York and Scarborough Teaching Hospitals
NHS Foundation Trust

Hyperacusis or Altered Sound Tolerance in Children

Information for patients, relatives and carers

Audiology (hearing and balance) Services

ⓘ For more information, please contact:

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What is hyperacusis?

Hyperacusis is a term used to describe a heightened sensitivity to certain noises, where even everyday sounds cause discomfort or pain. Children with hyperacusis may cry, cover their ears, scream loudly or behave erratically when they hear a sound that they find hard to tolerate.

Hypersensitivity to sound may affect behaviour and concentration. For some children, it can be extremely distressing and trigger avoidance behaviours that lead to isolation and affect social interactions and daily activities with potential consequences on education, communication and learning.

The term hyperacusis is used to refer to all types of sound intolerance. There are also other words that may be used to describe specific types of hearing sensitivity, including:

- **Misophonia:** a strong dislike to environmental sounds which, often generated by other people, regardless of their volume such as someone eating or sniffing.
- **Phonophobia:** a fear or adverse emotional response to certain sounds such as a public hand drier or fireworks

What causes hyperacusis?

The reason or cause for hyperacusis is not well understood. It is common for people to notice an increase in sensitivity to sound after a significant life event (such as a bereavement) or trauma (such as a sudden exposure to very loud noise), however for many people there is no clear reason behind the onset of their hyperacusis.

Although the specific mechanisms that underlie hyperacusis are not known, theories usually suggest that increased sensitivity within the auditory system can be influenced by mood or emotional response. Hyperacusis can be in one ear only but is more commonly perceived in both ears. It can develop suddenly, or it can gradually develop over time.

Associated risk factors for hyperacusis:

Hyperacusis can occur on its own or alongside other conditions. Triggers surrounding the onset of hyperacusis can include people who suffer a sudden, negative or traumatic life event or a period of increased stress, which can be associated to a sound.

In most cases, no specific cause for hyperacusis can be identified and it is simply that the child does not like the sound. It can sometimes be triggered by exposure to a loud or unpleasant noise that takes them by surprise, for example a balloon popping or someone shouting.

This can result in an anticipation of fear of loud sounds and an avoidance of certain situations such as parties or the school canteen.

Hyperacusis can be more common with certain syndromes and conditions, such as:

- Bell’s Palsy.
- Glue ear (see below for more information).
- Head injury.
- Lyme Disease.
- Meniere’s disease.
- Noise induced trauma.
- Williams’s syndrome.
- Children who find it difficult to process sensory information. For example, children who are neurodiverse, have autistic spectrum disorder or learning difficulties.
- Use of medications that are toxic to the hearing organ such as high dose intravenous antibiotics and some cancer medications.

Glue Ear and hyperacusis

Glue ear is one of the most common childhood illnesses, and occurs when the middle ear becomes filled with sticky fluid. It is usually temporary and can be linked with ear infections and temporary hearing loss. For most children, glue ear will clear up on its own but if it does not your audiologist may refer your child to the Ear, Nose and Throat department for further management.

When a child has a hearing loss (permanent or temporary) their dynamic range (the difference between the quietest sounds we can hear and the sounds that are so loud that they cause pain) is reduced so that normal, everyday sounds will be quieter.

As the glue ear clears, their hearing improves, and their dynamic range will increase. This can lead to temporary hypersensitivity to sound which may cause ordinary environmental sounds to become uncomfortably loud. This in turn can trigger a fear response to that sound, resulting in your child anticipating a similar bad experience and wanting to avoid loud situations in the future, like parties for example.

Impact of our emotional systems

When processing sound, we use two subconscious systems that help us to understand what we have heard and how to deal with it.

Our emotional system (called the limbic system) registers every positive and negative interaction we have with sound. This then helps us to know what to expect and how to feel when we encounter that sound again in the future.

This is why certain sounds can make you feel relaxed such as the sound of the sea or birdsong, or why hearing your favourite song can instantly lift your mood on a bad day.

It is also why some sounds can make us feel anxious, like hearing an ambulance siren, or why we anticipate something unpleasant is going to happen if we hear dramatic background music when watching something scary on the television.

The way we feel, and the context of our surroundings also affects tolerance to sound. For example, if a child spends time at nursery or school, they might be used to the sound of other children crying or making loud noise during the day. However, they might get upset or angry about a crying baby on a flight if they are trying to sleep. In both cases the sound is the same, but the situation and their tolerance level is different.

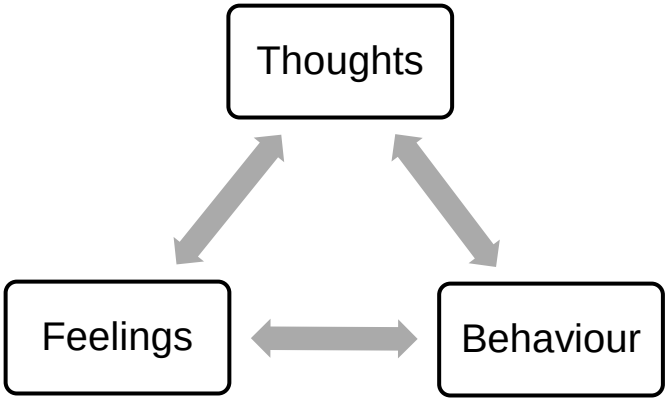
When we have a strong emotional response to a sound, it stimulates our autonomic ‘fight or flight’ system.
Its purpose is to help us deal with potentially dangerous events. This reaction results in our body secreting the hormone adrenaline into our blood stream.

