



A Two-Site Field Trial of an Instant-Fit Digital Hearing Aid

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ABSTRACT

An instant-fit, digital, CIC hearing aid has been developed that increases time- and cost-efficiency over that associated with custom, in-the-ear devices. A field-retrofittable custom shell is an available option. Data presented include objective speech recognition results obtained on the Hearing In Noise Test (HINT) in quiet and in noise, and subjective measures of benefit and satisfaction obtained on the Abbreviated Profile of Hearing Aid Benefit (APHAB)

INTRODUCTION

A two-site field trial evaluated the performance, benefit, and satisfaction of the Adesso™ hearing aid, introduced by Sonic Innovations in 2001. Test Site 1 was the Hearing Aid Research Laboratory at Sonic Innovations in Salt Lake City, Utah (SLC). The single-site results from Site 1 were reported at the 2002 International Hearing Aid Research Conference (IHCON)1. Site 2 was the Audiology Clinic in the Department of Communication Disorders and Deaf Education at Utah State University in Logan, Utah (USU).

Identical protocols were used at both test sites. Objective measures of speech recognition in quiet and in noise were obtained with the Hearing In Noise Test (HINT)2. Subjective measures of benefit were obtained on the Abbreviated Profile of Hearing Aid Benefit (APHAB)3. Additionally, satisfaction ratings were obtained using the Multiple Environment Listening Utility (MELU) portion of Kochkin's Hearing Aid Satisfaction Survey (HASS) and compared against the results of the nationwide results for 524 hearing aid wearers published as part of the MarkeTrak V survey results4.

The purposes of the study were to evaluate the objective speech recognition performance of Adesso in quiet and in noise, and subjective benefit and satisfaction at two independent test sites. Outcomes that could be influenced by test site are presented separately by site as well as pooled. Outcomes that are site-independent are presented as pooled data.

The specific research questions to be answered by the study were:

- Does use of Adesso hearing aids improve speech recognition in quiet over the unaided condition?
- Does use of Adesso hearing aids improve speech recognition in noise over the unaided condition?
- Does use of Adesso hearing aids provide communication benefit over the unaided condition?
- Does use of Adesso hearing aids generate satisfaction among hearing aid wearers across multiple listening environments?

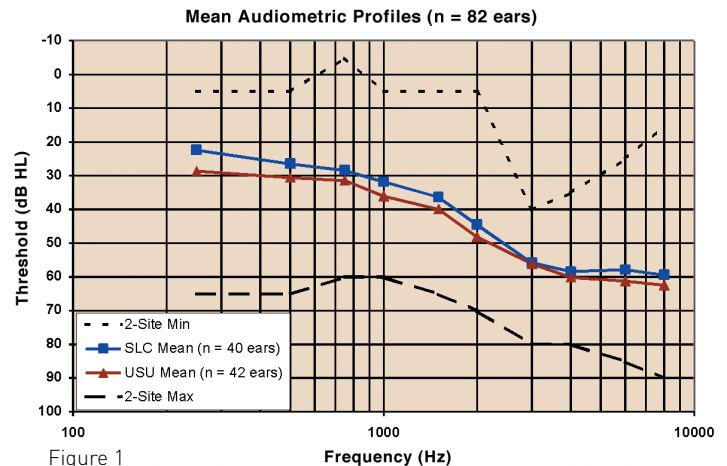
METHODS

Test Sites.

- SLC: 10 normals; 4 male and 6 female young adults.
- USU: 10 normals; 3 male and 7 female young adults.
- Essentially equivalent HINT test conditions for evaluating speech recognition in noise at the two sites ($p = .72$).

Subjects.

- SLC: 20 subjects, 12 male and 8 female, mean age = 64 years.
- USU: 21 subjects, 11 male and 10 female, mean age = 66 years.



- Symmetrical, bilateral, sensorineural hearing loss (Figure 1).

Hearing Aid Fittings.

