A large-scale substantiation of own-voice issues in hearing-aid users, part II: Reducing occlusion problems is still important

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Introduction

In a companion presentation (part I), Laugesen at al. (2008) report on a questionnaire study carried out at Hörzentrum Oldenburg, Germany, where the main hypothesis under test was that hearing-aid users have other issues and concerns – for example, finding the right speaking level for the occasion, speaking and hearing at the same time, and whispering – related to their own voice besides the well-known problems caused by occlusion. This hypothesis was strongly confirmed by the questionnaire data.

However, if not dealt with, the occlusion-related problems are of course still existent. Accordingly, a secondary hypothesis was that hearing-aid users exposed to occlusion will experience occlusion-related own-voice issues not seen in hearing-aid users not exposed to occlusion.

Method

TEST SUBJECTS

Three groups of experienced hearing-aid users were recruited. The groups were balanced with respect to age and gender.

Group	N	LF HL	Vent	Occlusion problems		
1	60	≤ 30 dB HL (small)	≥ 3.0 mm (large)	Not expected		
2	55	≤ 30 dB HL (small)	≤ 2.0 mm (small)	Expected		
3	54	≥ 50 dB HL (large)	Some vent	Not expected		

All subjects evaluated the own-voice perception with their current own hearing aids, which included various brands and models. The subjects had used the hearing aids for at least 3 months and at least 4 hours a day.

QUESTIONNAIRE

A new questionnaire, the Own Voice Qualities (OVQ) questionnaire (Jensen et al., 2006), was developed for the purpose of this study. The OVQ consists of 104 items about various aspects of own voice. The items are formulated as statements to which the respondents have to express their agreement on a Likert-inspired scale from 0 to 12.

