



How we know our hearing loss check is accurate

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It goes without saying that when you have a hearing check, you should be able to trust the results and subsequent recommendations. Here are three reasons why **eargym**'s hearing loss check is a reliable way to check your hearing health.

It is based on scientific research

The check we use to screen for hearing loss is known as the '**Digit Triplet Test (DTT)**', which is a type of 'speech in noise' procedure. The DTT was developed by [Smits, Kapteyn, and Houtgast \(2004\)](#) of VU University Medical Center, with their study being published in the International Journal of Audiology. This study showed that results from the DTT correlate strongly with pure tone audiometry; the 'gold standard' of hearing checks. Since then, the procedure has been evaluated in depth ([Van den Borre et al., 2021](#)) and has been widely adapted for remote hearing loss screening, including by the [World Health Organisation](#).

The **eargym** implementation uses the UK DTT version developed jointly by Hörzentrum Oldenburg (HZ-OL) and University of Southampton (Phipps, 2007; [Vlaming et al., 2011](#), [Akeroyd et al., 2015](#)). We use the data from these studies to calculate the hearing loss score and specify our outcome categories of '*no hearing loss detected*', '*possible hearing loss detected*' and '*hearing loss detected*'.

Our data agrees with UK averages

Looking at our data of hearing loss outcomes, we see that 18% of our users are identified as having hearing loss, 25% have possible hearing loss and 57% have no hearing loss (Figure 1). This is consistent with national statistics from the UK which show that 20% of adults have hearing loss, are deaf, or have tinnitus ([RNID, 2023](#)).

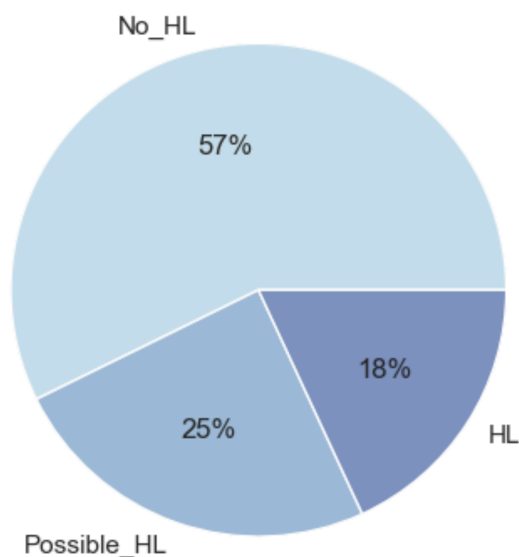


Figure 1: DTT outcome categories across unique users (N=1253). HL refers to 'hearing loss'. Data from December 2023.

Users who say they struggle with hearing in noisy environments get lower scores in the DTT

The DTT is a *behavioural* procedure, meaning that the results are based upon a user's actions. Within **eargym** we also have a *subjective* measure of hearing loss; the (modified) Amsterdam Inventory for Auditory Disability and Handicap ((m)AIAD) ([Meijer et al., 2003](#)).

This is a self-assessment questionnaire that consists of 28 questions covering all the relevant factors of disability in individual hearing functioning in daily life. The response scale for each item is a 4-point Likert scale measuring how often the respondent is able to hear effectively in a specific situation: 0 = almost always, 1 = frequently, 2 = occasionally, or 3 = almost never.

Results from (m)AIAD can be segmented into categories relating to auditory skills including 'intelligibility-in-noise'. This category can be seen as a self-reported measure of speech-in-noise ability, and should therefore correlate with **eargym**'s DTT implementation. The maximum score for the intelligibility-in-noise subset is 15, with higher values representing better self-reported ability.

When we plot subjective scores of speech in noise ability ((m)AIAD) versus behavioural scores (DTT), we see that users with a DTT outcome of 'hearing loss detected' have a significantly lower (m)AIAD score for the intelligibility in noise category (Figure 2). An independent t-test reveals a **significant difference** between the two groups ($p < 0.01$, $t = 7.11$). This suggests that **eargym**'s DTT is correlated to the self-reported (m)AIAD.