- Simplified Fitting Procedure (no in-situ dynamic range verification; frequency-dependent gain, output, and Noise Reduction [NR] parameters set by the fitting algorithm based on individual thresholds).
- All fittings accomplished in about an hour.
- Fittings and data collection performed with non-custom, foam shells.

Test Materials.

- HINT, noise-front (0-degrees azimuth), single loudspeaker at 1 meter.
- HINT modified to change noise onset from 0.5 seconds to 5.0 seconds prior to onset of sentence.
- Unaided APHAB responses obtained prior to fitting; Aided responses obtained at close of data collection.
- MELU administered at close of data collection.

Procedures.

- 2 follow-up visits for each subject for fine-tuning, if needed.
- Minimum of 30 days post-fitting prior to beginning data collection.
- Minimum of 10 days post-adjustment prior to beginning data collection.

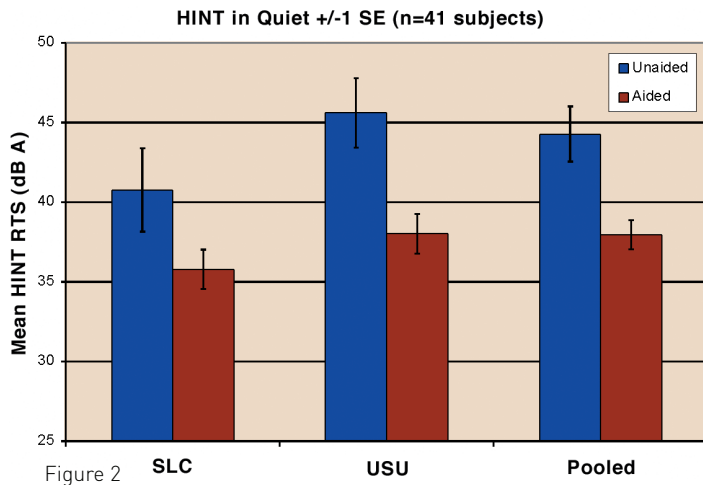


Figure 2

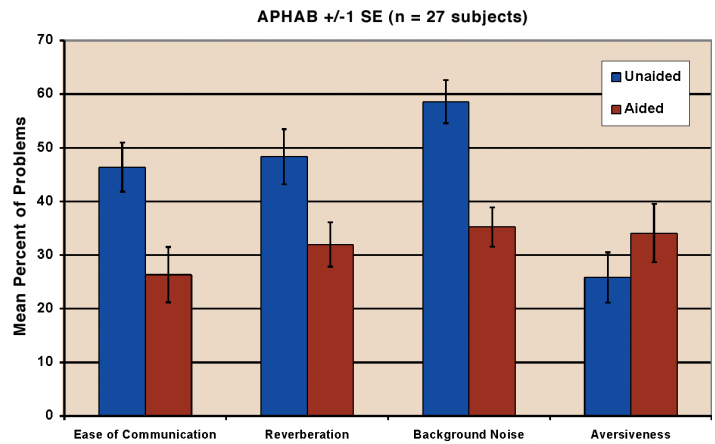


Figure 4

- No significant interaction between Site and Aided Condition ($p = .85$), suggesting that the improvement in SNR performance at each site was a direct result of amplification with Adesso hearing aids.

APHAB Results (Figure 4).

- 27 subjects pooled from both sites completed the APHAB.
- Significant main effect for Aided Condition [$F(1, 26) = 23.104, p < .001$] on the 3 performance subscales (EC, RV, and BN) due to the benefit provided by the Adesso hearing aids.
- Significant main effect for Subscale [$F(1, 27) = 6.50, p = .003$] on the 3 performance subscales due to differences in the performance parameter measured by each subscale.