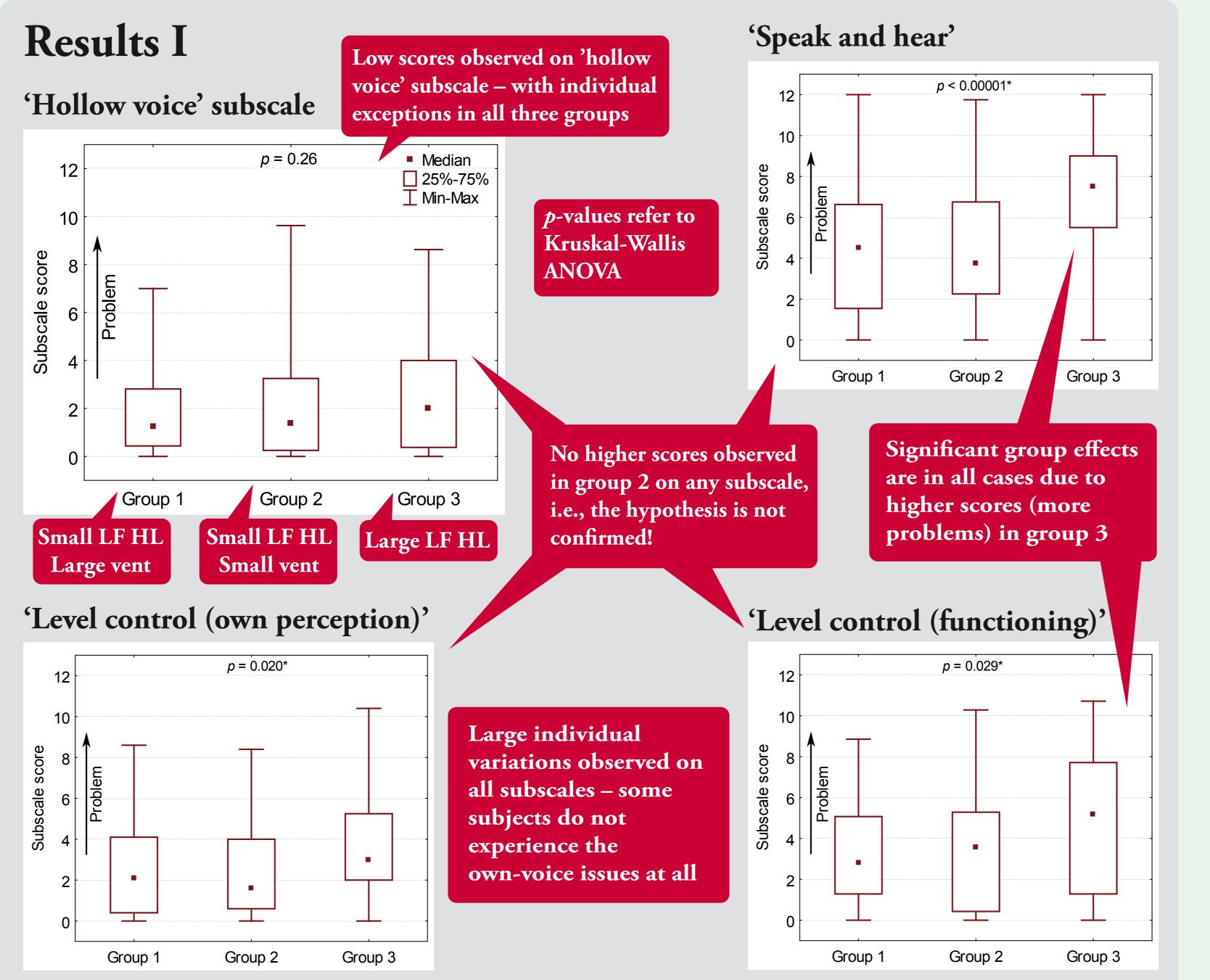


The OVQ is filled in during an interview in order to provide help and avoid misunderstandings. This approach is inspired by that used by Gatehouse and Noble (2004).

Example of OVQ-item	I find that my own voice sounds as if	Strongly disagree	Some- what disagree	Neutral	Some- what agree	Strongly agree	N/A
	I am speaking in a barrel.	0 1	2 3 4	5 6 7	8 9 10	11 12	

SUBSCALES

Items expected to probe into the same underlying phenomenon were grouped into a single subscale, which was used in the data analysis. Subscale scores are calculated as the average of the underlying item scores.



Basically, these results suggest that it makes no difference whether people with small LF HL are fitted with small or large vents. This does not agree with clinical experience – and the data thus call for some explanations!

Explanations

SELF-SELECTION

All test subjects were asked about own-voice perception with their own hearing aids, which they had decided to buy and use. It is not likely that a person will appear in group 2 if he is bothered by occlusion when using a small-vent hearing aid. More likely, this person will be in group 1. That is, group 2 has 'selected itself' among people not bothered by occlusion – and in fact it was much harder to find group-2 than group-1 subjects!

• ACUTE vs. CHRONIC OCCLUSION

The OVQ asks about the chronic occlusion experienced after getting adjusted to the hearing aids. If the acute occlusion – experienced immediately after the fitting of new hearing aids (and before making a buying decision) – had been assessed, it could be speculated that the results would have been different.

HEARING LOSS

The higher scores observed in group 3 on some subscales may be explained by the larger hearing losses in this group. Reduced listening abilities may have affected the responses on some items, e.g., regarding 'speak and hear' situations.

Follow-up study

A follow-up study was carried out by the 5th and 6th authors at the public hearing-aid clinic in Nykøbing Falster, Denmark. The study design was chosen according to the experiences made in Oldenburg – with the same hypothesis: That hearing-aid users exposed to occlusion will experience occlusion-related own-voice issues not seen in hearing-aid users not exposed to occlusion.

In a balanced cross-over study, 43 experienced hearing-aid users (hearing loss similar to group 1 and 2 in the Oldenburg study) compared own-voice perception with an open fitting and with a small-vent fitting, respectively. Each setting was used for one month before an abbreviated version of the OVQ was filled in.

