Is there a benefit to having hypersensitive hearing?

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Abstract

Hypersensitive hearing is a condition that causes those affected by it to be more sensitive towards certain frequencies or sounds. It is usually regarded as a negative affliction to possess. This study involved investigating multiple physical and psychological hearing conditions to observe and cross-compare them in order to find if there were any potential benefits, such as improved critical listening skills. The process of acquiring data for this study involved the qualitative and quantitive methods in the form of a survey that enquired with general questions about the participant's hearing condition or conditions. From the findings, there was a clear indication that within those with autism based sound hypersensitivity and hyperacusis as well as those with mild acoustic trauma based hyperacusis and tinnitus, there was a benefit to these conditions in terms of critical listening that either enhanced their environmental spatial senses in causing hyper-vigilance, enhanced their music listening experience being more intense based on hearing more details within the songs and enhanced music playing/composition skills with documented advantages when it came to playing an instrument by ear. There was also evidence that displayed the majority of participants with hyperacusis still regularly listened to music as they still saw value in doing so, despite prior research stating hyperacusis sufferers do not engage in music entirely. Not only did this project provide a positive outcome to the hypothesis but it also leads to a clearer understanding of the variables and nuance within the separate hearing conditions examined.

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Opening Statement & Introduction

The objective of this thesis is to find whether there is any potential benefit of hypersensitive hearing as well as uncover its connection to everyday life and music, in either those whom are affected by physical audiological or psychological hearing disorders.

Most people who are not hard of hearing will usually experience a minor fright at a sudden loud noise. They may be periodically startled for a moment but can recover seconds later and this kind of visceral reaction is normal and referred to as the acoustic startle reflex. However, in those with hypersensitive hearing, it can have a serious effect not just on their ears in the moment but even well after the noise event has ended.

Hypersensitive hearing, which in this study is a hypernym for multiple hearing disorders which will be later discussed, is a condition where the person afflicted perceives to hear sounds at a louder decibel volume than they are or are more sensitive to certain frequencies or sounds. It is often conflated with hyperacusis or noise sensitivity in those who are neurodiverse (autistic). The key identifying factor in hyperacusis is its relationship with the threshold of pain. Hyperacusis is a central auditory impairment that causes mild discomfort to severe pain in those whom are affected. A common description of the sensation when triggered is a fullness of feeling in the ears. This has two iterations, firstly a psychological construct that the ears are full of frequencies and can not accept any more or secondly, that the ears physically feel full with pressure from the perceived loudness level.

There are many different variations of the condition but the two main variables of hyperacusis are firstly acoustic trauma attained through noise damage that results after overexposure to continuous loud noise levels or after only one loud noise event. There are multiple ways of additionally developing hyperacusis such as head injury, surgery, medication, chemical imbalance, mental illness and stress. Attained hyperacusis is viewed to be a rare condition with a statistic of 1 in 50,000 people being affected. The second is hyperacusis derived from birth in those on the neurodiverse spectrum. There is an 18% chance that those born with autism will be sensitive towards sound, the level of sensitivity fluctuates on a case by case basis.

It is a potentially debilitating condition. It can be both a physiological or psychological perceptual issue. The level of intensities are subjective as they vary from person to person. There are those affected whom try to get on with their days and ignore these symptoms, but there are others whom have stated that they have had to change their daily routines in order to avoid certain sounds at all cost. Some can no longer attend bars or restaurants with the noise of cutlery hitting off plates and the sounds of general chatter being too grating. Others no longer attend cinemas or patronise shops as the standard music volumes played are unbearable for those sensitive to it. Avoiding areas of construction work or parks where young children play are also noted as high risk areas that can trigger the hypersensitivity. This means that everyday environmental sounds, some being so minor that most people would not take notice of them, become an issue. Repetitive sounds such as a clock ticking, distant car alarms or overhead fluorescent lights buzzing cause a break of concentration, discomfort and emotional responses such as anger. While louder sounds cause general discomfort and pain. It is often accompanied by the existence of being neurodiverse, having bipolar disorder (manic depression) or having anxiety disorders. It can also induce depressive or anxiety disorders

after emerging. For these reasons, it is typically viewed as a negative condition to be afflicted by. This study aims to further research and uncover whether there is any benefit to the condition.

There are various different hearing disorders that seemingly are all quite similar on paper but their affect on the person's mood is different and usually from this reaction the diagnosis is formed.

Tinnitus is a ringing or buzzing heard in the ears that is not caused by external sounds but rather is created internally. It is typically caused by hearing damage after overexposure to sounds at a loud decibel volume but also it can be related to age related hearing loss, middle ear infections, ear drum issues, earwax build-up and otosclerosis, which is a condition that causes irregular bone growth within the middle ear that interferes with hearing. Tinnitus is not viewed as an independent hearing disorder but instead thought of as a symptom of what initially caused it. It is estimated that around 300 million people are affected by it worldwide. More severe cases can lead to issues with sleeping and depression.

Misophonia, regarded as the hatred of sounds, is an anxiety related hearing disorder that triggers a strong emotional response, which usually is either anger or disgust. The sounds that most commonly cause it are mouth and eating sounds. It is not the frequency content of these sounds that cause the misophonia to trigger, rather the sound source itself and the association of what those sounds are. When hearing a mouth sound a person hears the movement of lips, tongue, teeth, spittle and breath. This results in an immediate association that triggers the emotional response. It usually appears in late childhood or early teen years. Some with misophonia have documented that in order to try and overcome their condition they seek out ASMR videos, Youtube content that is meant to trigger relaxation, that are strictly concerning their audio triggers as a means of exposure therapy. It is important to note however, that misophonia is not currently recognised officially as a hearing or psychiatric disorder by the DSM-IV.

Phono-phobia, also referred to as ligyrophobia or sonophobia, is regarded as the fear of sounds. This means an aversion to sudden environmental sounds, such as car horns, doors slamming shut or shouting/screaming. Upon hearing said sounds, an afflicted person will have a strong visceral reaction displaying stress, panic or general anxiety. All babies are born with an innate fear of loud sounds but it usually dissipates over time during childhood once they become aware of the sound source. It can also be caused by the presence of hyperacusis.

Hearing recruitment is a hearing loss condition that causes a person's ears to struggle to adjust between different levels of loudness. Recruitment stems from an issue within the peripheral auditory system that causes a perceptual problem that makes slight changes in loudness levels spike very quickly, therefore sound seems louder than it is, resulting in pain. It is not related to hyperacusis. It can emerge after cochlear damage or receiving a cochlear implant.

