

Fördelar med högre "Maximal Force Output" i benförankrade hörapparatsystem: en crossover-studie

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Handledare

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BAKGRUND

Maximal utnivå
(MFO)

Storlek



SYFTE

Undersöka hur högre maximal output i benförankrade hörselsystem påverkar den upplevda nyttan och subjektiv upplevelse av ljud samt hörselresultat hos personer med kombinerad hörselnedsättning

INTERVENTION

- Mindre ljudprocessor-
lägre MFO
- Större ljudprocessor-
högre MFO

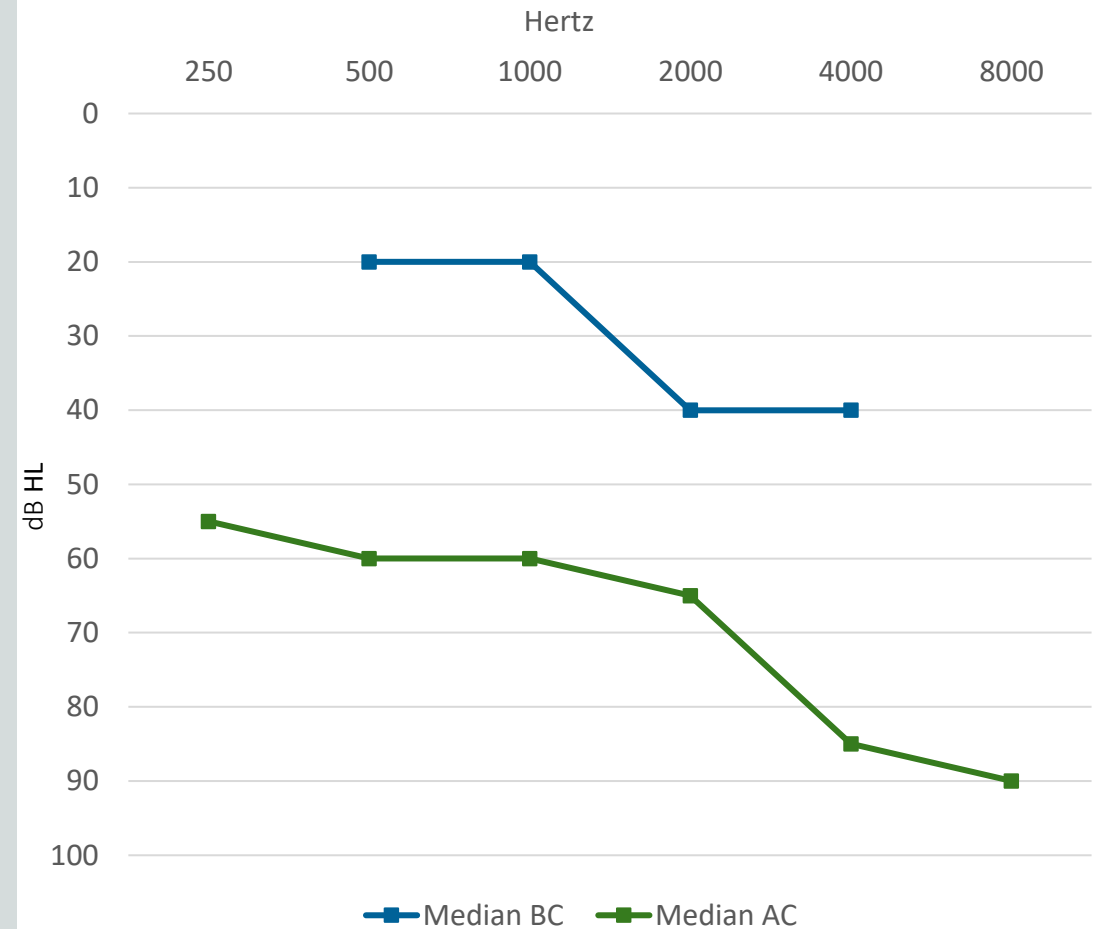


UTFALLSMÅTT

- Frågeformulär (SSQ och eget)
- Ljudfältsmätningar
 - Taluppfattning (HINT)
 - Hörtrösklar

