Author's response to reviews

Title: Exploratory factor analysis of the Dizziness Handicap Inventory (German version)

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Author's response to reviews: see over
Dear Mrs Pafitis,

Please find enclosed a copy of the revised manuscript that we would like to submit to BMC Ear, Nose and Throat Disorders. Many thanks to you and the referees for the time as well as the critical and valuable review of our manuscript. In this letter, we shall give point-by-point responses to the concerns of the reviewers and outline the changes we have undertaken in our paper. The adapted text of the manuscript is written in red.

Reviewer: Nicolas Perez

1) There is only one issue that authors did not address. Due to that different authors provide different solutions, wouldn’t it be interesting to use only the "total DHI" and forget domains or subtypes?
Response:
In fact, the final conclusion of our study is that only the “total DHI” should be used. To clarify this point, we adapted the concluding sentence in the abstract as well as the concluding paragraph at the end of the article.
In our opinion, a valid subscale structure could be interesting in the process of clinical reasoning. The patient’s answers of the questionnaire may help the clinician to generate hypotheses about the potential causes of the symptoms very early and to plan further examinations in order to refute or support the hypothesis (process of iterative diagnosis; Norman et al., 2009). It may be that clinicians recognize patterns of symptoms/problems in the process of analysing the DHI answers, which will help to establish pathomechanistic hypotheses. Valid subscales could perhaps give even stronger support for a hypothesis. As mentioned in the discussion, subscales could also be helpful for the decision to involve further health care professionals in the assessment or to select treatment elements.


Reviewer: Eva Ekvall Hansson

2) Abstract
In methods, the authors claim that patients filled in diverse questionnaires. It is better to write the exact number. Minor Essential Revisions
Response: We have adapted this sentence (p2).

3) Background
I am a little confused about the last two sentences on page 3 (If the analysis…. ) Here it seems like the authors is discussing future research and this would be more appropriate in the discussion. Major Compulsory Revisions
Response: We agree with the reviewer and therefore deleted this idea in the background section (p5). However, we opted to keep the description of the comparison in the “discussion” section (concern 8.2 and 8.3), in which our own results are set in context of existing data by others.
We would like to keep the Additional table 2. Although quite long, it will be informative for readers who are interested in the different three factor solutions of the English, Spanish, Dutch and German Version of the DHI. Beside the composition of the factors, the factor loadings and the labels of the factors are shown. These labels give an interesting impression about the interpretation of the factors by the different authors.

4) Aim
4.1) To investigate all factor analysis studies – better to write which studies you mean (the French, the German……) Minor Essential Revisions
Response: As mentioned before we deleted this objective and decided to compare the results of the different factor analysis studies in the discussion.

4.2) The last sentence in the aim: last instead of least? Minor Essential Revisions
Response: The sentence was deleted (4.1)

5) Methods
First sentence: Perhaps better like this? “Patients who had suffered from vertigo, dizziness or unsteadiness, associated with vestibular disorder, for at least one month were included in the study”. Discretionary Revisions
Response: We adapted the sentences (p5)

6) Procedures
Please write the entire time-period, so the readers won’t have to go back in the text. Minor Essential Revisions
Response: We adapted the section “procedure” (p6)

7) Results
7.1) The reference to table 3 comes after the reference to table 4 in the text. Minor Essential Revisions
7.2) Table 1: Range for physical subscale on DHI goes from 0 to 29 but the highest possible value is 28. Minor Essential Revisions
Response: We changed the order of the tables and corrected the wrong value in table 1.

7.3) Figure 1: Legend to figure is missing. Minor Essential Revisions
Response: According to the order of sections prescribed by BMC the legend can be found after the references.

8) Discussion
8.1) The first sentence is not necessary; you only describe the method again, instead of describing main findings. Better “This study showed that the 3-factor solution seemed…….”
Major Compulsory Revisions
Response: We have deleted the summary of the method (p12).

