



Hearing Screening Guide

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Why are hearing checks important ?



"In older adults research is showing that **hearing intervention may reduce the advancement of cognitive decline****".

An estimated **1 in 10 children** start school with hearing loss which left undetected can lead to speech, learning and behavioral problems.



Innovative digital solutions like Sound Scouts enable population-based screening.

*The Lancet 2020 396413-446 DOI: 10.1016/S0140-6736(20)30367-6, The Lancet 2023 DOI: 10.1016/S0140-6736(23)01406-X

Types of hearing loss

Conductive hearing loss occurs when something interferes with sound travelling to the inner ear. Usually temporary, it's often caused by fluid from middle ear infections but can also result from ear wax build-up or a foreign object lodged in the ear canal.

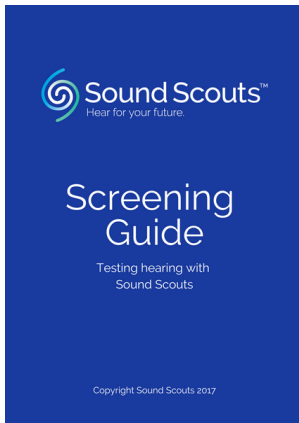
It's estimated that around four out of five children will experience a middle ear infection at least once. Hearing loss can occur even after symptoms resolve because fluid can remain in the ear.

Sensorineural hearing loss (inner ear) results from damage to the inner ear and is permanent. It's often present from birth but can also be acquired through exposure to loud noise, some medicines, some viral infections, and head injuries. It exists on a spectrum, ranging from mild to profound. Hearing aids, or for those with profound loss, Cochlear implants, can reduce the impact of a hearing loss.

Difficulty Hearing in Noise is a hearing issue that can occur despite a person receiving normal results in an audiogram. While hearing in quiet may be normal, hearing in noisy environments, such as the classroom or a restaurant, may be extremely difficult.

Difficulty hearing in noise can be caused by a number of things including (but not limited to): auditory processing disorder, a developmental delay, a language issue, attention deficit and English as an additional language (or bi-lingual/multilingual capabilities).

What you will need



Screening Guide



Touchscreen device/
tablet loaded with the
Sound Scouts App



Good quality adult
headphones



Internet access



Alcohol wipes

WARNING:

The use of suitable, good quality adult headphones is vital to ensure the Sound Scouts test results are reliable.

Choosing the right headphones

Choosing the right headphones and using them in the correct way is an important part of ensuring a reliable result when screening with Sound Scouts.



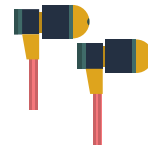
Use good quality adult headphones.



Do not use gaming or surround sound headphones.



Do not use a splitter as they can reduce the sound levels heard by the person being tested.

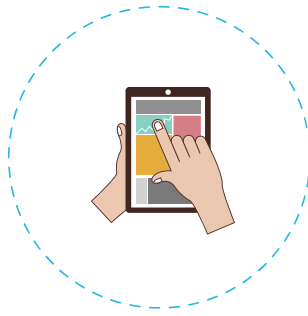


In the interests of hygiene do not use earbuds when screening in clinics.



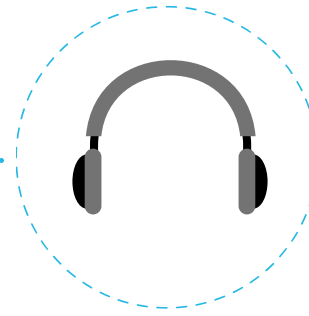
We recommend the following over the ear adult headphones:
Sennheiser HD 300
Sennheiser HD 400S

Setting up the screening environment



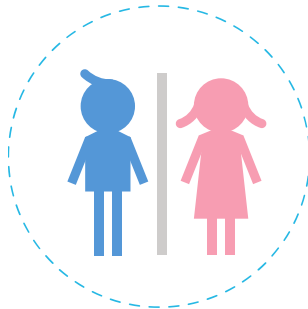
1 Download Sound Scouts App to a touch screen device

Ensure devices are fully charged, have notifications switched off and have the latest version of Sound Scouts downloaded from the App Store, Google Play or Microsoft Store.