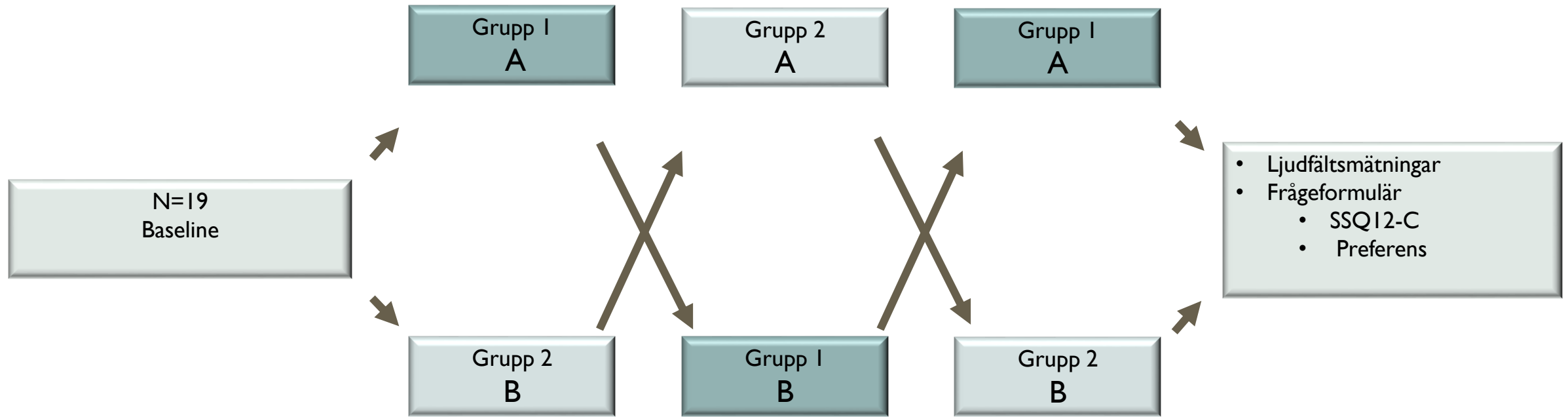
DELTAGARE

- N=19 (11 män, 8 kvinnor)
- Ålder 46-76 år (medel 68 år)
- TMV (BC) 21-41 dB HL
- Tidigare ljudprocessor
 - 11 standard
 - 8 power



