


Music therapy as a resource for the development of music perception in cochlear implant users: Case study

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ABSTRACT

This study aimed to evaluate whether or not music therapy can help to develop music perception of cochlear implant (CI) users, thus improving their music appreciation. It is a longitudinal and prospective study that uses a mixed approach. In order to collect data, the Munich Music Questionnaire (MUMU) and the Music Perception Test BATUTA were applied, the latter being adapted to assess the perception of melody and timbre of an adult with congenital, bilateral, and profound hearing impairment (HI) who uses a unilateral CI. Eight music therapy sessions were carried out, using sound-musical activities with musical instruments to stimulate and develop music perception skills. At the end of the sessions, the musical perception test was reapplied with the result of 17 correct answers before and 20 correct answers after the music therapy sessions. The participant's responses to the MUMU indicated that music is of great importance in his life and brings him pleasure, along with emotional satisfaction. Furthermore, there was an increase in the number of correct answers and a decrease in repetitions of the BATUTA's musical samples after each music therapy session. It was concluded that music therapy is a valuable resource for developing the music perception of individuals with hearing impairment who use CI.

Keywords: Music Therapy, Cochlear Implant, Hearing Loss, Music Perception, Music Appreciation.

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INTRODUCTION

Hearing impairment (HI) can be classified according to the type and degree of hearing loss. Regarding the type of hearing loss, there are three classifications: conductive⁴, sensorineural⁵, and mixed⁶ (SILMAN; SILVERMAN, 1997). As for the degree of hearing loss, it is classified according to the hearing threshold at the frequencies: 500 Hz, 1000 Hz, and 2000 Hz. The degrees of hearing loss are: mild (26 to 40 dB), moderate (41 to 55 dB), moderately severe (56 to 70 dB), severe (71 to 90 dB), and profound (≥ 91 dB) (LLOYD; KAPLAN, 1978).

The traditional definition of music is the organized combination of sound and silence over time, which places music only as an aural experience. Therefore, when thinking about the relationship between music and HI, some questions may arise and we may wonder how people with HI can relate to music in their everyday lives. Even though music is not perceived by them in the same way as it is by hearing people, it can still be experienced through visual stimuli, such as music clips, dances, and sign language. Additionally, they can feel the vibration through surfaces or through sound amplification using hearing aids (ANSAY; MAESTRI; COSTA, 2013; BARCELLOS, 2016).

A cochlear implant (CI) is an alternative for restoring hearing function in cases of sensorineural HI in patients who do not benefit from conventional hearing aids. If we compare the periods before hearing loss, after hearing loss and before CI surgery, and after CI activation, the use of CI does improve the hearing perception of its users (ALVES et al., 2015; ARAÚJO et al., 2018). But even with the technological advances, CI still has limitations regarding the perception of the elements of music, which is directly related to the decrease in the frequency that CI users listen to music due to not finding it satisfying (GFELLER et al., 2000; MCDERMOTT, 2004).

Music listening is influenced by two aspects: perception and appreciation. Perception is the "action or effect of perceiving something through sensations." (DICIO, 2022). Music perception is linked to physiological stimuli related to human listening, which can be influenced by some training or specific musical experiences. For instance, a professional musician, with years of study, may have a more accurate and refined perception when compared to a person who has not received musical training.

As for appreciation, which is defined as the "demonstration of esteem; act of appreciating, of liking" (DICIO, 2022), it can be influenced by the individual's previous experiences, such as their sound-musical history. Regarding the music appreciation of cochlear implant users, it can also be influenced by how they perceive the elements of music due to the limitations presented by the CI, impacting their appreciation and even the importance given to music in their lives (ALVES et al., 2015).

⁴ Problems caused by damage to the outer or middle ear.

⁵ Hearing loss caused by missing or damaged hair cells in the cochlea, located in the inner ear.

⁶ A sum of the two previous types of hearing loss.



It is worth mentioning that the CI's priority is speech perception, to the detriment of music perception, whose studies have only intensified in the last 20 years (SIMÕES et al., 2021).

Post-implantation auditory rehabilitation is necessary to develop perceptual skills and understand sound stimuli, achieving a better sound-music perception (LIMA, 2017; SCARANELLO, 2005).

Music therapy (MT) is the "field of knowledge that studies the effects of both the music and the use of musical experiences that are resulting from the encounter between the music therapist and the people attended" (UNIÃO BRASILEIRA DAS ASSOCIAÇÕES DE MUSICOTERAPIA, 2018). MT makes use of the effects that music can produce in humans on different levels, such as physical, mental, emotional, and social, facilitating the expression of feelings and communication and seeking to promote changes that lead to learning, mobilization, and internal organization that help the subject evolve (BRUSCIA, 2016; VON BARANOW, 1999).