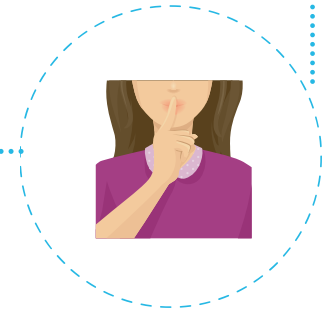
2 Use good quality adult headphones.

Please read our guidance on 'Choosing the right headphones.' Over ear headphones are best for screening in clinics. Ensure headphones are plugged in properly before getting started.



4 Ensure the Client/Patient is ready to focus

Before starting make sure children are well rested and have been to the bathroom. Both adults and children should **blow their nose if needed** as congestion can impact results.



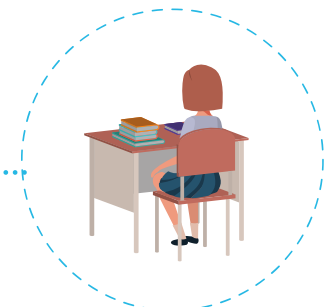
3 Test in a quiet place

Screening should be conducted indoors in a quiet, distraction free room. Beware radios, noisy air conditioners and appliances or heavy rain on a tin roof, as all can impact testing. Note: carpet helps to absorb ambient noise.



5 Keep screens and headphones clean between tests

Use alcohol wipes to clean screens and headphones between tests. Disposable headphone protectors may also help to prevent the spread of germs.



6 Set up the space to minimize distractions

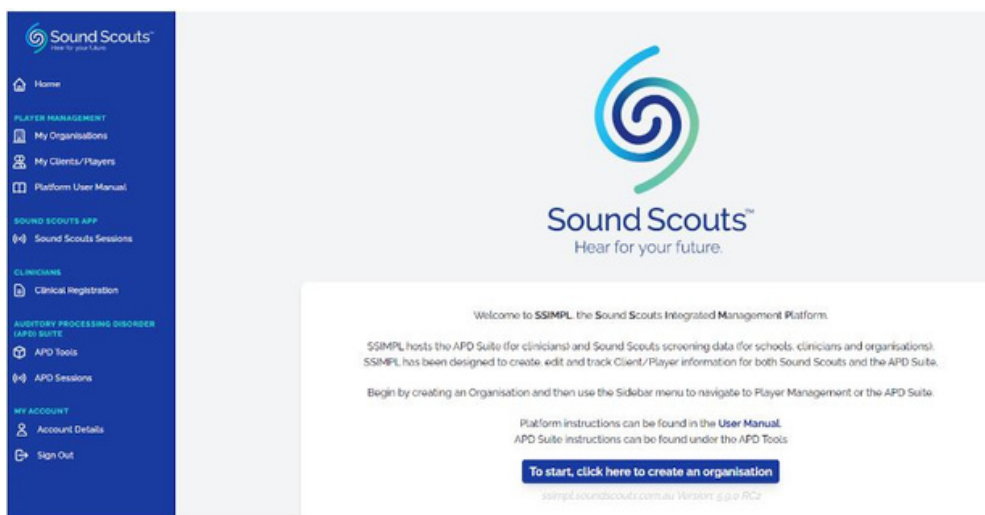
This may include facing the client away from a window and ensuring the device is positioned on a clear surface/desk.

SSIMPL & Sound Scouts Subscriptions

Subscriptions for testing with the Sound Scouts Hearing Screening Service are managed outside of the app via the Sound Scouts Integrated Management Platform: **SSIMPL**.

Use SSIMPL (accessed via a web browser) to manage subscriptions, create, track & edit clients/patients and their testing data across any internet-connected device. Creating a SSIMPL account means that when testing is undertaken on your touchscreen internet-connected device, results can be synced between the device and your online account making it easy to manage and review results.

Only one organization should be created per clinic/practice. Each organization can have multiple Users (eg clinic staff) and these Users can be assigned different roles with different permission levels.