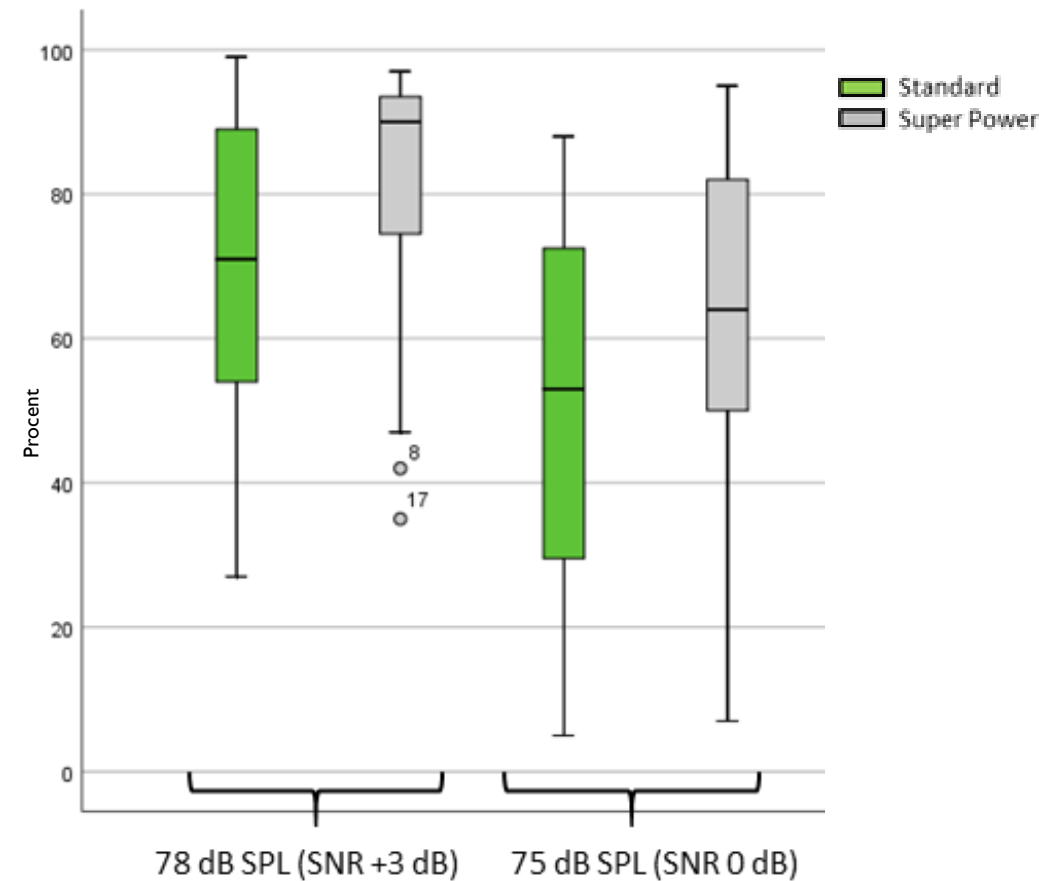
Studie design

ABA



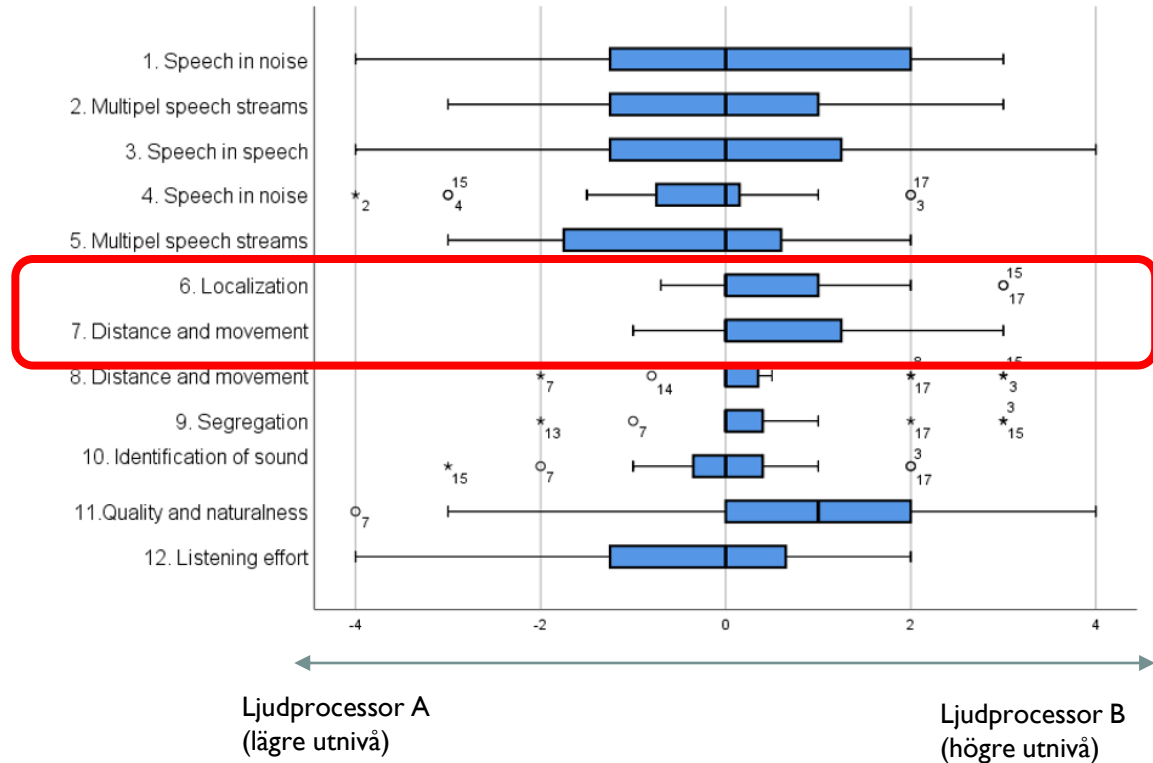
Ljudprocessor A- lägre maximal utnivå
Ljudprocessor B- högre maximal utnivå