8.2) The last paragraph on page 11: This analysis was not in your aim. I suggest you reformulate and put the findings of other research in connection with your own study.
8.3) First three paragraphs on page 12: It seems that you display knew data here and that these data answer the last question in the aim (to investigate the different results of all factor analysis studies). These paragraphs should be moved to results, or reformulated as suggested above. Major Compulsory Revisions
Response to 8.2) and 8.3):
As explained in 3), we deleted in the background section the last mentioned objective of comparing the results of all existing factor analysis studies. The comparison is now part of the Discussion, where previous work on this topic is compared with our data (factor analysis of the DHI). We found similar comparisons in the discussion section in the articles of Vereeck et al. (2006) and Wilhelmsen et al. (2008).

References:
Wilhelmsen K, Strand LI, Nordahl SH et al. Psychometric properties of the Vertigo symptom scale-Short form. BMC Ear, Nose and Throat 2008
9) References
Please state the date of citation to web-page in reference 4. Minor Essential Revisions
Response:
We added the date.

Reviewer: Johan Holmberg

10) General comment
Minor Essential Revisions
The development of good measures for dizzy symptoms in different languages is an important issue as I see it primarily in order to evaluate treatment effects. From my point of view the possibility to use this kind of questionnaire for a diagnostic purpose or as a guideline for treatment without a parallel clinical investigation is limited. I therefore suggest that the clinical purpose of this instrument and especially the subscales is made clearer.
Response:
We agree completely. The analysis of the responses of the questionnaire is only a part of the process of medical decision making. A clinical investigation is of course necessary. In the discussion part we wrote that the retained factors might indicate which other professionals might be involved in the assessment and treatment.
We adapted the background section to make the clinical purpose of the total questionnaire as well as the original subscales clearer (p4/5).

11) I wonder also what the clinical objective is to validate it to the ICF. As the factors described are validated to the ICF terminology theory considering ICF labels is lacking. I think that the description of the DHI and the original subscale structure should be paid more attention to in the background part.
Response:
We adapted the background section to make the purpose, the underlying model, and the structure of ICF clearer and to give an idea how the DHI can be analysed out of the ICF-perspective (p4/5). In our previous work the following figure was used to give an impression how the problems assessed within the DHI reflect the interactions between the components as described by ICF.
**FIG. 1.** Explaining the objectives of the DHI with the model of the WHO's International Classification of Functioning, Disability and Health.

Additional information’s:

“ICF Applications at the individual level

- For the assessment of individuals: What is the person's level of functioning?
- For individual treatment planning
- For communication among physicians, nurses, physiotherapists, occupational therapists and other health works, social service works and community agencies”

(02.02.2010: [http://www.who.int/classifications/icf/training/icfbeginnersguide.pdf](http://www.who.int/classifications/icf/training/icfbeginnersguide.pdf))

“Internationally endorsed classifications facilitate the storage, retrieval, analysis, and interpretation of data. They also permit the comparison of data within populations over time and between populations at the same point in time as well as the compilation of nationally consistent data” (02.02.2010: [http://www.who.int/classifications/en/](http://www.who.int/classifications/en/))

12) I can not find satisfactory description of how the linking was made between ICF label and different factors. It is referred to clinical experience and I do not find that convincing (see page 11).

**Response:**

The DHI was linked to the ICF in two ways:

1.) In the section results we primarily related the retained factors with their composition of items to the four components (1) body function, (2) activities and participation, (3) environmental and (4) personal factors of the ICF. As we declared to do an exploratory factor analysis we used ICF as one scientific accepted model to interpret the factors.
2.) In the Additional file 2 we related the single DHI items to ICF-labels and ICF-categories from the 2\textsuperscript{nd} or 3\textsuperscript{rd} level of the classification.