To access your Subscription:

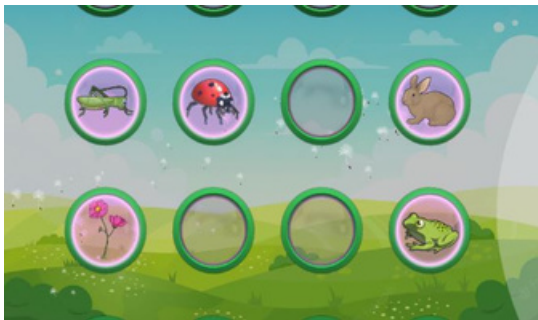
1. Set up your SSIMPL account by clicking here ssimpl.soundscouts.com and following the step-by-step instructions in the **SSIMPL Guide** to set up your Organization account.
1. Send an email to contact@soundscouts.com to advise that your organization has been created. You will then receive an email confirming that your Subscription has been activated.
2. Using the Invite User function on SSIMPL (page 9 in the Guide), invite your staff to create User accounts. For easy recall we recommend staff use their email address as their UserID
3. Tap on Settings and Check for Updates to ensure you are on the latest version of the App
4. Login on the app to commence testing (see page 19 in the SSIMPL Guide)

For assistance, please contact us on contact@soundscouts.com

Two Screening Tools: Automatic Audiometer and Triple Factor Hearing Screener

Sound Scouts has two tools available for use within the app. Test credits must be purchased in order to screen clients.

One test credit is assigned uniquely to a client and allows you to screen that client up to 4 times using the Automatic Audiometer and/or Triple Factor Hearing Screener.



Automatic Audiometer

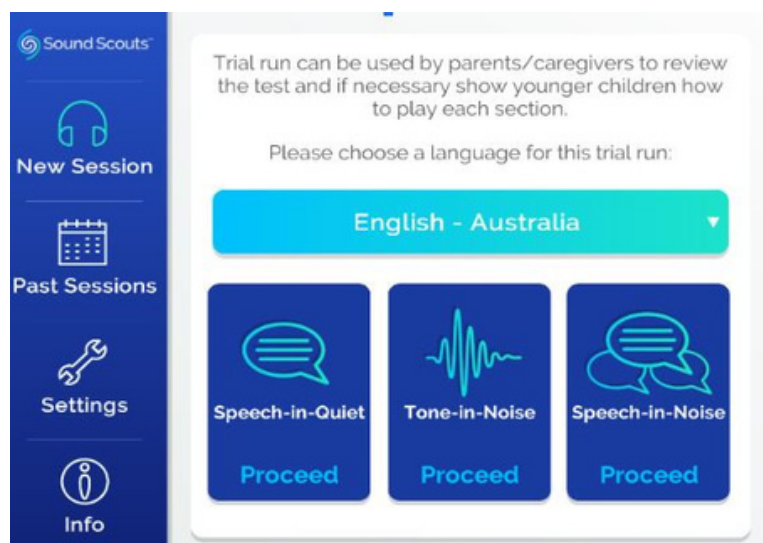
The Automatic Audiometer delivers a traditional style pure tone hearing test. Set to screen at 20dB, four frequencies are measured: 500Hz, 1000Hz, 2000Hz, 4000Hz. An audiogram (more details on page 17) is generated and can be downloaded when logged into your SSIMPL account via your web browser. **The Automatic Audiometer can only be used with an Apple device and a list of recommended headphones.** The test takes approx. 4.5 minutes when set to screening.

The audiometer can also be used for threshold finding, however this is only recommended for hearing health professionals

A password is needed to use the Audiometer. Email contact@soundscouts.com to request the password.

Triple Factor Hearing Screener

The Triple Factor Hearing Screener assesses the ability to hear speech in quiet, tone in noise and speech in noise, using three game based activities. A report is generated indicating recommended next steps when a potential hearing issue is detected (more details on page 15). The screener lasts approx 8 minutes. When screening a child, we recommend using the Triple Factor Hearing Screener in the first instance.



Supervising the Automatic Audiometer



1 Set the volume to maximum

Before starting each test set the volume to maximum or to the highest comfortable listening level.



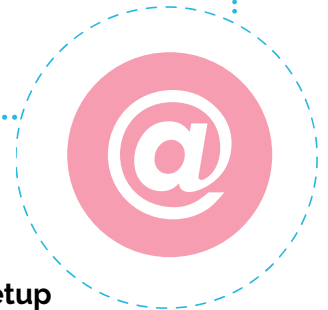
2 Start a New Session

To begin go to **New Session**. Read and carefully follow the instructions on each page.



4 Headphones

Ensure you are using recommended headphones and complete the Sound Check to ensure they are in good working order. You need to hear sound in both ears!



