this information will distract the reader from the current research question.

Comment 9

For the SISSS description, the last sentence is unclear. I don't understand what the cutoff value of 30 dB means. Please clarify.
Answer:

We changed the sentence and hope it is understandable now:

“A SRTn of 30 dB was considered relative silence and therefore, 30 dB was used as cutoff value on the U-STARR and SISSS.” (Methods, page 6, lines 1-2)

Comment 10

In Results, page 7, lines 18 and 20, it makes more sense to call correlations "weakest" and "strongest" instead of "lowest" and "highest," since the correlations were negative in direction.

Answer:

We agree with the reviewer and therefore changed the sentence as suggested.

“The weakest correlation was found for the ‘SSQ1’ and ‘SISSS worst performing situation’ (r=-0.33, p=0.046) and the strongest correlation.....” (Results, page 7, lines 23-25)

Comment 11:

Page 7, line 42, this bit about multiple testing correction should be moved to Methods.

Answer:

We noted that the description of the Benjamini-Hochberg false discovery rate procedure was unclear in our previous version. We changed these sections in the text and also changed these section in Table 2 and Table 3.

Table 2: we added a column to Table 2, where the corrected significance level is reported. If the p-value of the Spearman r (third column) is lower than the significance level in the fourth column, the correlation is significant. All p-values were lower than the corrected significance level and therefore, all correlations were significant.

Table 3: all p-values were higher than the significance levels corrected for multiple testing. This means that none of the correlations and comparisons in Table 3 were significant. For the readability of the table, we do not present all corrected significance levels in this Table and only added this information in the legend of the table:

“*After correction for multiple testing with the Benjamini-Hochberg false discovery rate procedure, none of the test results yielded significant results.” (legend Table 3)

Changes in text:

“The critical significance levels of the p-values were adjusted for multiple comparisons using the Benjamini-Hochberg false discovery rate method.” (Method, page 7, lines 10-11)
“When we corrected for multiple testing using the Benjamini-Hochberg false discovery rate method, all p-values of the correlation coefficients were lower than the for multiple testing corrected significance level, resulting in all significant correlations (Table 2)” (Results, page 8, lines 7-9)

“The correlation coefficients in the bilateral group did not differ significantly from the correlation coefficients in the unilateral group, after correction for multiple testing using the Benjamini-Hochberg false discovery rate method (Table 3)” (Results, page 8, lines 14-16)

Comment 12:

I think the authors should reconsider how they compared correlations between bilateral and unilateral patients at the bottom of page 7, and they should get a statistician involved. Currently the authors just ran these correlations separately for the two groups (unilateral vs bilateral), and the results weren't significant after correcting for multiple comparisons. However, I know there is a method to compare the magnitude of correlations between two groups, at least for Pearson correlations. I assume there is a similar method for Spearman correlations, and involving a statistician would be helpful. It may be that the differences in correlations are different between groups, even if the subset correlations themselves were not significant when the groups were split.

Answer:

We thank the reviewer very much for this suggestion. We used Fisher's z transformation to test the significance of the difference between the two correlation coefficients.

“We used the Fisher’s z transformation to analyze if there was a statistical significant difference between the correlations in the bilateral and unilateral CI group.” (Method, page 7, lines 2-4)

Table 3: a column with the p-values of the comparison between the correlation coefficients is added.

Comment 13

In Discussion, the statement on page 8, lines 18-21, seems unnecessary about what a high and low correlation means. I would remove.

Answer:

We thank the reviewer for this suggestion and removed the sentence.

Comment 14

Assuming the revised analyses still suggest that the correlations are not different between unilateral and bilateral CI users, I'm not sure I agree with with the authors’ interpretation on page
8, lines 39-45, particularly the last sentence that unilateral CI patients seem to be less capable to indicate their own performance than bilateral patients. I think the authors should temper this statement that it is a possible interpretation of the findings. It could also be that subjective measures are simply more sensitive in bilateral users, because unilateral users might be affected more by the status of their other ear (hearing aid vs no-aid, etc.).

Answer:

We thank the reviewer for his suggestion. In the revised version of the manuscript, the correlation coefficients in the bilateral patients did not differ significantly from the correlation coefficients in the unilateral patients, after correction for multiple testing using the Benjamini-Hochberg false discovery rate method.