The open-fitting hearing aid was Oticon Epoq fitted with open domes, while the small-vent hearing aid was the same hearing aid fitted with micro moulds with small vents (0.8 mm nominal diameter ~ 1.3 mm effective diameter).

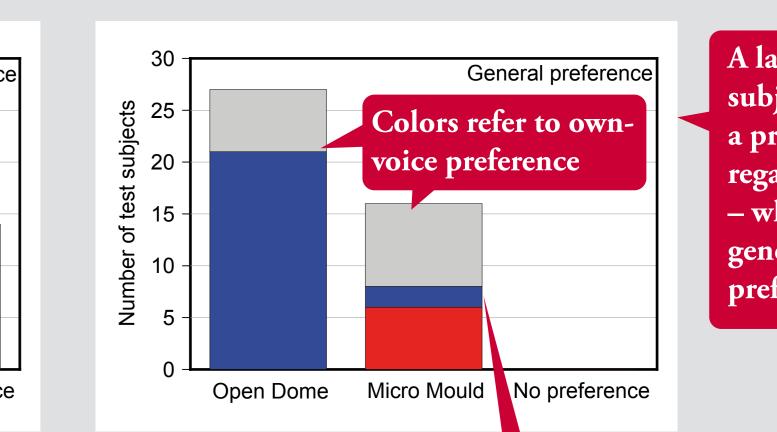


Open Dome Micro Mould No preference

Among those having an own-voice preference a clear majority preferred the open fitting

Hearing-aid preference

At the end of the follow-up study, all subjects were asked about their preference regarding own voice only, as well as their general hearing-aid preference.



- while all stated a general hearing-aid preference

A few test subjects preferring open domes for own voice had a general preference for the micro mould fitting. None had the opposite shift in preferences!

The majority of test subjects preferred the open fitting – both with respect to own voice and in general. But a large minority preferred the micromould fitting in general – mainly reporting better hearing abilities as the reason for their preference.

Conclusions

- The expected differences between hearing-aid user groups were not observed in the Oldenburg data, mainly due to the study design where self-selection was allowed.
- The follow-up study showed the expected differences, thereby offering support for the hypothesis (i.e., occlusion-related problems are reduced when occlusion is eliminated) as well as for the explanations for the results observed in the Oldenburg study.
- There was a large individual variance in the data in both studies. Some hearing-aid users experience significant own-voice problems, while others do not experience such problems at all.
- After using an open fitting, reverting to a small vent is particularly bothersome with respect to own voice.
- Obvious own-voice benefits of open fittings are seen, but small-vent fittings (micro moulds) are in fact preferred by some people due to better hearing abilities.

References

Gatehouse S., Noble W. (2004): The Speech, Spatial and Qualities of Hearing Scale, Int. J. Audiol. 43(2), 85-99.

Jensen N.S., et al. (2006): A first attempt at a comprehensive Own Voice Qualities (OVQ) questionnaire. Poster presentation at IHCON.

Laugesen S., et al. (2008): A large-scale substantiation of own-voice issues in hearing-aid users, part I: There is more than just occlusion. Oral presentation at IHCON.

Results II p-values refer to Wilcoxon Subscale differences Open domes difference on 'Level significantly better on 'Hollow voice and 'Speak and hear' and 'Level control Large individual A 2-point median pronounced differences than subscales 'Hollow voice' subscale and underlying item scores 25 % of the subjects have a rating of 10 or more on this item with micro moulds Single cases of occlusion-like mptoms are also seen with open Before entering the study, only a few subjects had used open fittings – Micro Mould Open Don ost were used to hearings aids which in terms of vent were closer to Many individual subjects d the micro mould fittings not report about occlusion Order effects problems at all *p*-values refer The difference between the two fittings is more pronounced for the subjects who started with the open ittings and switched to micro moulds than for the subjects who were fitted in the opposite order

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