3

Client Setup

Select Create Client/Player. Enter the required details.. Select **Automatic Audiometer** and enter password. **Note that the password is requested from contact@soundscouts.com**



5 Explain to the Client how the test works

Tell the Client to tap a circle when they hear the sound and there will be times when they can't hear anything



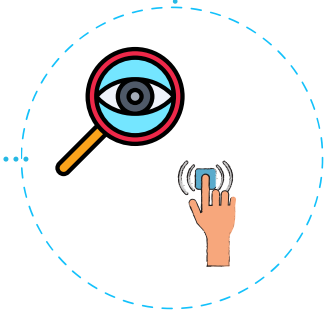
6 Trial Run

Use the Trial Run to ensure that the client understands how to interact with the Automatic Audiometer. The Trial Run also sets the response time.



8 Intervene if the Client is not interacting

If the client is not responding, exit the test and use the Trial Run with the headphones out to deliver further explanation.



7 Supervisors should supervise

Supervisors should watch to ensure the Client isn't tapping repeatedly when no sounds are presented. The circles will turn red in this instance. Supervisors can prompt Clients to only tap when they hear a sound.



9 To end a test session

If anything happens during the test that may impact the results (e.g. persistent loud noise or client unwilling to complete), you can either exit the game by **tapping on the top right corner of the screen 3 times** OR terminate the App by using the method appropriate to the device (i.e. Apple vs Android).

Supervising the Triple Factor Hearing Screener

*Client = Patient



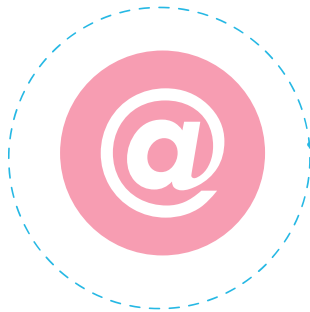
1 Set the volume to maximum

Before starting each test set the volume to maximum or to the highest comfortable listening level.



2 Start a New Session

To begin go to **New Session**. Read and carefully follow the instructions on each page. NB: We recommend Supervisors complete the Trial activities or a test to understand how the program works.



4 Client / Player Setup

Select Create Player. Enter the required details. We suggest using a **SSIMPL** account or a designated email for all Reports. Select **Triple Factor Hearing Screener**.

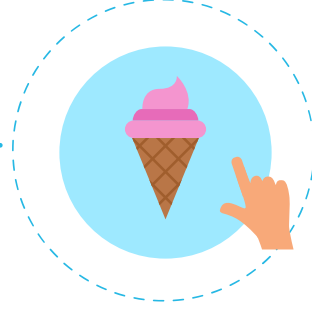
3 Supervisor Setup

Supervising adults must carefully complete a short game-based activity that should be done in the same environment the client will be tested in. This activity calibrates the sound levels. **'Manual Setup'** is the recommended option.



5 Explain to the Client how the test activities work

Noting that the sounds will get quieter, and sometimes they may not be able to hear anything and that this is OK. Advise them to wait and only tap the screen when they hear the sounds.



6 Ask the Client to select the five words they know best

When selecting the words for the first activity we recommend the client says each word out loud. The Supervisor should guide children to choose the five items they're most familiar with.



7

Trial Run

Use the Trial Run to ensure that the client understands how to interact with the three test activities. Do not test people who cannot complete the trial activities.

8

Headphones

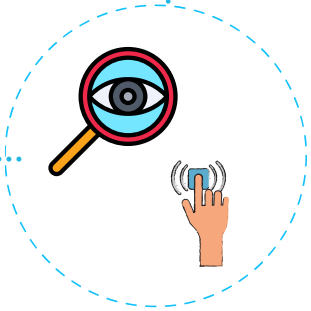
The Client should be using the same headphones as those used by the Supervising adult. Ensure the headphones are sitting correctly on or over the ears.



10

Intervene if the client is not interacting

If the client is not responding, exit the test and use the Trial Run with the headphones out to deliver further explanation.



9

Supervisors should Supervise

During the test supervisors should watch for on screen alerts. They should also watch to ensure the client isn't tapping repeatedly when no sounds are presented. Supervisors can prompt clients to only tap when they hear a sound.








11

To end a test session

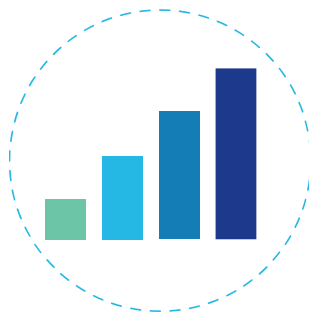
If anything happens during the test that may impact the results (e.g. persistent loud noise or client unwilling to complete), you can either exit the game by **tapping on the top right corner of the screen 3 times** OR terminate the App by using the method appropriate to the device (i.e. Apple vs Android).

