

VALIDITY OF HEARING SCREENING USING THE HEARTEST SMARTPHONE-BASED AUDIOMETRY AS A SCREENING TOOL FOR HEARING LOSS

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INTRODUCTION

Studies in various countries have investigated the use of smartphone apps as a hearing screening tool to estimate the prevalence of hearing loss and identify cases¹⁻⁵. We were unable to identify studies in Brazil that have estimated the accuracy of these apps, while international investigations have yet to test their different test response modes⁶⁻⁸.

OBJECTIVE: To investigate the validity of hearTest smartphone-based hearing screening compared to pure tone audiometry (PTA), the gold standard.

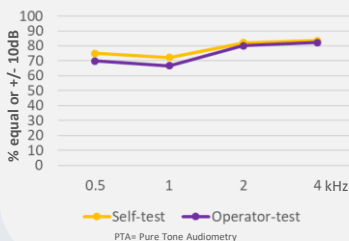
METHODS

A diagnostic accuracy study was conducted in a public university outpatient clinic to identify a) **disabling hearing loss (DHL)**⁹, and b) **any degree of hearing loss (AHL)**, using **two test response modes: self-test and operator-test**. We estimated the proportion of ears with thresholds between +/-5 and +/-10 dB HL, comparing hearing screening and PTA. To analyse the accuracy of auditory thresholds obtained from PTA and hearing screening we categorised the results into pass/fail: a) **“failure”** when the threshold averages for 0.5 to 4 kHz were >40 dB HL in adults (≥ 15 years old) and >30 dB HL in children; b) **“failure”** when the threshold averages for 0.5 to 4 kHz were >25 dB HL, independent of participant age. We estimated the following accuracy measures: sensitivity (Se), specificity (Sp), positive and negative predictive value and Youden Index. Based on the previous studies, a **Se and Sp of 80%** and a **Youden Index of 70% or above** were established as the cut-off points for good accuracy.

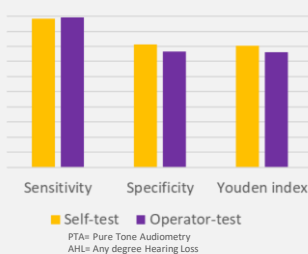
RESULTS

- Of 340 participants (5 – 92 years) , 301 undertook all test procedures (602 ears).
- Based in the Youden Index, hearTest hearing screening consistently provided better accuracy in identifying disabling hearing loss compared to any level of hearing loss.

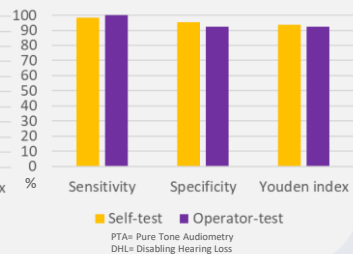
Hearing thresholds PTA vs hearTest



hearTest against PTA to AHL (all ears)



hearTest against PTA to DHL (better ear)



CONCLUSION

Hearing screening using the hearTest smartphone-based audiometry provides good accuracy to identify both disabling hearing loss and any degree of hearing loss in both response modes, either mediated or self-tested, and is a feasible screening alternative when tonal audiometry is not available.

Keywords: hearing loss; mass screening; mobile applications.

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