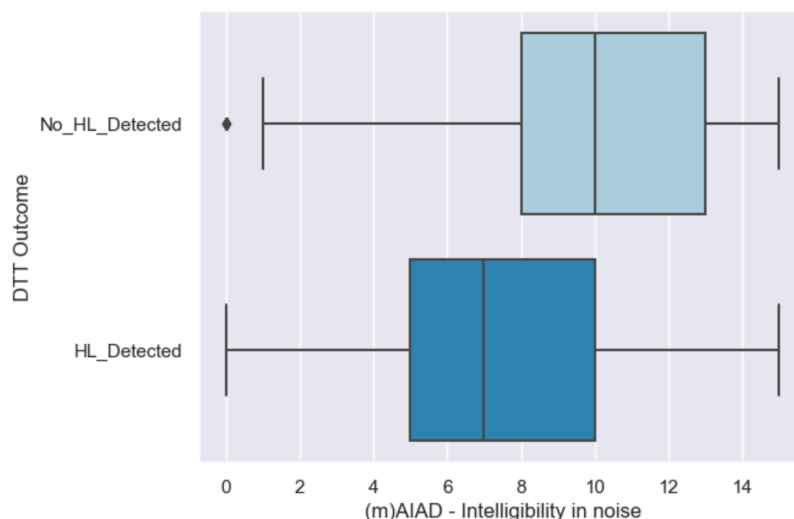


Figure 2: (m)AIAD subjective scores of speech in noise ability versus DTT outcomes of ‘no hearing loss detected’ and ‘hearing loss detected’, for eargym users who have taken both the DTT and (m)AIAD and who fall within these two DTT categories (N=524). A higher (m)AIAD score represents a higher perceived ability. HL refers to ‘hearing loss.’ Data from December 2023.

To further investigate this relationship, the continuous DTT Speech-Reception-Threshold (SRT) outcome is plotted against the (m)AIAD score for the intelligibility-in-noise category, Figure 3. The calculated Pearson Correlation Coefficient of -0.31 with a p-value of $p < 0.01$ shows a low but **significant correlation** between the DTT SRT values and (m)AIAD. In other words, users who self-report speech-in-noise difficulties have worse DTT results than those who rate their speech-in-noise ability more highly. It should be noted that correlations between subjective and behavioural measures are often low and therefore a low but significant correlation is the expected result.

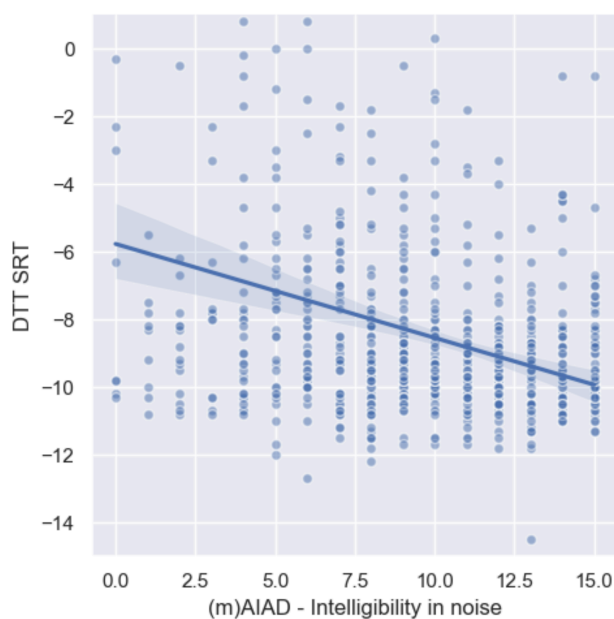


Figure 3: DTT SRT result versus (m)AIAD score for the intelligibility in noise category. A higher (m)AIAD score represents a higher perceived ability. HL refers to 'hearing loss'. N=709. Shading on the regression line shows 95% CI. Data from December 2023.

Finally, we can also investigate how the DTT results correlate with the total (m)AIAD score (i.e. across all questions in self-reported measure), Figure 4. As with the intelligibility-in-noise subset, a low but **significant correlation** is seen (Pearson Correlation Coefficient of -0.39 with a p-value of $p < 0.01$). This shows that users who self-report lower listening ability across all auditory skills typically also have a worse DTT result.

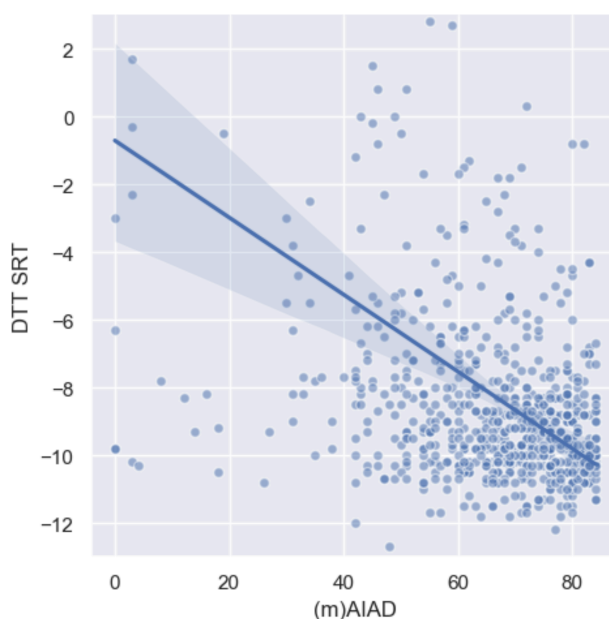


Figure 4: DTT SRT result versus (m)AIAD score for all questions. A higher (m)AIAD score represents a higher perceived ability. HL refers to 'hearing loss'. N=709. Shading on the regression line shows 95% CI.

Conclusions

The validity of the DTT as a hearing loss screener is well reported in the literature with strong correlations seen with pure tone audiology results. Our data shows **eargym's** DTT results are in line with national averages for hearing loss prevalence and are also correlated to users' self-reported speech-in-noise ability.

References

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