The use of music in MT consultations with children and young people with HI who use CI has been shown to be very positive. As a result, there is an improvement of perception skills, such as the recognition of melodies, perception of pitch and duration of notes, the differentiation of timbres, the recognition and differentiation between spoken and sung voice, and the ability to identify and reproduce rhythmic patterns. In addition, it also brings benefits in emotional, social, and communication aspects (BRANDALISE, 2015; REINERT; ANSAY, 2019; RODRIGUES, 2019).

However, many education and rehabilitation programs for individuals with HI treat music only as a resource, an ordinary tool, aiming to utilize the auditory residues for better communication and oral production. Thus, music consists of a means, rather than an end (HAGUIARA-CERVELINI, 2003).

Therefore, this study aims to evaluate whether or not music therapy can help in the process of auditory rehabilitation for the development of music perception of CI users in order to improve their music appreciation.

METHODOLOGY

This is a longitudinal and prospective case study that uses a mixed approach. Its purpose is to evaluate whether music therapy can help in the process of auditory rehabilitation for the development of music perception of CI users in order to contribute to their music appreciation. A mixed approach research study uses both quantitative and qualitative methods in the same study or survey to collect and analyze data or to make findings or inferences (CRESWELL; CLARK, 2013). This research was submitted to the Ethics Committee and approved through the substantiated opinion 5.568.496.

A case study "consists of a deep and exhaustive study of one or a few objects, in a way that allows their broad and detailed understanding" (GIL, 2018, p.54). Gil (2018) points out the main

purposes of using a case study:

- a) Exploring real-life situations whose boundaries are not clearly defined;
- b) Preserving the unitary character of the object studied;
- c) Describing the situation of the context in which a particular investigation is being carried out;
- d) Formulating hypotheses or developing theories;
- e) Explaining the causal variables of the given phenomenon in very complex situations that do not enable the use of surveys and experiments.

The criteria for inclusion of the research participant were:

- Being over the age of 18;
- Bilateral sensorineural hearing loss;
- Activation time of cochlear implants longer than one year;
- Not being an amateur or professional musician.

Ten appointments were conducted, including one for the application of the Munich Music Questionnaire (MUMU) (Appendix) (FREDERIGUE-LOPES; BEVILACQUA; COSTA, 2015) and the music perception test BATUTA (SIMÕES et al., 2023), eight for Music Therapy sessions, and one for the reapplication of the music perception test.

The music perception testing was performed by using an adapted version of the BATUTA for the melody and timbre modules, with samples that were presented in pairs, to which the participant answered whether they were the same or different. The melody module included ten samples consisting of the first phrases of the song 'Asa Branca' played in different tones by the instruments: guitar, violin, cello, flute, bassoon, clarinet, and piano. The timbre module was assessed by combining ten samples of the song 'Ciranda Cirandinha' and using the same instruments at a frequency of C 256 Hz.

The MUMU includes 25 questions regarding the habits and experiences of listening to music at different stages in the life of the CI users: before hearing loss, after hearing loss and before CI use, and after CI surgery. The questions can be answered in a 'yes' or 'no' format, by using Likert scales, and by choosing from multiple choices with the possibility of ticking more than one item. Out of the 25 questions, eleven that proved to be most relevant to the study were selected.

The music therapy sessions took place from September 29th, 2022 to October 31st, 2022 in a teaching clinic, on a weekly basis, with each session lasting 50 minutes. A total of eight sessions were conducted. During the sessions, sound-musical activities were performed with the use of musical instruments aiming to stimulate and develop music perception skills.

The music therapy techniques used during the sessions were: improvisation, re-creation, composition, and listening. Some variations of these techniques were also used, such as instrumental



improvisation with and without reference point, song improvisation, vocal improvisation without reference point, vocal re-creation, instrumental composition, and perceptual listening (BRUSCIA, 2016).

Different instruments that represent different families of musical instruments were made available and utilized during the sessions. Among the instruments used are the piano, guitar, metallophone, xylophone, sound tubes, drums, tambourine, bongo, repique, and rattles.

Upon finishing the eight sessions, the music perception test was applied again in order to compare the results prior to and following the MT interventions. The participant was also asked what it was like to answer the music perception test on both occasions and whether he felt any difference in his music appreciation.