Hearing loss can happen to anyone at any age but is most common in those over the age of sixty. It is usually caused by age and acoustic trauma but also possible to stem from illness, genetics and medication.

A person with hypersensitive hearing can also have one or multiple other hearing disorders, which can make it harder to diagnose or treat. The course of treatment varies from each disorder, tinnitus, hyperacusis and hearing recruitment all being physical issues caused be hearing damage, require the

use of hearing aids as they can be used to compress frequencies in the ranges that are bothersome for the individual.

Phono-phobia along with misophonia require cognitive behavioural therapy in conjunction with exposure therapy, i.e an affected person must subject themselves to hearing the noises they dislike in order to work their way towards overcoming their condition. With general hypersensitive hearing, treatment can be more complex. Cognitive behavioural therapy is utilised in order to help the patient to recognise their thought patterns, so that the hippocampus and amygdala, parts of the temporal lobe in the human brain which are responsible for emotional response and memory, to not become overloaded resulting in becoming overwhelmed with feelings of confusion or anger. Young children and at risk adults, based on their own level of discomfort to noise may also benefit from wearing headphones and earplugs to shield their ears from auditory overstimulation as well as monitor their recreational music listening time and ceasing once their ears begin to feel fatigued.

Through research on the personal documentation of those whom have hypersensitive hearing, the conditions and their relationship with music vary significantly. The common consensus is that music, depending on genre and loudness levels, can cause auditory overstimulation. Those whom are aware of this tend to avoid situations which involve listening to music, even for personal enjoyment in a controlled environment. This action is usually related to onset depressive symptoms, as documented by those affected. But others whom have bipolar disorder and have recounted their experiences with music while in a manic state (racing thoughts, bursts of energy to do rigorous activities) whom have not so prominently documented their experiences, have claimed that either their own musical ability is enhanced or that listening ability has become more heightened by the condition. Statements that they feel the music has more layers, they can clearly hear certain instruments or that they find music more exhilarating.

There has been very little study conducted in the area specifically of hyperacusis and its relationship with music. At the time of this study there has only been research on hearing disorders as a data collection report of which is the most common form of hearing disorder to affect orchestral musicians. Not only that but there is still a lot to yet uncover about hypersensitivity to sound itself, many academic journals are forced to use speculative language whilst discussing the condition and often there is misinformation circulated within the communities due to the variations of the conditions being grouped together as one. Through the undertaking of this study, as well as attempting to prove the hypothesis, great care was taken with the research and cross referencing to previous articles in order to confirm or deny these generative speculations. This study aimed to contribute to a further understanding in the area of the origins of developing hypersensitive hearing, the coping mechanisms and to compartmentalise the different elements that make up the various other hearing conditions previously stated.

Literature Reviews

The following is an analysis of various studies, academic journals and data reports relating to musicality and sound hypersensitivity that are all vital to aid in the study of the current body of work.

Neural Mechanisms Involved in Hypersensitive Hearing: Helping Children with ASD Who Are Overly Sensitive to Sounds by Jay R. Lucker & Alex Doman is a study that examines hypersensitive hearing in young children who typically suffer from autism. The authors provide insight about the brain during childhood development, which is important to the current study as there needs to be an understanding to the neural mechanisms of what is happening within the brain of a person who experiences hypersensitivity to sound. It specifically offers further research on whether the idea that the nonclassical auditory pathway is used by certain children, which is connected to the emotional system of the brain. It theorises that some children may associate negative emotional reactions with sound which may be the cause of their issue. It lumps together various different sound disorders and characterises them as one thing, hypersensitivity, stating that each one is connected as they are presumed to use the same neurological pathways within the brain. However, each of these conditions are different from each other in the way the affected persons react to sound as well as how they are to be treated medically. There is assumption that all children that display an uncomfortableness to sound suffer from some form of autism, which may not be the case, they may in fact be displaying early symptoms of onset mental illness or other emotional issues.

Hearing Loss, Tinnitus, Hyperacusis, and Diplacusis in Professional Musicians: A Systematic Review by Arianna Di Stadio, et al, is a study that explores the various hearing issues, such as tinnitus, diplacusis and hyperacusis, that can arise within professional musicians. The research conducted aimed to assess the probability of developing audiological issues and also explore which genres of music are most likely to cause them, either rock, pop or classical. The information provided on hyperacusis was the main focus to aid in the current study. It stated that hyperacusis was the second most common hearing issue within the musicians who took part in the study. It speculated that there could be a connection between the genres of music being played by a musician and the different stress levels that could be triggering the hyperacusis. This research can be used as a starting point for the current study as it provides information that had not yet been acknowledged in other academic journals, such as the connection hyperacusis has to hearing loss and that it can seemingly develop over a period of time due to overexposure to loud noises rather than it's usual association with neurodiversity. However, based on the language used to describe these opinions, it seems to still remain quite speculative so reexamination or cross comparison will need to be conducted in order to officially confirm or deny these theories.

Insights to the first international conference on hyperacusis: Causes, evaluation, diagnosis and treatment by Hshir Aazh, et al, is a journal that documents different areas of hyperacusis based on information derived from the conference that took place in London in 2014. It initially states the limitations that surround the lack of study and understanding of the cause of hyperacusis, however it does divulge important information gathered from many previous studies and medical professionals

that will be relevant and useful to this current body of work. It suggests that gain within the central auditory pathways of the brain is the cause of developing hyperacusis, which was also stated within the previous study titled Hearing Loss, Tinnitus, Hyperacusis, and Diplacusis in Professional Musicians. The physiology of the inner ear are discussed, explaining that the cochlea's output is reduced but that the neural responses in the auditory cortex and inferior colliculus can be boosted by more than fifty percent. This backs up the theory that those who suffer from hyperacusis perceive certain sounds to be louder than they actually are. As this journal is currently six years old, there are some things that remain unconfirmed, such as the links between hyperacusis and various anxiety/ depressive disorders.

Cognitive Behavioural Therapy For Alleviating The Distress Caused By Tinnitus, Hyperacusis And Misophonia: Current Perspectives by Hadir Aazh, Michael Landgrebe, Ali A. Danesh and Brian CJ Moore is an article that examines the efficiency of CBT treatment on various hearing disorders, including hyperacusis, which is the primary interest of the current study. It discusses the negative thought process that those who are affected by the disorder experience while being triggered by sounds and suggests therapeutic practices in order to intervene and break the negative thought cycle. The results did not prove that cognitive behavioural therapy was actively effective in reducing the loudness and pain that is reported by those who suffer from hyperacusis. Yet the article did provide insight into the thought process of persons affected as well as more information on the background of the disorders which are of value to the current body of work.