Triple Factor Hearing Screener

Script examples for explanations to children

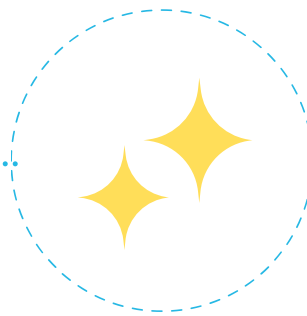
	<p>"In this game, we have to practice good listening. So, as soon as I put the headphones on, or you put on your headphones, neither of us can talk. We both have to try and be as quiet as we can!"</p> <p>OR</p> <p>"You're going to play a listening game, so you have to listen carefully for the special sounds."</p>
	<p>"In the first game, there are hot air balloons, and the lady will say the name of a picture and you have to drag it up onto the balloon.</p> <p>Sometimes her voice will be loud, and sometimes it will be VERY quiet. Sometimes, she will even try and trick you and she won't say anything at all! If you can't hear her say a word – don't press anything, just wait until you hear the next word.</p> <p>After the hot air balloons finish, the same thing will happen with some sailing boats."</p>
	<p>"In the 2nd game, there is a helicopter searching through the bush for some hidden animals. When the helicopter sees one, it will make a funny noise, like this [make noise]. As soon as you hear that funny noise, press the red button and it will show you the animal you found! Only press the red button if you hear the noise."</p>
	<p>"In the last game, there are some people having a picnic in the bush – BUT they've forgotten some things. There are going to be lots of voices because a radio is playing. While they talk, someone will tell you which things they are missing from the picnic. When you hear the name of something, drag it up from the bottom into the picnic area".</p>
	<p>"Sometimes, when you're playing the game, you might see a picture of a lady that looks like this [demonstrate pose with hand behind ear]. If you see that picture, it means that maybe you have to try a little bit harder to listen carefully".</p>

After the test



1 Results are instant if device is connected

Results for both the Triple Factor Hearing Screener and Automatic Audiometer can be viewed on the device and downloaded via SSIMPL. The Triple Factor report can also be emailed from the device..



2 Clean the device and headphones

Wipe down screens and headsets and replace headphone protectors if applicable.



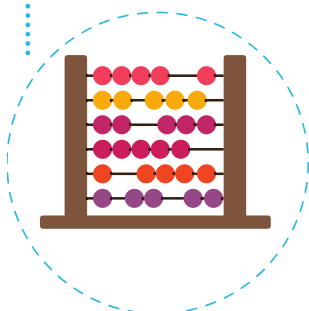
4 Stored results can be accessed through 'Past Sessions'

To retrieve a session go to 'Past Sessions,' select the session and if a connection is available the results will be processed.



3 If you don't receive results...

If the device is not connected to a Wi-Fi network the test data will be stored and can be processed when a connection becomes available. You will not receive results until you connect to Wi-Fi. Phone hot spots can be used.



5 Incomplete session

Results won't be processed for the Triple Factor Hearing Screener if the Player does not complete all three activities.



6 Triple Factor Hearing Screener: Read the report carefully for next steps

If the client receives a fail or borderline result please **RETEST** after 24 hours. Follow the recommendations in the report unless advised otherwise by the Sound Scouts team.

How is the Triple Factor Hearing Screener structured?

The Triple Factor Hearing Screener incorporates three separate test activities completed in 7-8 minutes

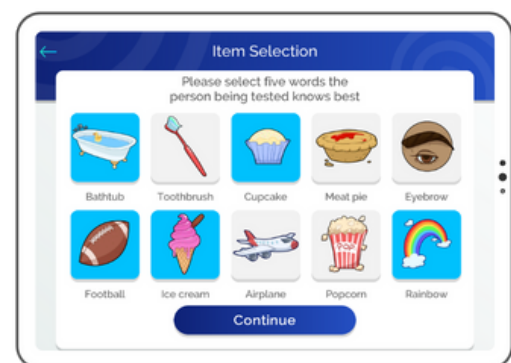
- 1 **Speech-in-Quiet (Calibration)**
- 2 **Tone-in-Noise**
- 3 **Speech-in-Noise**

The Triple Factor Hearing Screener is an interactive game based solution designed for touchscreen devices. The speech in quiet activity serves to calibrate the test and it also provides a comparison of the the Client's ears.