RESULTS

The participant L, who has expressed his agreement to participate in the study by signing an Informed Consent Form (TCLE), is a 20-year-old male person with bilateral pre-lingual profound sensorineural hearing loss. His HI is a result of Waardenburg Syndrome, a genetic disorder described in 1951 by the scientist of the same name, which can lead to hearing loss in varying degrees (SILVA; RANGEL; JUNIOR, 2011).

L has been using the Nucleus CP802 unilateral CI since his first year of life, which offers amplification in a frequency spectrum of 100 to 8,000 Hz in the left ear. He had speech therapy until he was eight years old. Currently, his oral communication is very effective. As a child, he attended guitar and drums lessons, but did not continue learning musical instruments.

From the MUMU, questions 1, 2, 3, 4, 5, 7, 12, 13, 14, 15, and 16 were selected. In questions 1, 2, 14 and 15, which are related to the three different stages (before hearing loss, after hearing loss and before CI use, and after CI surgery), only the answers from the third stage (after CI surgery) were considered, since the participant has congenital HI and uses CI since his first year of life, having no hearing references prior to implantation.

L replied that he never listened to music and that it played no role in his life before the CI. Today, he considers music to play a very important role in his life and listens to it frequently, as he rated 9 for both questions on a Likert scale that ranged from 1 to 10.

L spends 2 hours or more per day listening to music, through the radio, television, or music devices. He listens to both background music and songs that focus on a single voice or sound, and he does so without using CI-adapted headphones. Regarding the reason for listening to music, L answered that he does it for pleasure, emotional satisfaction, and to improve his mood.

Questions 12 and 13 are related to the musical instruments that he can identify well and the ones that he enjoys listening to, respectively. The instruments listed were violin, flute, trumpet, tuba,

piano, horn, cello, xylophone, trombone, accordion, harp, drums, guitar, and saxophone. Among these instruments, L replied that he can identify well the piano, drums, and guitar. As for the instruments that he enjoys listening to, those are drums and guitar.

Table 1 reproduces L's rating regarding the music genres he listens to the most and the pleasure of listening to music divided by music genres. They are represented on a Likert scale that ranges from 1 (no pleasure) to 10 (a lot of pleasure).

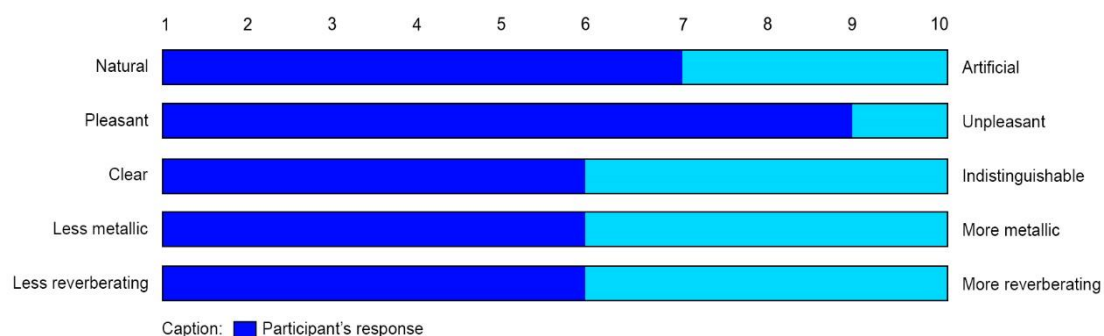
Table 1 - Most listened to music genres and the pleasure each of them brings.

Musical Genre	Usually listened to	Listening pleasure
Classical Music		8
Opera / operetta		6
Religious Music		6
Brazilian country music		6
Brazilian popular music	X	10
Rock	X	9
Jazz / blues		7
Music for dancing		7

Source: The authors

Figure 1 below highlights L's responses concerning how music sounds to him when he uses the CI, also on a Likert scale ranging from 1 to 10.

Figure 1 - How music sounds to him



Source: The authors

Regarding the BATUTA results for the testing before and after the TM sessions, the participant's responses were tabulated in Microsoft Excel (version 16.0). They indicated 17 correct answers prior to the sessions and 20 correct answers following the MT sessions.

When answering the BATUTA for the second time, L got one more answer right in the



melody module than the first time and correctly answered two samples of the timbre evaluation.

When asked about what it was like to perform the music perception test, L said that his biggest difficulty was with the timbre module, both in the first and second application of the test. However, he stated that he found it easier to differentiate the melodies and timbres after the MT sessions, needing fewer repetitions in some of the samples and having a difference in the number of correct answers before and after the reapplication. L also reported that, after completing the MT sessions, he noticed a difference in how frequently he listens to music compared to before. This made a difference in his music appreciation and influenced other activities that are connected to hearing in his daily life.