Hearing Loss in Musicians by Marshall Chasin is a book published in 2009 that discusses hearing disorders. There is a chapter on tinnitus and hyperacusis, implying that the two are related as a result of hearing damage. It goes on to state that anxiety and depressive disorders may be present with phono-phobia. This is the first piece of literature that explores the idea that multiple hearing disorders can be experienced at once, or that they may work in conjunction with each other this proving to be difficult to not only diagnose but to treat. Phono-phobia requires CBT and exposure therapy while hyperacusis can be treated with either avoidance of certain sounds or medication. There are issues regarding some of the information in the book. It uses some inconstant or incorrect terms such as referring to phonaphobia as fear hyperacusis, when the two disorders (phono-phobia being a fear of sounds and hyperacusis being anger from sounds resulting from pain) are not characterised as having the same effect on the sufferer. It also states that there in no cure for hyperacusis, which is not true, it has been documented by patients suffering from bipolar disorder that when taking their prescribed medication to treat their illness, their hyperacusis has diminished alongside with their other negative symptoms. This inconsistency may be a result of inadequate research available at the time this book was written.

A Review of Hyperacusis and Future Directions by Richard S Tyler, et al, is an article from 2014, which provides detailed research into the history of hyperacusis. It states how debilitating life can be for those who suffer from hyperacusis, that some may even have to alter their life in order to manoeuvre around their disorder. This article also narrows down the speculative ideas presented in previous reviews, mainly that an auditory system abnormality could induce hyperacusis which would lead to anxiety and depression for the sufferer or that hyperacusis is a symptom of an already existing mental illness. It's these two pieces of information that need to be examined further in order to understand the underpinnings of the neural mechanisms. In relation to music it corroborates

the information provided in the book Hearing Loss in Musicians referenced previously, that hyperacusis can be brought on by exposure to loud noises and is not directly related to cognitive issues such as anxiety or depression. The information provided in this article will aid in the construction of the survey questionnaire that will be used for data collection for this study.

Roots of Musicality by Daniel Perret is a book about the general benefit of art therapy and actively playing music as a form of self expression and music therapy. Chapter three titled Neuro-musical Thresholds was the main area of research required for the current study, as it discusses the response of children with autism and other behavioural difficulties over long term observation to being taught music as a form of self expression. The work reflected upon displayed a positive outcome for children that were taught the beginnings of music theory, such as basic rhythms, pulse and melody. Through regular music therapy sessions they began to follow instructions, use their instruments or voice to play songs they created and their personality began to emerge. One child became less aggressive and was able to communicate emotion from learning the association through music. As stated in the introduction chapter of this thesis, hypersensitivity to sound is regarded as a negative condition due to having the potential to trigger overstimulation to the brain causing the suffer a range of different emotions and to become overwhelmed. However, this book suggests that when in control of the noise source, and shown how to associate music with emotion, it has the opposite effect and lets the child truly express themselves. This information is greatly needed in conjunction to prove the hypothesis of this current study. More research into this specific area is needed to officially confirm the information provided in this book as it may possibly be a coincidence.

Resource-Orientated Music Therapy in Mental Health Care by Randi Rolvsjord is book based around the concept of music being important to people's general well being. It offers the point that music causes if not all then most people to feel empowered when listening to it. It reflects upon previous work within the area and states the benefits of music and the power that it holds for some people, e.g being able to connect with an elderly person who may no longer be able to communicate due to mental deterioration as a result of ageing, but yet are still able to be moved by certain musical pieces from their youth. Rolvsjord suggests that music can be used as a gateway into rewiring the pathology of those whom are suffering from some form of neurodiverse issue, in order to give them a way to explore their potential strengths through another purpose, that being music. Although it offers some insight to the benefits of music therapy, unfortunately the book fails to address real mental health problems and mostly reads as if it's geared towards someone suffering from poor self-esteem. More research will have to be done in order to fully back up the current hypothesis.

Methodology

As referred to in the literature review chapter previously, the study by Arianna Di Stadio used a survey methodology that required musicians to listen to various different genres of music in order to determine which genre was not only most taxing on the musicians ears but also how common hyperacusis was within the group. This specific choice of methodology is ideal for the current study, however, the ethical risks assessed within the IADT Research Ethics Procedure from the 1st of February 2019, it was determined that due to the general sensitivity of the thesis topic and the risk of having participants with sound hypersensitivity react negatively towards audio clips, it was decided upon that a survey containing in depth questions with an emphasis on how the participants feel when listening to music would be a more appropriate way of approaching the data collection process.

Originally this study aimed to examine the connection between sound hypersensitivity and music. By enlisting musicians and music enthusiasts who have hyperacusis, this study preposed is to establish whether it can be used as a tool in the benefit of listening to music critically, to determine such things as key, audio effects on instruments, frequency range or use of compression. It also was to explore a more basic level of those with hypersensitivity find that their overall enjoyment of the act of listening to music is more enhanced as a result. However, an area of identified potential issue was that the topic of hyperacusis alone would have been too niche in order to attain the information needed to prove the hypothesis. As this was a major concern it was decided upon in January of 2021 to broaden the study to include various physical and psychological audio issues stated in the introduction chapter. This required additional research time in order to be able to accurately cross-compare the conditions, reshape the survey questions and evaluate the end results. The benefits of this was that there was more engagement on the survey from the additional communities but also there were certain participants who stated they had multiple hearing disorders such as a combination of hyperacusis and tinnitus, hearing loss and tinnitus or misophonia, phonophobia and hyperacusis.

An area of research limitation that proved difficult was acquiring access to certain academic journals, studies and books on relevant topics to the current work at hand. Being unable to use the IADT library and local libraries due to the ongoing level five lockdown from the Covid-19 pandemic that took place from mid October 2020 to May 2021 was a major hindrance. In addition, a selection of academic journals were behind paywalls, which the IADT online library did not have in its collection or have access to through the college services. As a way to rectify this issue, it resulted in having to contact students in University College Dublin to utilise their online services as a means to be able to gain access to these journals in order to assess whether they were of importance to this study by supplying additional information on the various hearing conditions.