We added information to the process of linking in the section results (p10)

Additional information:
Each of the four ICF components is build up of several domains, which are the 1st level of the classification. From each domain the classification is going deeper in detail until the 4\textsuperscript{th} level of classification. Cieza et al. (2005) emphasize 2 steps in outcome research, namely, to define first "what to measure" and only then "how to measure". There is a trend to match the items of outcome measures to ICF-categories in order to have the possibility to compare different measures and as a support to select the appropriate outcome measure for the defined intervention goal.

Reference:

13) page (p) 4. In what way does the DHI fit well with the ICF?

Response:
We adapted the background section to clarify this point (p4).

14) p4. Previous studies…. – reference lacking (p5).

Response:
We adapted the sentence.

15) p5. Retained factors refer to what

Response:
"The factors retained by the exploratory factor analysis". We complemented the statement (p5).

16) p 5. How were patients medically investigated?

Response:
We added this information in the section "procedure" (p6).

17) p 6. The data collection was continued … What does this mean?

Response:
We adapted the section procedure (p6).
Data analysis - general comment.
I have not the competence to evaluate the statistics of this work in a satisfactory way. However I wonder if the statistics could be explained in a manner easier to overview for readers like me. For example:

18) p 7. First sentence. What descriptive statistics?
20) p7. The Determinant has to be > 0.00001 and Bartlett’s test highly significant (p < 0.001). This sentence referring to previous sentence get confusing.
21) p 7. …PCA…. Using abbreviations does not make it easier to understand.
22) p 7. With communalities in the 0.5 range, samples between 100 and 200 can be good enough.
23) Samples of what? What range?
24) p 7. No more than 50% of the residuals should be greater than 0.05. According to who or what?
25)p 7. Values < 0.25 were considered to indicate…..
I suppose “values” refers to correlation coefficient from previous sentence. In order to make it easier to read change values to coefficient.

Response:
Some adaptations were done in the section data analysis. The detailed description of what was done may support the estimation of the internal validity of the survey (p7/8).

26) p 8. What were the distribution of vestibular disorders?
Response:
Because of the many different diagnoses we opted to categorize patients to four groups of diagnoses (Table 1).

27) p 8,9. KMO and F7 are also examples of abbreviations that hinders flow in reading. I suggest when referring to specific items of the DHI instead write for example E15 (afraid of appearing intoxicated) throughout the manuscript.
Response:
Each abbreviation is written as a whole word when it is mentioned the first time.
We adapted the manuscript: each time an item of the DHI is mentioned we added a short description of its content.

28) p 9. I question if figure 1. adds much information.
Response:
The eigenvalues of the factors can only be seen in the figure respectively in the figure legend.

29) p 10. Item E15, ‘afraid of appearing intoxicated’, demonstrates that the potential thoughts of observer may become as important as the consequences of postural instability for one’s own safety. Confusing sentence - seems speculative to me.
Response:
We reformulated the sentence for more clarity (p10).

30) p 11.
30.1) I question clinical experience as a source of information valid to make categorizations from. Also from my clinical experience this conclusion is not always correct. For example difficulties leaving home alone are one of core symptoms of agoraphobia.
30.2) What is meant by walking ability? There is no possibility from available data to make conclusion considering walking ability.
Response:
30.1) When we did an exploratory factor analysis, we investigated different factor solutions to find the statistically most reliable and clinical most meaningful solution. Of course interpreting the factors exclusively based on the own clinical experience would be insufficient. Therefore we based our interpretation of the factors on the ICF, an internationally accepted classification of functioning and disability, the neurophysiology of the vestibular system, the interaction of vestibular disorders and psychiatric co-morbidity as described in cross-sectional studies and the comparison with the results of the previous factor analysis studies of the English, Spanish, and Dutch version of the DHI (Additional file 2). We adapted the discussion section to make this clearer. (p15).
We agree that item E9 (difficulties leaving home alone) might be a core symptom of agoraphobia. This might support the label we have chosen for the last factor of the 4-factor solution: “dependence of others/ fear”. A high score in this factor might lead to the hypothesis of somatoform dizziness. Therefore we belief, that the factors could be helpful for the clinical reasoning process.
30.2)
I found the phrase “walking ability” in different surveys. Within stroke research it is discussed what abilities a person must have to be able to walk outside the own rooms. Hill et al. (1997) listed following points: FIM > 5 (independent gait), FAC = 6 (ability to negotiate uneven terrain and kerbs), Gait velocity >= 0.8 m/sec, Gait endurance > 500 m. And these criteria still have to be completed!
Items of the DHI only give an impression of aspects of the self-perceived walking ability. But again this might lead to the decision to quantify the walking ability with objective assessments. We now reformulated this aspect in the manuscript and say that items of the DHI quantify (aspects of) self-perceived walking ability.