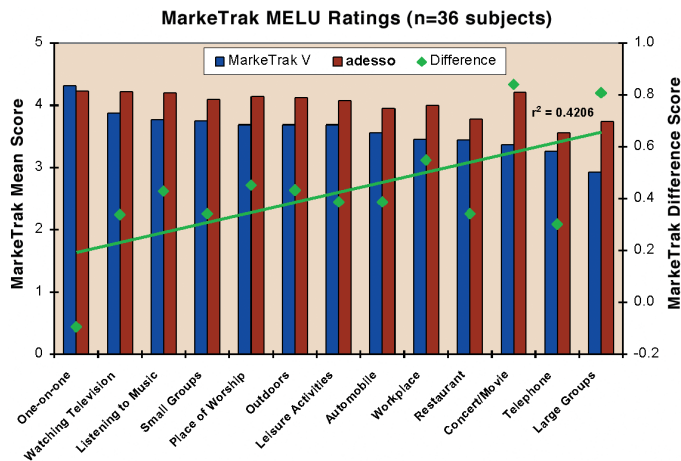


Figure 5

- No significant interaction between Aided Condition and Subscale ($p = .21$) on the 3 performance subscales.
- No significant difference between Aided and Unaided ($p = .07$) on the Aversiveness subscale, suggesting that wearing Adesso hearing aids does not make sound more aversive than when unaided.

RESULTS

HINT in Quiet (Figure 2).

- Significant main effect for Site [$F(1, 39) = 4.98, p = .03$] due to greater average hearing loss for USU subjects.
- Significant main effect for Aided Condition [$F(1, 39) = 41.71, p < .001$] due to improvement in performance from Adesso hearing aids.

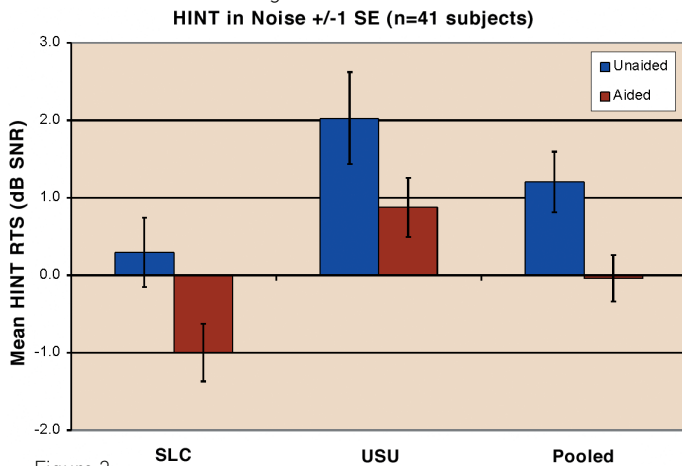


Figure 3

- No significant interaction between Site and Aided Condition ($p = .19$), suggesting that the improvement in thresholds at each site was a direct result of amplification with Adesso hearing aids.

HINT in Noise (Figure 3).

- Significant main effect for Site [$F(1, 39) = 9.82, p < .01$] due to greater average hearing loss, and consequently greater SNR loss, for USU subjects.
- Significant main effect for Aided Condition [$F(1, 39) = 21.06, p < .001$] due to improvement in performance from Adesso hearing aids.

MELU Results (Figure 5).

- 36 subjects pooled from both sites completed the MELU.
- The mean MELU score for Adesso was 4.0 ("Satisfied") across 13 conditions, as compared to the national average of 3.6 (between "Neutral" and "Satisfied").
- Differences between the national average and Adesso satisfaction ratings increased as listening conditions became more difficult.

SUMMARY

The results of a 2-site study of the Adesso non-custom, instant-fit hearing aid have been presented. Outcomes on tests of objective performance indicate that Adesso is effective at improving speech recognition for hearing-impaired individuals in quiet and in noise. Subjective ratings indicate improved communicative benefit for Adesso over the unaided condition and increasing satisfaction over the national average as listening conditions become more challenging.

REFERENCES

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4. Kochkin, S. (2000). MarkeTrak V: Consumer satisfaction revisited. *The Hearing Journal*, 38-55.