The quantitive method as well as the inclusion of the qualitative method were both used in conjunction with the collection of data for the current study. The quantitive method was decided upon as being the more suitable means of gaining the most accurate information, by creating a survey with straightforward, succinct questions with an area to provide yes or no answers. By utilising the qualitative method, this provides participants with the means of dispensing more in depth information to the study, for example if they feel the need to clarify certain answers or give insights to their condition. Alongside the yes or no questions, there were questions that could only be answered by participants in their own words under the ‘other’ option. This also was a way for the

study to gain more personal information, such as the participants background or their experience with mental health issues without encroaching on the ethical risk.

The questions were formed based on the research carried out on the individual experiences from those with hypersensitive hearing whom have documented themselves, be that on online blogs, video logs or other means of documentation. This method is the most accurate way to garner the information on how the questions ought to have been formed, as well as be a way to govern the information that was required to answer the hypothesis. Attention to how each question is phrased was imperative. The questions need to be written in a clear, concise way as to not cause any confusion to participants. Using words that imply ownership e.g have, is fundamental. Words that imply suffering, victimhood or ableism could not be used as they would cause offence and potential bias. Any words that implicated negative feelings surrounding hypersensitive hearing would cause an inconclusive outcome.

The data was collected through posting the survey to online communities that discuss the study topics. Based on the research already undertaken, the information states that the percentage of those with hypersensitive hearing is regarded to be quite low. This determined that there may be a potential issue with the level of interaction the survey will receive. To strategise a contingency plan in order to bypass this problem, the survey was originally to be commenced on three separate occasions over a three month period in order to gain as many potential participants as possible. In January of 2021 after broadening the thesis topic, research into additional online communities was conducted.

Additional data collection through means of interviews with professionals in the field of audiology and psychology was originally a contingency put in place but upon finding various active online communities centred around different hearing conditions, it was concluded that the study had enough sources to conduct a thorough investigation without needing to rely on additional qualitative research. No personal information was required from participants for the survey, the only relevance was that all participants did indeed have hypersensitive hearing. Whether they have mental illness or neurodiverse issues that they care to share was solely up to them, as stated previously, to provide in the answers to the qualitative questions.

The survey was conducted on Friday the 7th of May, at just after 1pm. The survey was posted in the Reddit communities of r/tinnitus, r/hyperacusis, r/autism and r/hearing. It was refused postage in r/anxiety and r/bipolar due to the fact that the moderators rarely approve any surveys as they do not want to be held responsible for any adverse affect the surveys can have on potential participants within the group. Due to this there is an imbalance of participants with anxiety based hearing conditions. The r/autism group had 109K members with 503 actively online at the time of postage, the r/hyperacusis group had 1.2K members with 43 online, the r/tinnitus group had 23.6 members with 127 online and r/hearing had 3.2K members with 9 online. The duration of the survey took four days to collect the information required for this study from 83 participants.

Upon organising and analysing the data provided, eight surveys were deemed unusable. One survey was mistakenly submitted entirely unanswered. Seven surveys were disregarded due to the age stated by the individual participant. Though there was no age requirement stated in the disclaimer for the survey, the inclusion of those under seventeen seems unethical due to them being minors that most likely did not seek authoritative permission to take part in the study.

Not every participant chose to answer every single question, as of this the overall numbers vary. To have a clearer understanding the inclusion of participant numbers will be placed along side the percentage. The percentage is derived from the overall number of participants which was seventy-five and the number of unanswered or non applicable responses was also documented.

Analysis

The following depicts the results of the survey conducted to prove or deny the thesis question.

Seventy-five surveys were deemed usable to gather the information from for this study. They consisted of 50.7% (38) females, 36% (27) males, 4% (3) non-binary persons, 1.3% (1) agender person, 1.3% (1) gender fluid trans male and 6.7% (5) participants preferred not to disclose their gender.

The age ranges from seventeen to seventy, primarily consisting of people in their twenties with the average age being twenty-seven.

Participants were asked to state which hearing condition or conditions they were affected by. They were provided with seven answers to choose from with the addition of an 'other' option to provided an answer not listed or to state that they had multiple comorbidities. For the participants whom did not answer or selected 'none of the above' based upon their survey responses they have been filtered into a subgroup titled general hypersensitivity for the purpose of the data collection. For the purpose of displaying multiple hearing conditions succinctly they have been abbreviated to the initials.

Hyperacusis 13% (10), Tinnitus 16% (12), Misophonia 9% (7), Phonophobia 3% (2), Hearing Loss 5% (4), General Hypersensitivity 17% (13),
Audio Processing Disorder 3% (2), Tonic Tensor Tympani Syndrome 1% (1), T+H 19% (14), T+M 4% (3), T+HL 3% (2), H+M+T 3% (2), H+P+M+HL 1% (1), HL+H 1% (1)

Question four on whether the participants had ever noticed symptoms worsen with lack of sleep, seventy-four participants answered. 70.7% (53) stated yes, 28% (21) stated no and 1.3% (1) stated they did not know.

Question five had seventy-five responses. In regards to symptoms fluctuating with mood 70.7% (53) stated yes they agreed, 25.3% (19) stated no they did not agree, 1.3% (1) stated that it fluctuated with their hormonal changes, 1.3% (1) stated sometimes and 1.3% (1) stated their hyperacusis symptoms did not fluctuate but rather their symptoms of misophonia and phono-phobia did fluctuate.

Question six asked whether the participant has or had purposely avoided areas that are expected to have loud noises. Out of seventy-five responses, 81.3% (61) stated yes and 18.7% (14) stated no they had not. This question proved to be the first indicator on how much of an obstacle hypersensitive hearing could be.

Question seven regarding whether participants had ever perceived sounds to be painful, 89.3% (67) stated that yes they had while 10.7% (8) stated no they had not. Some of those identifying as having misophonia, general hypersensitivity, tinnitus and hearing loss were part of the 89.3% despite pain being the key trait of hyperacusis. A handful of participants claimed to experience pain beyond just their ears, referring to feel it in other areas of their body or their entire body.

Enquiring about the emotional state that hearing an intrusive sound can cause within the moment, participants were asked to state the feeling associated with the triggering of their condition. As each answer was left to the individual to fill in there are a miscellany of descriptions and for the purpose of this analysis they have been assorted into general emotional states or those related to anger, anxiousness, pain and stress.

33.3% (25) stated their reaction to anger, 42.6% (32) stated anxiousness, 14.6% (11) stated pain was their main focus in response and 9.3% (7) stated stress.

A significant amount of participant answers indicated that their fight or flight response would become triggered, which the use of the word escape being observed several times.

Asking whether the participant had ever felt there was a benefit to having hypersensitive hearing 37.3% (28) stated yes, 60% (45) stated no, 1.3% (1) was undecided and 1.3% (1) did not provide an answer.