Each Player's results are compared with the results of players of the same age with normal hearing.

Part One: Speech-in-Quiet (Calibration)

- Adult with good hearing completes a short game based activity to help establish sound levels for the test.
- The speech in quiet activity uses two syllable words (e.g. popcorn, rainbow, ice cream, football).
- Supervising adult guides the Client to select 5 items they recognize visually and verbally (adults can ask the child to say each word out loud). Client can select from 10 items.
- Client to complete the same test for one ear and a similar test for the second ear (using the selected words).
- Client can tap or slide the spoken 'target' item into the scene.
- Items become progressively harder to hear until the Client reaches their threshold ie. the lowest volume at which they can hear.
- Volume adapts automatically based on the responses so the Client should only miss every second item once they reach their threshold (provided they are responding reliably).





Part Two: Tone-in-Noise

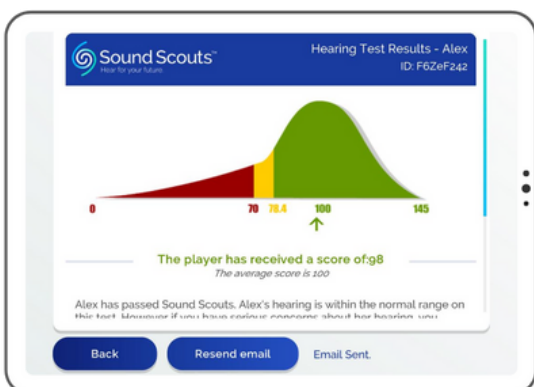
- The Client is asked to listen for the beep from a 'helicopter's sound tracker' and to press the red button when they hear the sound.
- They are visually rewarded when they correctly identify the sound.
- The test ends when the Client reaches their threshold and maintains consistent responses for a period of time OR after the set maximum number of presentations is made.

Part Three: Speech-in-Noise

- The Client is asked to listen to the spoken words and then drag the corresponding target item into the scene.
- The items can be placed anywhere in the scene and will adapt in size depending on where they are placed.
- There is background dialogue throughout this section. The Client must focus on the target items, which become increasingly difficult to hear against the background noise.



- This test assesses the Client's ability to hear in noise. Some people may be able to hear in quiet but due to language, concentration or processing issues, they may struggle to hear in noise.



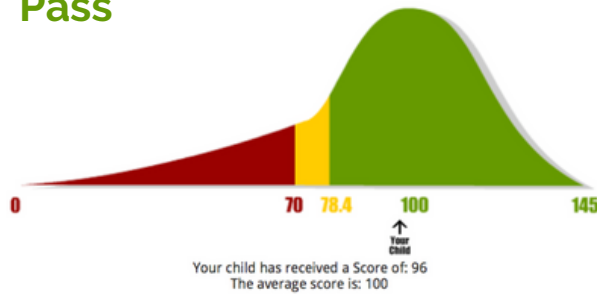
Results

- When the Client finishes the test results are immediately returned to the Supervisor on the device and can be sent via email.
- The results are assessed against normal results for people of the same age.
- Please **RETEST** all Clients who receive a 'Fail' or 'Borderline' result before taking further action.

Understanding the Triple Factor Hearing Screener results

When the hearing check is complete a report is automatically generated. The report is viewable on the device and is also sent via email (when an address is provided).

Pass



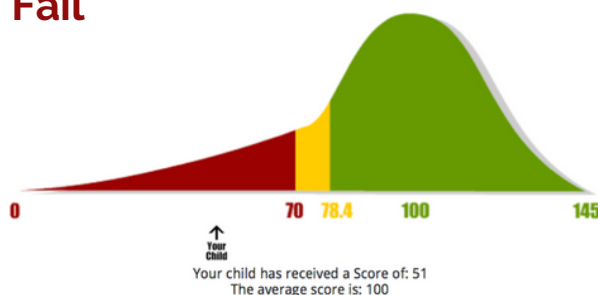
If the Client receives a **Pass** the Report will state that they passed the Sound Scouts hearing check. This means that the results are within the normal range for people of the same age. If you have ongoing concerns about their hearing we strongly recommend seeing the doctor or a hearing professional.