Reference:

31) I wonder if the labeling of factors should be handled in the discussion part.
Response:
We adapted the discussion section and pointed out the subjective part of interpreting the factors. (p15)

32) p 11. What is the purpose of additional tables? Why are they not included in the manuscript.
Response:
These tables give “only” additional information. Some readers might not be interested in the ICF-categories of the 2nd or 3rd classification, or they find it sufficient to know, that the DHI should only be used as the total scale. Furthermore the tables will be too comprehensive for a PDF-format.

33) p 12. Why was the three factor solution more reliable? It is probably clear from a Statistic point of view but to me the four factor solution make more sense.
Response:
Because of this observation we described both factor-solutions. In our survey only the 3-factor solution is reliable from a statistical point of view and clinically interpretable. Therefore we put the focus on this result. But as described the results of an exploratory factor analysis are dependent of the kind of study population. I think that further research for example may investigate if the fourth factor of the 4-factor solution may identify people with somatoform dizziness or patients with specific psychiatric morbidity or co-morbidity. We only investigated the association with the HADS, HADS-A, and HADS-D (Spearman correlation coefficients: 0.47, 0.37 and 0.48)

34) p 12. What objective of the DHI was supported?
Response:
We repeated this information in this discussion section (p12).
35) p 12. Last sentence first paragraph. This becomes speculative.
35.1) There are no data considering walking ability and there is no
35.2) scientific evidence considering the effect or methods applied by different professions.
According to what is written in general comment I doubt that this kind of questionnaire is valid
to make such generalizations. And again this highlights the question of what the clinical
purpose of subscales is.
Response:
30.1) Instead of walking ability we now write “self-perceived walking ability”.
30.2) Yes it is speculative. Therefore we write: it might be.
For some clear diagnoses evidence based treatment strategies are known. But sometimes a
clear diagnosis can not be found or patients have symptoms and feel disabled though it can
not be explained with a medical cause. In this topic: chronic subjective dizziness,
somatoform dizziness, phobic postural control might be examples. In order to improve
functioning and well-being there are efforts to develop or improve treatment strategies.
Different professions are experts in the different health and health related domains defined
by the ICF and it seems to be reasonable to select the health care professionals or treatment
strategies according to the main symptoms or disabilities of an individual. At least short time
effects could be shown in randomised controlled trials evaluating the effectiveness of
vestibular rehabilitation or cognitive behavioural therapy though in many surveys the study
population was very heterogeneous (and small). In our manuscript we only point out the
possibility of subscales to cluster specific disabilities which may support the decision making.
Even a categorisation of patients on the basis of specific symptoms or disabilities could be
helpful for the analysis of the effect of interventions and their development.

36) p12. Especially the 3-factor solutions show parallels. Parallels to what?
Response:
Parallels to each other: The 3-factor solutions of the English, Spanish, Dutch and German
version of the DHI show parallels – are comparable, like it is described in the following
section and demonstrated in the Additional file 2 (p13).

37) 13. Please check if conclusion from reference 27 about Menieres disease is correct.
Response:
You are right. I mentioned the wrong publication of this author group! I corrected it.

38) p 15. Spelling of solution.
Response: The correction is done.