On whether the participant still regularly listened to music 74.7% (56) stated yes and 25.3% (24) stated no. Part of the additional information provided detailed a segment of the 25.3% stating they either never strongly enjoyed listening to music or they did not receive much from listening to it so they proceeded to no longer actively engage with it.

On asking whether the participant had experienced periods in their life where they could not listen to music 62.7% (47) stated yes, 32% (24) stated no and 5.3% (4) stated sometimes.

Specifically enquiring about the thesis question, asking if the participants had viewed their condition as beneficial 32% (24) stated yes, 57% (43) stated no and 11% (8) stated it was not applicable to them.

On whether hypersensitive hearing had taken away from their music listening experience 68% (51) stated yes, 28% (21) stated no and 2.6% (2) people did not provide an answer.

Enquiring on if the participant felt they heard music differently as a result of their condition 65.3% (49) stated yes, 28% (21) stated no and 6.6% (5) of participants did not provide an answer.

Querying the participant to describe what their listening experience was like. As there were many different interpretations of this question that data has been section in to either good or bad. 54.6% (41) stated good, 29.3 (22) stated bad and 16% (12) of participants did not provide an answer.

On wether the participant had noticed an improvement with music playing or composing ability based on their condition, 18.6% (14) stated yes, 45.3% (34) stated no and 36% (27) stated not applicable as they were not a musician. With the difference in ratio in yes to no answers, it’s possible some whom answered no meant to state not applicable instead.

On asking for the participants to rate their overall experience with their condition, out of slight to very intrusive. It verged from 1 to 10 with the average rating being 7 on the severity scale.

When asked on whether they would remove their condition if there was a magic way to do so, 68% (51) people said yes, 29.3% (22) said no and 2.6% (2) people were conflicted as to whether they would or would not given the option. A portion of those who said yes and had previously stated multiple hearing disorders opted to only remove the condition that they viewed most debilitating, aggregating or upsetting rather than simply live without any disorders at all. Another aspect that was brought up by those who either had a lifelong or severe hearing condition was that if they were to recover they would have a hard time adjusting based on the level of anxiety that having the condition had caused them.

The final question nineteen acted as a way to garner qualitative data, which the majority of participants did leave blank. The addition information gained included diagnosis history, links to information that could be beneficial to the study, advice on potential further questions that participants viewed could have been included in the survey, elements that can worsen their condition, personal insights as to the uniqueness of their particular condition and general blanket statements regarding the perception of the condition.

Discussion

Question nine, twelve, sixteen and eighteen at their core are all the same question simply framed differently in order to provoke the participant with more context had they not been able to apply the question to themselves originally in a multitude of ways. This decision had a positive result as this promoted the participant to think critically about their condition and where they indicated that they were unable to state any benefits initially, when approached again with the context of music listening, composing or with the potential of removing their hearing condition, they were then able to positively confirm a benefit.

The principle benefit stated was enhanced critical listening skills in music and within the general environment, e.g being hyperaware or vigilant of their spatial environment. This information confirms the hypothesis of this thesis that yes, depending on the severity, there can be beneficial elements to each hearing condition or symptom outlined in the introduction chapter.

When prompted on whether the participants viewed there to be negative aspects to their hypersensitivity to sounds, the majority of those who previously divulged critical listening as a benefactor also stated that the intensity of the skill proved difficult at times as they felt they were too critical when listening to music and that this took away from their enjoyment. An example of this stated purposely listening out for production mistakes or inconsistencies within the music.

The two most selected hearing disorders choose by participants to describe their condition were hyperacusis and tinnitus. It is unclear as whether they all originated from the corresponding Reddit communities or if a significant portion were from the the autism subreddit. As there was no question relating to diagnoses it can be speculated that a portion of all participants may have been self diagnosed. This inherently is not an undesirable prospect, as certain conditions are usually recognised initially by those affected by them prior to attaining official medical diagnoses. However, this would be the reason there are some minor inconsistencies with results in relation to mood, mainly on how the participant was affected by the condition they had provide in question three.

On research obtained prior to administering the survey, those with acoustic trauma based hearing disorders such as tinnitus, hyperacusis or age related hearing loss were predicted to be unable to identify or determine any sort of benefit to having their variation of hypersensitive hearing. Though this theory was not completely true as it was a general assumption that did not take into account the ratings of individual severity, the results did indicate that participants on the severe side could not state any benefit and claimed the opposite, that their condition was completed detrimental to their hearing ability.

Description of what the severe side of hyperacusis included physical pain not just felt in the ears but face, neck and in some cases the entire body. When discussing the music listening experience in question fifteen, participants claimed that the way they hear music is completely distorted as a result of their brain perceiving sounds to be louder than they occur, which makes it near impossible to engage with any hobbies that rely on sound. In participants whom stated they still regularly listen to music a selection included which genres as part of their qualitative feedback. Acoustic, ambient and folk were the most popular genres amongst those with hyperacusis. One participant had the reverse

reaction to ambient music however, claiming the transients in ambient music caused him discomfort and irritation. This person proved to be the only anomaly within the entire group when it came to this reaction.

Participants with misophonia drew attention to the fact that they can not freely enjoy songs if the singers mouth is recorded too close to the microphone with breath and mouth movement sounds being too prominent within the mix as it triggers their negative reaction. Based on this they are able to dismiss consuming music by musicians whom are known to have softer, breather tonal qualities to their voices.

Here are the variables that were presented in the results relating to music consumption. One participant who claimed to have hyperacusis and tinnitus could only listen to loud music as a means of drowning out the ringing in his ears as that was viewed as more of a hinderance than the potential ear fatigue or pain. Neurodiverse hyperacusis participants mostly stated they listen to music through noise cancelling headphones while trauma induced participants stated to preferring to use speakers from a distance or at a lower volume to continue their listening experience. Both laptop speakers and in-ear headphones were dismissed as being usable for highlighting the higher frequencies that could be perceived as uncomfortable for both groups. The dynamic range within songs was referenced multiple times as a negative aspect to music. Two solutions communicated were firstly only listening to songs that were previously approved as safe by the listener as they documented no major changes to the sound level in the chorus or ending of the song. Secondly, utilising the volume control when actively listening to songs with a known increase in dynamic range so upon listening the volume could be lowered at anticipated louder parts of the song.