Borderline



If the Client receives a **Borderline** result, hearing may be on the edge of normal. When a Borderline result is received it is recommended that a retest is completed after 24 hours. If the Client receives a similar result further investigation may be necessary.

Fail



If the Client receives a **Fail** result we recommend retesting after 24 hours. If a second Fail result is received, then further diagnostic assessment is recommended.

NB: If there are reservations about the result i.e. the result is not in line with other indicators, we recommend re-testing or seeking further diagnostic assessment.

Failing the Triple Factor Hearing Screener - Next Steps

Those who fail the screener may be flagged as having an issue in one of the following areas:

Middle ear (Conductive hearing loss)

If two fail results with an indication of a middle ear, or conductive hearing loss, are received, Sound Scouts recommends that the Client follow up with a visit to the doctor. A conductive loss may be caused by things such as a build up of wax or fluid, and in most cases, with the appropriate treatment, hearing will return to normal.

Inner ear (Sensorineural hearing loss)

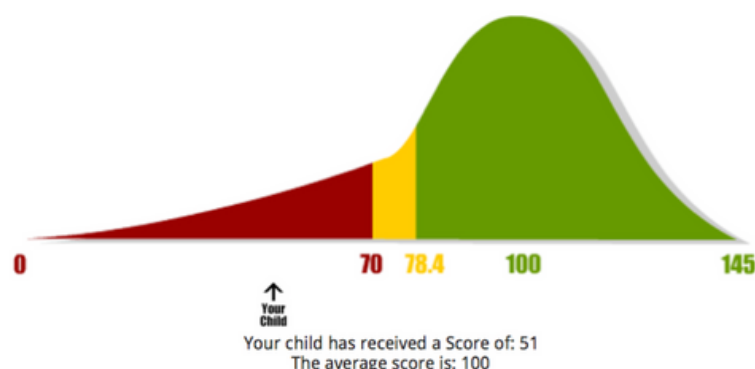
If two fail results with an indication of an inner ear, or sensorineural hearing loss, are received, the Report recommends follow up with an audiologist.

Difficulty Hearing in Noise

If two fail results are received with an indication of difficulty hearing in noise, the possible causes need to be considered. Difficulty hearing in noise can be caused by poor attention, language disorders, English as a second language (ESL or EAL/D) and Auditory Processing Disorders (APDs), which are related to the brain's ability to process sounds. Children who experience difficulty hearing in noise can typically hear in quiet environments but struggle in noisy environments like the classroom or playground. By determining the most likely possible cause, the client's care team can determine who best to see for further assessment.