TALUPPFATTNING I BRUS

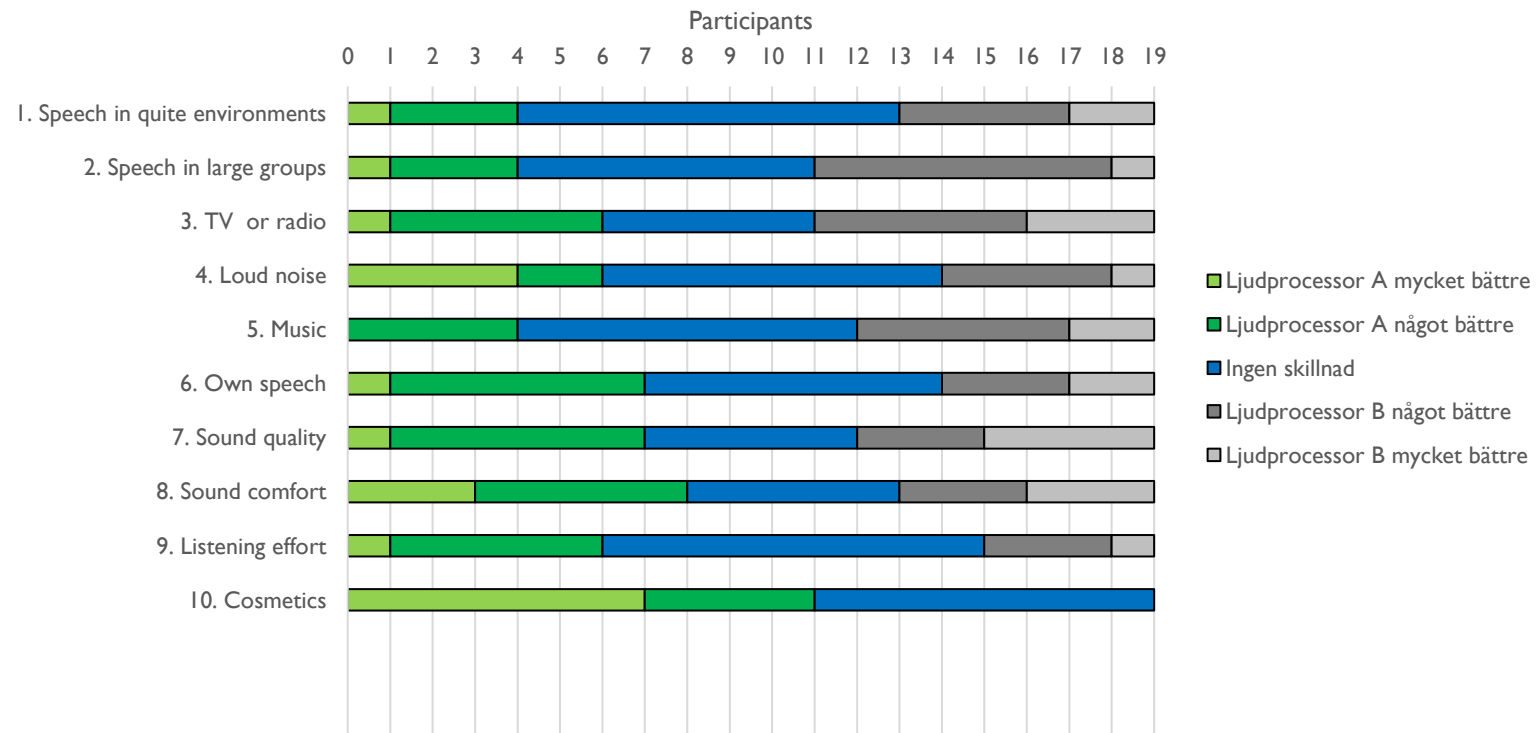


Signifikant bättre med ljudprocessor B (högre MFO)
@ 78 and 75 dB SPL ($p < 0.05$)

FRÅGEFORMULÄR SSQ12-C



FRÅGEFORMULÄR PREFERENS



VAL AV LJUDPROCESSOR

Ljudprocessor A (lägre MFO)