Hyperacusis and tinnitus are conditions that usually affect females more than males, and the results of the survey certainly confirms this statistic with 51% of participants identifying as female. This knowledge gives way to the discourse of how these conditions affect men and women differently and how debilitating they can be in particular for women. One female participant stated that when her children whine, shout or cry it becomes unbearable for her to endure due to her hyperacusis. There is a natural instinct where mothers do not want to hear their child in discomfort and it causes them also to become upset on behalf of the child. Those moments can cause more hearing damage if the mother has acoustic trauma induced hyperacusis as well as severely affecting their overall mood.

Although the questions in the survey were scrutinised over for the interest of being inclusive to all participants with different hearing conditions, four people with severe acoustic trauma induced hyperacusis reacted negatively towards being asked about their listening ability and any further questions relating to it as they had been forced to disengage with the activity due to their pain threshold. Based on one persons feedback, it was not that the questions were based around listening ability but rather that the questions did not convey sympathy towards the persons affected. As stated in the methodology chapter, use of the word suffer or any words that implied victimhood or disability were purposely not used in order to assure no bias, potential inconclusive outcomes or offence towards those who felt their hearing condition was not a negative aspect. It is also likely that this reaction was based on said participants not comprehending that the study was not specifically designed for their particular condition as well as a general confusion on the repeated use of the term hypersensitivity throughout the survey. It was observed that these participants did not view the term as equating pain or discomfort. Instead acoustic trauma hyperacusis participants applied the term towards neurodiverse hyperacusis participants as based on their own views. They

did not equate the later group to experience the same level of discomfort or pain as they themselves did.

In comparison between people with attained hyperacusis due to acoustic trauma and those who are born with it due to being neurodiverse, there was a vast difference in attitude towards their personal views on the condition. People with acoustic trauma have memory of what their hearing was like prior to the incident that caused their ears to become damaged. This muscle memory is clearly responsible for the way they perceive the severity of their condition and why they have a harder time accepting it or applying coping mechanisms into their daily lives. Meanwhile, those born with the condition have nothing to compare it too, this lead to more of an acceptance and even viewing the condition as part of what makes them uniquely themselves.

Despite some participants using the exact same high rating in question sixteen on how debilitating they view their condition is to their daily lives, neurodiverse people displayed better coping mechanisms, stating that they try their best not to let the condition keep them from living a full life. This involves using ear plugs, ear muffs, noise canceling headphones either alone or in conjunction to listening to music when in an outside busy environment. Where as those with acoustic trauma documented how they try to avoid being in public environments that will trigger their pain threshold, this included not patronising restaurants, bars or clubs, changing job descriptions or in some peoples quests for self preservation from encountering audio triggers, their condition had presented itself as agoraphobia where they no longer care to venture out from their home as they view it as unsafe or too risky. This also could be a symptom of anxiety induced phonophobia.

Rather than to have a proactive outlook on their condition as with the neurodiverse group, the trauma sufferers seemed to also display symptoms of anxiety and depression in relation to the impact of their condition. As there is nothing to indicate that they may have already had these preexisting to their acoustic trauma so it can not be stated as fact that hyperacusis and tinnitus caused this outcome but it is highly likely based on the concerning individual feedback garnered through the qualitative questions.

There was a significant hindrance to the sourcing of participants, as they were not able to be briefed days prior to taking the survey and it was clear some were in a more agitated headspace while completing it based on the answers they provided.

An additional outcome was that a handful of tinnitus and hyperacusis sufferers stated that they no longer viewed there to be any benefits to their conditions, indicating that originally when their symptoms began they were able to see some difference in their listening ability. But this dissipated over time with the worsening in severity of their condition. As it was mainly younger people with the same conditions who were able to identify an improvement to their critical listening skills in either an environmental settings or music listening, it is possible that this aspect is only beneficial for people with mild cases of either tinnitus or hyperacusis. Whether these conditions originated due to acoustic trauma is also an important element that determines the severity, especially if continuous exposure to loud noises persists for an individual who is already presenting symptoms and then do not take proper action in protecting their hearing from further damage. An alternative indication could be that those in their early twenties with acoustic trauma who do not maintain care for their hearing will have the same experience as the older participants documented once they reach that age group themselves.

Despite using two disclaimers on the purpose and process of the survey, one being on the initial posts placed into the individual Reddit communities and the second being in the description box of the survey, there was still issues with various participants not understanding that the study was not specifically written for their individual hearing condition. As a result, some members from the hyperacusis community proceeded to answer the survey in a generative manner.

It is important to highlight that after eight months of monitoring, some members within these various hearing condition subreddits have had negative experiences with medical professionals over the diagnosis of their condition or treatment, which has resulted in them feeling mistrustful of medical practitioners to a point where the individual feels they are more knowledgable about their condition than a qualified doctor in the select field. This negative feeling has conflicted some participants as it is apparent that they are unable to recognise that their own variation of severity of their condition is not the baseline standard for others with said condition. This affected that data results as four participants were unable to think critically about their condition in a broader sense when applied and generalised to others with the same affliction.

Another area of concern is that these subreddits are first and foremost sought as support forums, were people with similar ailments can gather to share their insights and engage in general discourse. But in relation to the distrust of medical advice, there are regularly examples of persons newly affected by a hearing disorder that seek advice on what could be potentially causing their condition prior to seeking medical attention. This results in scaremongering from those who have had negative experiences themselves either diagnosing the inquirer based from their own condition or purposely trying to deter them from seeking genuine medical intervention as it can be viewed that once the condition presents itself, the affected person is beyond professional help. Though there is great solace to be gained from participating in these groups that lead to people feeling less alone and less isolated, two important problems that were highlighted by tinnitus and hyperacusis participants on multiple completed surveys, the issues of users feeling they are an authority on their condition just because they possess it resulted in a conflict of interest and did not ensue conclusive outcomes when undertaking a project such as this one.

This project was limited by the seriousness of the topic of hearing disorders and their relation to potential mental illness issues as certain questions that would have been beneficial to the data collection process were unable to be asked, e.g not being able to enquire on the history of the development of the condition due to the potential of triggering past trauma for the participants. A select few participants did disclose their diagnosis history and how their hearing condition originated, whether they were born with or acquired through acoustic trauma. This information certainly provided more insight to the participant's answers within the survey as well as provide context for their overall feelings towards their condition, be it positive or negative.

Conclusion

Through the undertaking of this body of work it was concluded that there was positive confirmation that hypersensitive hearing does have a benefit in regards to improving critical listening skills in those with neurodiverse hyperacusis and general sound sensitivity, mild tinnitus and mild hyperacusis. This work exhibits that to automatically assume that these conditions have no benefit or should be viewed as a negative proves to be an incorrect judgement.