We used the suggested explanation of the reviewer in the Background section:

“Correlations between tests might be different for unilateral and bilateral CI users, due to differences in test sensitivity or differences in indicating their own performance.” (Background, page 3, lines 23-25)

Reviewer 2: Sheila Pratt

Comment 1

The background and discussion portions of the paper were clearly written but the methods and results were a bit vague, and as a result more difficult to read. The methods and results sections lacked specificity.

Answer:

We thank the reviewer for this comment. Please see the fully revised and edited version of the manuscript.

Comment 2 and comment 5 combined

2: The analyses were overly simplistic. The authors could have use more advanced statistics and dug deeper into the performance of their participants on the particular tasks. It would have made for a more interesting paper.

5:Page 7 - lines 49-59: The authors talk about differences between groups but don't really test it. Other stats could get at those differences more directly.

Answer:

We thank the reviewer for these comments. We have added statistical analyses for comparing the correlation coefficients in both groups, in order to draw stronger conclusions. In order to do this,
we used Fisher’s z transformation to test the significance of the difference between the two correlation coefficients of both groups.

“We used the Fisher’s z transformation to analyze if there was a statistical significant difference between the correlations in the bilateral and unilateral CI group.” (Method, page 7, lines 2-4)

Table 3: a column with the p-values of the comparison between the correlation coefficients is added.

Comment 3

I don’t believe that correction for the multiple correlations was really needed and that it was applied correctly. The corrections seem too conservative given the use of false discovery.

Answer:

We thank the reviewer for this comment. However, we think correction for multiple testing is needed in the current study. We agree with the reviewer that corrections must not be too conservative and therefore we chose to use the Benjamini-Hochberg procedure instead of the more conservative Bonferroni correction for example.

We noted that the description of the Benjamini-Hochberg false discovery rate procedure was unclear in our previous version. We changed these sections in the text and also changed these sections in Table 2 and Table 3.

Table 2: we added a column to Table 2, where the corrected significance level is reported. If the p-value of the Spearman r (third column) is lower than the significance level in the fourth column, the correlation is significant. All p-values were lower than the corrected significance level an therefore, all correlations were significant.

Table 3: all significance levels corrected for multiple testing, were lower than the p-values. This means that none of the correlations and comparisons in Table 3 were significant. For the readability of the table, we do not present all corrected significance levels in this Table and only added this information in the legend of the table:

“*After correction for multiple testing with the Benjamini-Hochberg false discovery rate procedure, none of the test results yielded significant results.” (legend Table 3)

Changes in text:

“The critical significance levels of the p-values were adjusted for multiple comparisons using the Benjamini-Hochberg false discovery rate method.” (Method, page 7, lines 10-11)

“When we corrected for multiple testing using the Benjamini-Hochberg false discovery rate method, all p-values of the correlation coefficients were lower than the for multiple testing
corrected significance level, resulting in all significant correlations (Table 2).” (Results, page 8, lines 7-9)

“The correlation coefficients in the bilateral group did not differ significantly from the correlation coefficients in the unilateral group, after correction for multiple testing using the Benjamini-Hochberg false discovery rate method (Table 3).” (Results, page 8, lines 14-16)

Comment 4

Page 7 - lines 32 - 45: This section should be expanded. It reads as if only the SSQ2 vs localization correlations shown in Table 2. It would help if all of the results were described throughout the results section.

Answer:

We thank the reviewer for this suggestion. We changed the sentence:

“A significant moderate correlation was found between the SSQ2 and localization test (r=0.59, p=0.0001) (lower part of Table 2).” (Results, page 8, line 5)

We described all of the results and used different subheadings to refer to the different analyses: correlation between subjective and objective speech perception tests; correlation between subjective and objective localization tests; comparison of correlations between bilateral and unilateral CI patients.

Comment 6

Figure 1 - The graphs are blurry and it would help if regression lines with r2 values were plotted for each group.

Answer:

We thank the reviewer for these comments. We uploaded the figure again and hope these version will be more clear.

In the current study, we only performed correlations and did not perform regression analyses.

Correlation is the statistical test of choice when a researcher wants to examine the strength of relation between two variables, neither of which is considered to predict the other variable, as we do in the current study. Regression analysis examines the ability of one or more factors, called independent variables, to predict a patient’s status in regard to the target or dependent variable10. Therefore, we did not add regression lines to the plots.

REFERENCES


