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SCREENING AND DIAGNOSTIC

# Validation of the AMTAS method for user operated pure tone audiometry in Sweden

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## Abstract

The Automated Method for Testing Auditory Sensitivity (AMTAS) is a clinically available method for effective hearing assessment. Earlier studies have compared the AMTAS method to the 'gold standard' manual method of pure tone audiometry, but a majority of the participants in those studies had normal or mild to moderate hearing loss. Therefore, the *I HeAR* project has initiated a clinical study to explore how the AMTAS method works with all degrees and types of hearing loss.

## Objectives

The aim of the current ongoing study is to investigate the accuracy, reliability, and user-experience of user operated pure tone audiometry with the AMTAS method, with children and adults in different ages, different degrees and types of hearing loss, as well as different audiogram configurations. This poster presents partial results regarding threshold differences between AMTAS and manual audiometry.

## Methods and Materials

This poster presents results from 77 (of a planned total of 660) participants (48% female, mean age=56, sd=19, range=10–87 years), included at seven Swedish hearing health clinics. Participants' hearing ranged from normal hearing to severe hearing loss (figure 1).

All participants underwent standard manual pure tone audiometry and user-operated audiometry with the AMTAS method. In a majority (97%) of cases, a standard bone-conductor spring was used to hold the bone conductor in the forehead position during AMTAS measurements.

## Results

***Figure 1.*** **Air conducted thresholds (top), air conducted threshold asymmetry (middle) and air-bone gaps (bottom) for the 77x2 ears measured with manual pure tone audiometry.**

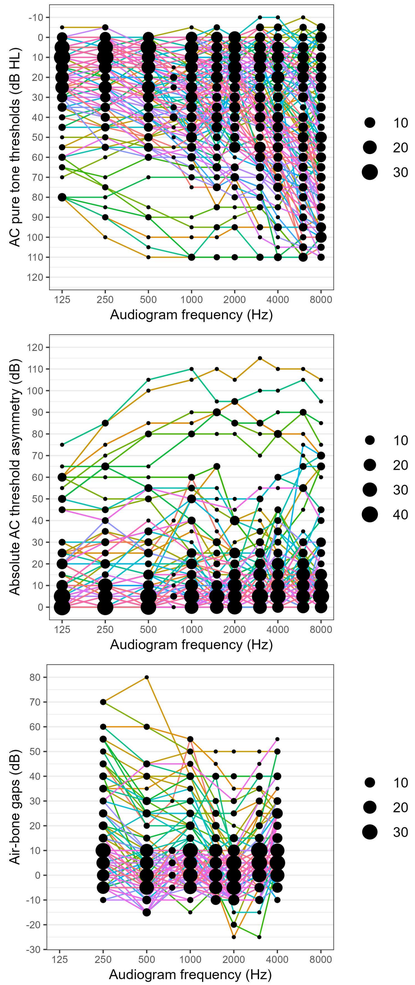
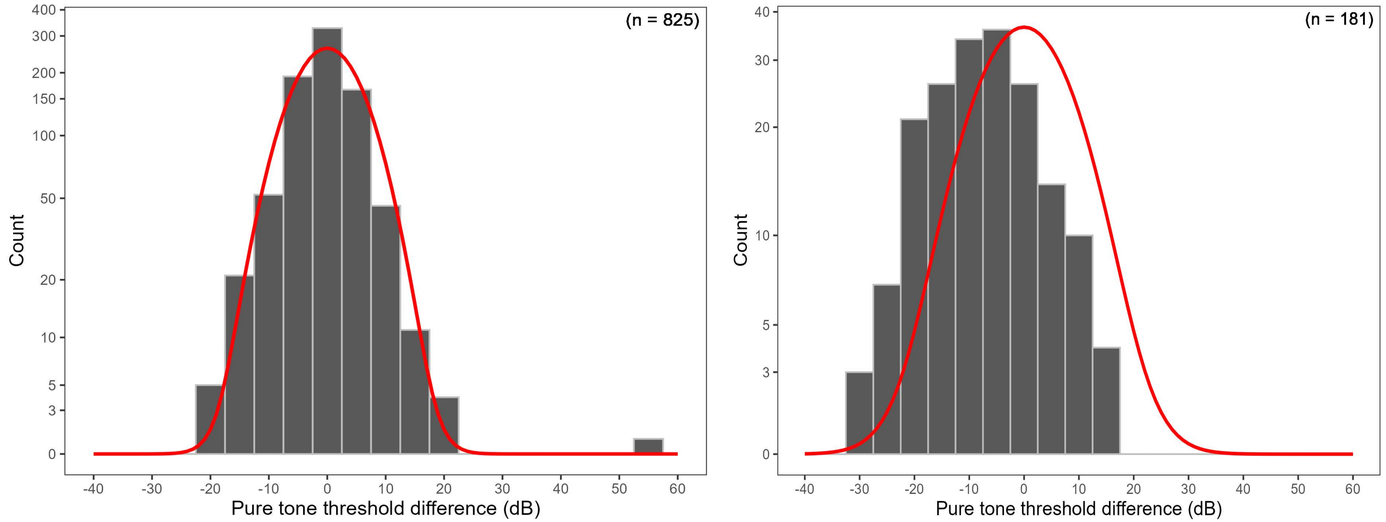



***Figure 2.*** **The distribution of hearing threshold differences between manual and automated pure-tone audiometry (with good quality ratings) for air conduction (left) and for bone conduction (right). Red lines show the expected test-retest differences from manual audiometry (1).**




Of the 77 AMTAS audiograms, 65% was rated as having good quality, 18% as fair quality and 17% as poor quality by the AMTAS Qualind (2) algorithm. The remaining analyses are based solely on the 50 AMTAS audiograms rated as having good quality. As figure 2 indicates, for air-conduction measurements, the AMTAS method produce hearing thresholds that are well in line with manual measurements. Unlike in some previous studies (3, 4), AMTAS tends to produce slightly higher (mean difference = 7.5 dB) bone conduction thresholds than manual audiometry. Mean absolute differences were 4.2 dB (AC) and 10.1 dB (BC), and root mean square differences were 6.3 dB (AC) and 12.4 dB (BC), respectively. This is similar to findings reported in other studies (3, 4).

## Conclusions

The early results of this study indicate that the AMTAS method holds promise in addressing the high demand for efficient tools and strategies in hearing health care. However, more data and detailed analyses are needed, particularly concerning bone conduction measurements.

## References

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