To evaluate the research and data collection process of this project, further studies could improve upon this body of work by directly sourcing members from these groups to participate and have them state their history with their condition. Creating individual surveys for each condition would be advised as to ensure that there would be no misunderstanding on a participants behalf as well as to make them feel that their condition is understood and what they are contributing will directly benefit the perception of their condition.

Other areas of interest for potential further examination include that there have been chronicles from people with bipolar disorder type one that state they have in the past purposely overexposed themselves to loud music in order to overstimulate their brain to induce mania as they attribute mania to productivity. Assessing whether there is any validity in these claims would be greatly important. Though it technically is not an advisable activity to do based on the risks involved with the negative connotations of mania, there could be an additional benefit that has not already been explored in this current study due to having to abide to the IADT code of ethics. Uncovering unconventional benefits that can only be established through investigation of people who have these varying conditions, who can themselves state and confirm their experience to be factual needs to be documented.

With the lack of being able to accurately assess more perceptual based hearing conditions such as misophonia, phonophobia and hyperacusis resulting from chemical imbalance, this would certainly be an area for further research as these groups could provide more information not just on how they view their condition but also whether they are able to identify any positives within them.

Three participants with neurodiverse related hyperacusis stated they had absolute pitch, also referred to as perfect pitch, an ability that lets them recreate notes without having to reference the tone of the note prior. This ability is rare with estimates of it affecting 1 in 10,000 people. The prior studies conducted that explore this phenomenon mostly speculate as to the potential cause, examining and cross-comparing the brain function of people with autism with those whom have absolute pitch. Though there are similarities, there are also unrelated reasonings to developing it such as being hereditary or more likely in children with musical training under the age of six. Examining this topic in more depth or expanding upon it to assess whether hypersensitive hearing as any role to play in the likelihood of developing absolute pitch would certainly be a worthwhile endeavour.

There is a disproportionate amount of musicians, ex-musicians and music enthusiasts within both the tinnitus and hyperacusis communities. This is not surprising as a significant amount of noise damage is caused by not using protective ear wear when either performing or attending a musical concerts. There is a considerable stigma based around all attained noise damage conditions. The

data received for the current body of work underlined this issue was especially prominent in younger participants, with feelings of remorse or embarrassment expressed with experiencing an ailment that is usually associated with people much older than themselves or as a result of not taking the proper precautions to protect their hearing. The stigma also effects people with age related hearing loss with a reluctance to adapt to the use of hearing aids. It can result in the persons self esteem lowering or becoming depressed because they become more aware of their ageing process. To dismantle the stigma it is required that more education is needed to promote the awareness of noise damage that can happen at a young age as well as education to treat older people with more acceptance and understanding to ensure that they can still lead the best quality of life instead of trying to conform to the social norm and disguise their ailment for fear of judgement. Recognising that hearing loss is sometimes a part of life can be difficult but it does not mean that a person's world needs to become smaller or that they should isolate themselves because of it.

Many phones and audio listening devices display a warning when the volume is significantly increased to remind the person listening to music that this could be dangerous and lead to damaging their hearing over time with continuous use. Though this reminder is helpful, it can be easily dismissed when there is no context for how noise damage can present itself and what life is like having to live with it. Providing audio examples of how decreased hearing sounds when impacted by hearing loss, tinnitus and hyperacusis in primary and secondary schools would significantly raise the awareness in younger people to proactively take care of their ears. Usually this type of education is only provided for students of music but there is no reason why the topic can not be extended to include all students.

In relation to self diagnosed hyperacusis and tinnitus sufferers, research as to why they have not proceeded to present their hearing issues to a doctor should be conducted. As it inherently causes self isolation due to anxiety over triggering the pain threshold, this particular group are most at risk of developing mood or depressive disorders as a direct result of their hearing condition. They should be viewed as a priority and assessing if there is a common reason as to what prevents them from seeking medical aid would be beneficial to their treatment of the condition. There are clearly definite differences between each hearing disorder explored within this study. However in the survey results, there was some grey area amongst tinnitus and hyperacusis. Tinnitus is typically viewed as a symptom that is not terribly intrusive. But there were both claims of it causing and not causing pain. Whether this is a side effect of unbeknownst hyperacusis also being present or if the participant incorrectly stated which condition they believed they had, it caused a minor inconclusiveness to certain questions relating to garnering information of the conditions themselves. Further studying this topic to acquire how president tinnitus is with hyperacusis is as well as being able to clearly define that server tinnitus can induce pain but not be in relation to any other hearing condition should be studied in order to confirm or deny this theory.

In recent weeks, red flags have been raised within the tinnitus and hyperacusis online communities in relation to the Covid-19 vaccines. Some recipients have stated their hearing disorder symptoms worsened after receiving their first and or second vaccination. At the time of writing, not one individual vaccine has been identified as the sole perpetrator of these adverse effects, however there is no current study or literature that confirms that these are in fact genuine side effects. Other people within the communities whom have had Covid-19 also contributed information attesting to this belief. Further study of these claims should be conducted, so that vaccine recipients can defiantly know what to potentially expect when receiving their dose. In reference to the scaremongering discussed in the discussion chapter, the worry may result in those with already existing anxiety

conditions to not proceed with receiving their vaccinations, which could be dangerous, especially based on the level of comorbidities documented by this group.

Works Cited

Aazh, Hashir, et al. “Cognitive Behavioral Therapy For Alleviating The Distress Caused By Tinnitus, Hyperacusis And Misophonia: Current Perspectives.” *Psychology Research and Behaviour Management.* Vol. 12 991-1002. 23 Oct 2019. doi:10.2147/PRBM.S179138 Web. 24 Oct 2020.

Aazh, Hashir, et al. “Insights to the first international conference on hyperacusis: Causes, evaluation, diagnosis and treatment” *Noise & Health.* Vol. 16 123-126. 7 May 2014. Web. 27 Oct 2020.

Ansdell, Gary. Ed. *How Music Helps in Music Therapy and Everyday Life.* England. Ashgate Publishing Limited. 2014. Print

Cartreine, James. “Misophonia: When sounds really do make you “crazy”” *Harvard Health Publishing.* 21 Apr 2017. Web. 3 Feb 2021. www.chicagohealthonline.com/misophonia-sounds-really-make-crazy/

Chasin, Marshall. Ed. *Hearing Loss in Musicians: Prevention & Management.* United States. Plural Publishing. 2009. Print

Danesh, Ali A., et al. “Tinnitus and Hyperacusis in Autism Spectrum Disorders with Emphasis on High Functioning Individuals Diagnosed with Asperger’s Syndrome.” *International Journal of Pediatric Otorhinolaryngology.* vol. 79, no. 10 Oct 2015. pp. 1683–1688. *EBSCOhost*, doi:10.1016/j.ijporl.2015.07.024. Web. 27 Oct 2020.