N=11

- Storlek
- Behagligare ljud
- Lättare att hantera

Ljudprocessor B (högre MFO)

N=8

- Bättre ljudkvalité
- Fylligare och rikare ljudupplevelse
- Bättre taluppfattning

KONKLUSION

- Högre maximal utnivå ger signifikant bättre taluppfattning i krävande ljudmiljöer
- Vid val av ljudprocessor är det många olika faktorer som vägs in, vissa användare tycker det är viktigare med ljudprocessorns utseende och storlek är viktigare än högre maximal utnivå

OPEN

Benefit of Higher Maximum Force Output in Bone Anchored Hearing Systems: A Crossover Study

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Objective: To investigate how higher maximum force output (MFO) in bone anchored hearing systems (BAHS) affects perceived benefit and the subjective experience of sound as well as hearing outcomes in subjects with mixed hearing loss.

Study Design: Prospective single-center, randomized crossover design (A-B-A) with within-subject control design.

Patients: The study included 19 experienced BAHS users with mixed hearing loss in the fitting range of a standard BAHS.

Interventions: The study evaluated two sound processors with differing MFOs and sizes—Device A: standard sound processor with a lower MFO and Device B: superpower sound processor with a higher MFO.

Outcome Measures: Speech recognition in noise at different signal to noise ratios, aided thresholds, and questionnaires.

Results: Speech recognition test showed significant improvements using Device B compared with Device A at both 78 dB SPL (mean difference: 9%) and 75 dB SPL (mean

difference: 12%) ($p < 0.05$). Moreover, speech, spatial and qualities of hearing scale (SSQ12-C) showed a significantly greater perceived benefit with Device B concerning spatial abilities (mean: 0.5–0.6) ($p < 0.05$). At the conclusion of the study, 58% of participants chose to keep Device A for further use. The main reasons for this were the size of the sound processor and a more comfortable sound experience.

Conclusions: A BAHS sound processor with a higher MFO leads to improved speech-in-noise performance in loud/noisy listening situations and is perceived as significantly better to process spatial information in daily listening situations. However, the relation between cosmetics and performance is not straightforward, and several factors seem to affect the selection process of BAHS. **Key Words:** Bone anchored hearing aids—Maximum force output—Mixed hearing loss.

Otol Neurotol 42:1451–1459, 2021.

Bone anchored hearing systems (BAHS) are a rehabilitation alternative for patients with conductive, mixed hearing loss, or single sided deafness (1,2). A percutaneous BAHS consists of an external sound processor that picks up sound and converts it into mechanical vibrations. These vibrations are then transmitted to a skin penetrating abutment and an implant, and onward through the temporal bone to the inner ear (3).

BAHS sound processors differ in size, design, and maximal force output (MFO). MFO is the maximal level

of force that the sound processor can transmit to the temporal bone without distortion (4). The MFO in modern BAHS sound processor is controlled by signal processing. When the output signal reaches the MFO, it will be quickly attenuated in that frequency band, such that physical saturation of the transducer never occurs. The high compression ratio will introduce some artifacts, which may affect speech recognition and sound quality (5). To date, all BAHS available in the market have a MFO that are below listeners' loudness discomfort levels and limited MFO leads to a reduced auditive dynamic range but also prevents loud sounds reaching an uncomfortable level (6–9). In general, larger sound processors with larger vibrators provide a higher MFO and, as such, allows the reproduction of a larger proportion of the auditive dynamic range, therefore sounds are reproduced more naturally without being distorted with this kind of device (6,7).

A higher MFO in BAHS sound processors has been shown to improve speech understanding in noise at normal conversation levels for people with mixed hearing loss (10) and reduce listening effort when measured with pupillometry, as a consequence of fewer saturation artifacts (5). Moreover, a study of Bosman et al. (8)

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The project was supported by Oticon Medical AB, William Demant Foundation and Region Västra Götaland, Habilitation & Health, Hearing Organization, Gothenburg, Sweden.

T.R. is an employee of Oticon Medical AB, Askim, Sweden and M.P. is a former employee. For the remaining authors none were declared.

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DOI: 10.1097/MAO.0000000000003331