Invalid Tone result in the Helicopter test

We recommend using the Automatic Audiometer to cross check

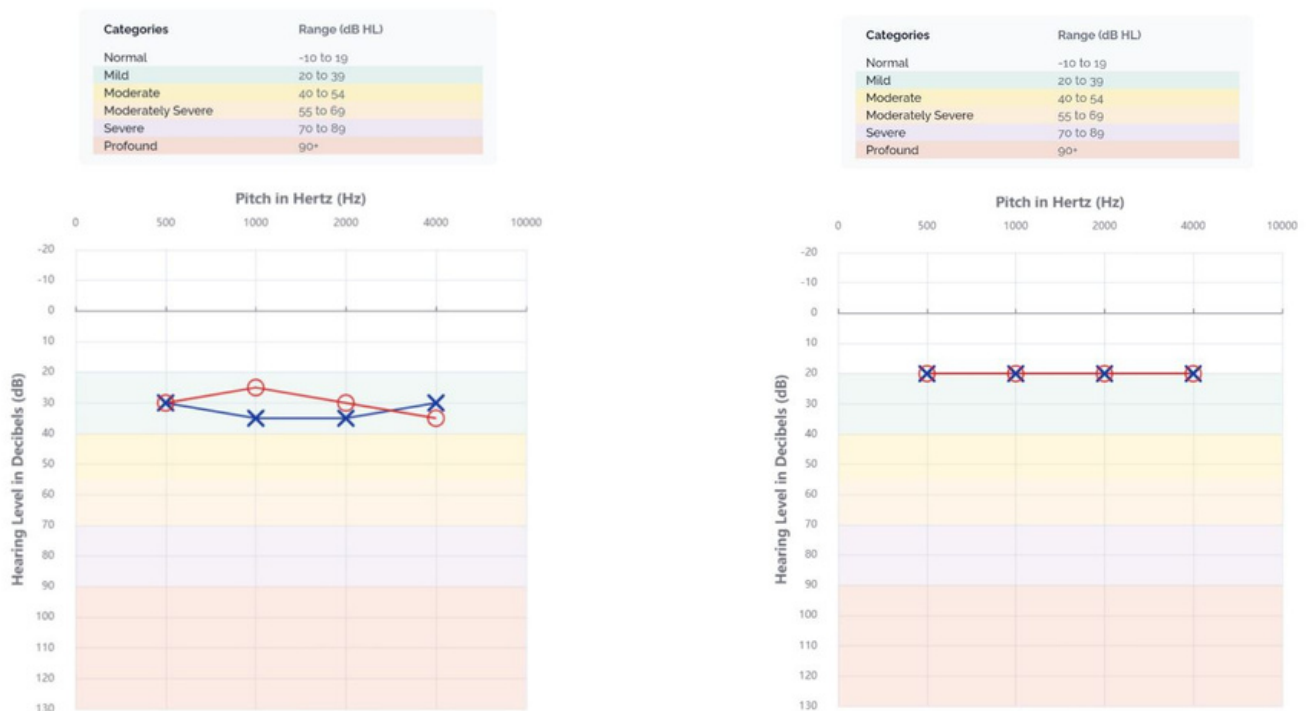


Understanding the Automatic Audiometer results

When the screen is completed, an audiogram is generated. The Report is viewable on the device and is downloadable when logged into SSIMPL on your web browser. The audiogram will indicate if the results are outside the normal range.

Along the top of the graph the numbers refer to frequencies, or different pitches of sounds. Frequency is expressed in terms of the number of cycles per second, or Hertz. The higher the number, the higher the pitch of the sound. Normal, young, healthy human ears can hear frequencies as low as 20Hz and as high as 20,000Hz, but we typically only screen hearing in the range of 500 to 4000Hz, as most sounds of speech occur in this frequency range.

Loudness or intensity of sounds is measured in units called decibels (noted on the vertical axis). Zero decibels (0dB) does not mean 'no sound' – it is just extremely soft. Conversational voice level is around 65 decibels, and 120 decibels (120dB) is very, very loud.



Thresholds for the right ear (i.e. the softest sounds the ear can hear at each frequency) are marked as an 'O' in red, and the left ear is an 'X' in blue on the audiogram.

NB: When screening at 20dB, the quietest sound that can be heard will be at 20dB, therefore a flat line is shown. This means that the person could hear the lowest sounds presented to them. 20dB is considered to be the cut off for normal hearing.

If a loss is indicated by the audiogram, we recommend doing the Triple Factor Hearing Screener to get an indication of the likely cause. If this is not possible, the Client should see their doctor for further advice.

NB: If there are reservations about the result i.e. the result is not in line with other indicators, we recommend re-testing or seeking further diagnostic assessment.

If English is not the Client's primary language (ie ESL or EAL/D), to complete Sound Scouts, the Supervisor must determine if the person can identify 5 words from the list of 10 spondee items. Provided they can identify 5 words (we suggest they say them out loud) they should be able to undertake the test. For these people, please use the Trial Run with the headphones OUT to ensure they understand each of the three activities. You may need to repeat several times.

The second activity, the helicopter game, is largely language independent so provided the person understands what to do i.e. tap the red button when they hear the stimuli (target sound), they will be able to complete this activity.

If the client can do the first two activities it should be possible to determine if they have a hearing loss.

It is likely people who speak English as an additional language may get a borderline or fail result due to the final 'listening in noise' activity. This is a common outcome and is due to the person having to process complex audio, bilingually. The Report will note that the client has received a result 'outside the normal range due to difficulty hearing in noise' which can be caused by the client speaking more than one language. We recommend using the Automatic Audiometer in this instance.

If the client CANNOT identify 5 words, we recommend using the Sound Scouts Automatic Audiometer.

In relation to children with **cognitive** issues, Supervisors should confirm that they are able to successfully complete the Trial Run activities before undertaking a full test. **Those children who cannot independently complete the Trial Run activities should NOT be tested with the Triple Factor Hearing Screener. However, if they are confident doing the Trial Run for the Automatic Audiometer, they can be tested with that tool.**



'Sound Scouts levels the playing field by enabling children with hearing loss to be identified and the risks associated with hearing loss to be managed.'

Meriel, Special Educator- Hearing



Need more information?

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 www.soundscouts.com