Adrenaline effects our body in different ways:

- It makes you breathe faster.
- Increases your heart rate.
- Sends blood to your muscles to give them a boost of energy.
- Makes you sweat.
- It will enhance our senses, particularly sight, hearing and touch.
- You are more likely to be irritated and jumpy to sounds that you would not normally be reactive to.

Increased sensitivity to sound will further add to your annoyance and distress. This results in a continuous production of excessive adrenaline due to the constant distress.

This reaction can alter a future reaction to that sound and can be associated with a fear response of pain or discomfort when the sound is heard. This can often lead to the development of avoidance behaviours as a protective mechanism.



With hyperacusis, the more negative experiences we have with a particular sound, the stronger the reaction becomes. This can result in our brain recognising the sound as a threat, causing us to focus attention on the sound, making it very difficult to focus on anything else until the ‘threat’ is removed or goes away.

Hyperacusis or sound intolerance in children

Children with hyperacusis may display emotional or physical distress in response to hearing loud sounds such as the washing machine, vacuum cleaner, hand dryer or traffic noise. They can develop a fear of these sounds and refuse to go near or be around the sound source. The type and level of noises will vary and are individual to each child. Only some sounds will evoke a fear reaction even when other sounds or noises are heard at the same volume.

Studies have shown that hyperacusis is less common after the age of five to six years and unlike many adults affected, most children will find that the problem lessens with time (Potgieter et al., 2020).

How can I help my child manage their sound sensitivity?

- It is important to acknowledge the sound sensitivity but not to focus on it or promote avoidance behaviours.
- The use of ear protection such as ear plugs, defenders or sound-cancelling headphones should be avoided except in extreme or short-term, unavoidable situations for example, during a music concert.
  Ear protection use in everyday situations can deprive the auditory system of sound. This can result in our brain trying to compensate by amplifying quieter sounds, making the ears even more sensitive.
- Exposure to normal and tolerable sound is crucial if the ear and brain are to establish normal sensitivity.
- Try to explain and rationalise the source of the sound.
- Your child's fear reaction will often diminish if they can exercise some control over the sounds. For example, encourage them to clap their hands, play with noise makers or start and stop the vacuum cleaner or hair dryer themselves at home.
- You could try creating a game out of making sound or noise such as tapping a tabletop in a certain rhythm or shaking rattles as long as the child is always in control of the sounds.

- Repeated gentle exposure to the noise may help reduce their reaction to it. You could record one or more of the problem sounds (e.g. laughter, clapping, thunder, sirens, and machine-noise) and allow them to initially play the recording at a very low volume. Over a period of days or weeks the volume can gradually be increased.
- Controlled exposure to sound should help your child learn that sound is not something that they need to be afraid of and can actually be fun.
- It is generally advised to reintroduce sound slowly and gently into the child's life, in an environment they are comfortable and at ease in (controlled exposure to sound). This is called 'sound enrichment' or 'sound therapy'. The aim is to try and create positive relationships with sound, so that the brain gets out of its 'threat response' habit and starts to filter sounds out rather than focus on them. Natural sounds such as ocean or rain sounds can also be used if they help with relaxation.
- Children should not be forced to stay in a situation that is causing them obvious distress for example, during singing in assembly. This may compound their apprehension and make them associate that situation (the assembly hall) with pain or discomfort. If fear of a specific situation has become established, it is important to gradually reintroduce the child, with time and care.

- Older children may be reassured if they have the teacher's permission to leave the classroom for a few minutes if they are exposed to an aversive noise.

  Upon request, your audiologist will usually be happy to liaise with the school via a letter to explain the implications of hyperacusis and how they can best support your child in school.

Relaxation

Being able to help your child relax is important in managing the stress often associated with sound sensitivity. It can help your child to reduce any physical anxiety response to sound sensitivity.

There are various techniques which can be taught including controlled breathing and muscle relaxing exercises.

Where can I obtain further information?

The Hyperacusis Network (www.hyperacusis.net):
a resource, with useful and up to date information, forums and management suggestions for hyperacusis.

Relax kids (www.relaxkids.com):
Relax Kids uses research-based mindful and relaxation techniques alongside values and positive psychology (positivity, strength-building, gratitude, resilience and compassion) to help support children's emotional health and wellbeing.

Tinnitus UK (www.tinnitus.org.uk):
Here you will find useful information on hyperacusis and other sound intolerances, with resources to help manage symptoms.

Telephone helpline: 0800 018 0527

References

Living with Tinnitus and Hyperacusis; (2010) McKenna, L. Baguley, D. McFerran, D. p108.

Potgieter I, Fackrell K, Kennedy V, Crunkhorn R, Hoare DJ. Hyperacusis in children: a scoping review. BMC Pediatr. 2020 Jun 29;20(1):319.

Tell us what you think of this leaflet

We hope that you found this leaflet helpful. If you would like to tell us what you think, please contact Audiology department, York Hospital, Wigginton Road, York, YO31 8HE, Telephone 01904 726741 or email yhs-tr.AudiologyAdmin@nhs.net.

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Our Trust is committed to teaching, training and research to support the development of health and healthcare in our community. Healthcare students may observe consultations for this purpose. You can opt out if you do not want students to observe. We may also ask you if you would like to be involved in our research.

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An answer phone is available out of hours.

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