Di Stadio, Arianna, et al. “Hearing Loss, Tinnitus, Hyperacusis, and Diplacusis in Professional Musicians: A Systematic Review” *Int J Environ Res Public Health*. 26 Sep 2018. Web. 27 Oct 2020.

Encyclopaedia Britannica, inc. "Fight-or-flight response". *Encyclopedia Britannica*. 12 Aug 2019. Web. 3 Feb 2021. www.britannica.com/science/fight-or-flight-response

Fritscher, Lisa. “The Fear of Loud Noises or Ligyrophobia” *Very Well Mind*. 1 Feb 2021. Web. 3 Feb 2021. www.verywellmind.com/fear-of-loud-noises-2671882

“Hyperacusis” McGovern Medical School. 10 Jan 2020. Web. 17 Dec 2020 www.med.uth.edu/orl/2020/01/10/hyperacusis/

Joris, Philip X. “Recruitment of neurons and loudness. Commentary on "Encoding intensity in ventral cochlear nucleus following acoustic trauma: implications for loudness recruitment" by Cai et al. J. Assoc. Res. Otolaryngol. DOI: 10.1007/s10162-008-0142-y.” *Journal of the Association for Research in Otolaryngology : JARO* vol. 10,1 (2009): 1-4. doi:10.1007/s10162-009-0156-0 Web. 3 Feb 2021.

The Korea Advanced Institute of Science and Technology (KAIST). "How to trigger innate fear response? Neuroscientists identify the brain circuit in the prefrontal cortex that determines innate fear response." *ScienceDaily*. 8 August 2018. Web. 3 Feb 2021. www.sciencedaily.com/releases/2018/08/180808093855.htm

Lucker, R. Jay, Doman, Alex. “Neural Mechanisms Involved in Hypersensitive Hearing: Helping Children with ASD Who Are Overly Sensitive to Sounds” *Autism Research and Treatment. Vol. 2015.* Article ID 369035. 8 Pages. 28 Dec 2015. Web. 27 Oct 2020.

Mullen, Emily “Experts Answer Eight Key Questions About Covid-19 Vaccine Reactions” *Smithsonian Magazine*. 20 Apr 2021. Web. 7 May 2021. www.smithsonianmag.com/science-nature/all-your-questions-about-covid-19-vaccine-reactions-answered-180977537/

Paulin, Johan, et al. “Characteristics of Hyperacusis in the General Population.” *Noise & Health*, vol. 18, no. 83, July 2016, pp. 178–184. EBSCOhost, doi:10.4103/1463-1741.189244. Web. 24 Oct 2020

Perret, Daniel. Ed. *The Roots of Musicality: Music Therapy and Personal Development.* London. Jessica Kingsley Publishers. 2005. Print

Rolvsjord, Randi. *Resource-Orientated Music Therapy in Mental Health Care.* United States. Barcelona Publishers. 2010. Print

Sarris, Marina. “Perfect Pitch: Autism’s Rare Gift” *Interactive Autism Network*. 2 Jul 2015. Web. 14 May 2021. www.iancommunity.org/ssc/perfect-pitch-autism-rare-gift

“Tinnitus” *NHS Inform.* 22 Dec 2020. Web. 5 Feb 2021 www.nhsinform.scot/illnesses-and-conditions/ears-nose-and-throat/tinnitus#:~:text=Tinnitus%20is%20the%20term%20for,buzzing

Tyler, S. Richard, et al "A Review of Hyperacusis and Future Directions: Part I. Definitions and Manifestations" *American Journal of Audiology*. 1 Dec 2014. Web. 27 Oct 2020

Vaughan, G. “Deafness and Hearing Loss” All Ears International. *World Health Organisation*. 1 Apr 2021. Web. 7 May 2021. www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss

Ph.D Walker, Nick “Neurodiversity: Some Basic Terms & Definitions” *Neurocosmopolitanism*. 27 Sep 2014. Web. 24 Oct 2020.

Ph.D. Wright, Anthony. “Chapter 6: Limbic System: Amygdala” *Neuroscience Online*. 10 Oct 2020. Web. 24 Oct 2020.

Appendix

This survey is for people with hypersensitive hearing, which is an umbrella term for various different perceptual and physical hearing conditions. The aim of this study is to uncover more information about these conditions in order to cross reference and compare the nuances between them as well as to explore the potential benefits or drawbacks of them. The results will be kept private and only used as rounded statistics in the analysis section of the thesis.

1. Please state your gender

2. Please state your age

3. Do you have any of these hearing disorders? If multiple, please state which by using the "other" option

   Hyperacusis

   Tinnitus

   Misophonia

   Phonophobia

   Hearing recruitment

   Hearing loss

   None of the above

   Other

4. Have you ever noticed your symptoms with hypersensitivity to sound worsen with lack of sleep?

   Yes No Other

5. Would you agree that your sensitivity to sound fluctuates with changes to your mood?

   Yes No Other

6. Do you avoid areas where you know will have loud noises? E.g bars & restaurants, parts of town with ongoing construction, musical concerts, cinemas etc.

   Yes No Other

7. Have you ever perceived sounds to be physically painful to your ears?

   Yes No Other

8. When you hear intrusive noises, how does hearing them in that moment make you feel?

9. Have you ever felt there was a benefit to you having hypersensitive hearing?

10. Do you regularly listen to music?

    Yes No Other

11. Have there been periods in your life where you feel you can't listen to music due to the hypersensitivity?

    Yes No Other

12. Do you feel that your hypersensitive hearing has ever improved or enhanced your music listening experience? If yes, please explain why

13. Do you feel that hypersensitive hearing has taken away from your music listening experience?

14. Do you feel the way you hear music is different because of your hypersensitivity to sound?

15. Can you describe what your music listening experience is like?

16. If you are also a musician, do you feel that having hypersensitive hearing has benefited you when it comes to playing or composing music?

    Yes No Other

17. Can you please rate your overall experience with hypersensitivity to sound? 1 being slight, a minor inconvenience and 10 being very intrusive, debilitating

1 2 3 4 5 6 7 8 9 10

18. If you had a magic wand and could make your hypersensitive hearing disappear, would you? Please explain your answer

19. Is there any other information you would like to contribute that you think would be beneficial to the ongoing study?