DISCUSSION

Music making is a natural practice of the human being, who is also a "musical being". Thus, everyone, without exception, must have the opportunity to participate and manifest themselves through music (ZUCKERKANDL, 1976). For people with HI, music turns out to be a privilege of only a few, as they end up losing their contact with music from an early age upon receiving the diagnosis of HI. Consequently, music is removed from every aspect of their lives, including family, school, and society (HAGUIARA-CERVELINI, 2003).

Over the MT sessions, it was observed that L could recognize changes in tempo and dynamics while playing. He was also able to understand and maintain simple rhythmic patterns, perceiving whenever there was a change in rhythm (BRANDALISE, 2015; JIAM; CALDWELL; LIMB, 2017; LASSALETTA et al., 2008; MCDERMOTT, 2004; REINERT; ANSAY, 2019).

The combination of musical instruments and voices that make up a song can influence the appreciation of CI users, as background instrument sounds can make it difficult to understand the lyrics and perceive the elements of music (BUYENS et al., 2014, 2015; KOHLBERG et al., 2015). In the first MT session, when speaking about the difficulty of understanding the lyrics of some songs, L brought up this complaint, arguing that the melody and instrument sounds blend together in those songs. In the last session, L brought this up once again and reported that the musical activities performed during the MT sessions helped him understand song lyrics and also in situations of his daily life. As an example, L said that he was once talking to his friends through an audio call with background music, and even so, he was able to understand and communicate well without a problem.

In the fifth session, when performing an activity with songs, L chose a song and sang it, along with the original version playing on the cell phone speaker. He opted for singing accompanied by the original version rather than by me playing the guitar, for he found it easier by doing so. During the performance, he demonstrated that he could sing within the song's tempo and rhythm, respecting the metric of the lyrics. He showed some difficulty in reproducing the melodic contour present in the

song, but managed to recognize it by associating with the rhythm of speech and the words.

During the listening activities that were proposed in the sessions, L's greatest difficulty was in perceiving the elements of music in songs that have a large frequency spectrum and a great variation in dynamics, such as songs played by an orchestra. He reported having better perception and appreciation with music when played by few instruments, or even by a single one. This issue can be related to the CIs' limitations when capturing and processing simultaneous and complex sounds (JIAM; CALDWELL; LIMB, 2017; MCDERMOTT, 2004).

In the last session, L was assigned to create a melody for an instrumental composition activity (BRUSCIA, 2016). Some cards with C major scale notes were provided for him to arrange in the order of his choice. It was suggested that L choose 16 notes to create four bars in 4/4. He then chose the cards and started creating a melody that sounded pleasant to him and reflected how he was feeling that day. During the process, he used a metallophone to play the melody a few times. After switching a few cards around, he reached the combination that pleased him the most (Figure 2). Subsequently, he was asked to give a rhythm to the melody and choose its tempo, reaching the final form shown in figure 3.

Figure 2 - Cards with musical notes in the order chosen by the participant



Translation: C - E - G - D - F - A - C - B / A - E - E - F - D - G - C - A
Source: The authors

Figure 3 - Melody created by the participant



Source: The authors

When analyzing the melody created by L, a predominance of consonant intervals is noticeable; mostly major 3rd and minor 3rd intervals. In general, consonant intervals and chords are



regarded as pleasant, whereas dissonant ones are regarded as unpleasant (FISHMAN et al., 2001). Some studies reveal that CI users may present some difficulty in noticing and distinguishing between consonant and dissonant sounds, which impacts how they perceive the emotional content of the music (JIAM; CALDWELL; LIMB, 2017); however, this was not the case for L. The pleasure in listening to a piece of music may also relate to the musical expectation of the listener. Regardless of having formal knowledge of music or not, a person can understand the musical structure and thereby create a certain expectation about the development and resolution of a melody (PFEIFFER; ZAMANI, 2017).

During the construction of the melody, L would choose the notes and play them, repeating this process until he found a combination that he would consider pleasant and enjoyable. Even without having knowledge of music theory, he could unconsciously recognize which intervals would sound more pleasant and also have an expectation of how the melody would sound.

The MT sessions also proved to be a safe environment, where the participant could express himself and deal with emotional issues and feelings that arose over the sessions, especially during improvisational activities. Music is a language that enables the subjects who use it to deal with their emotional issues in a meaningful way, actively or passively. Through improvisation in MT, the subject can express these emotions and feelings (BRUSCIA, 2016; RODRIGUES, 2017, 2019).

The MT sessions performed with the participant revealed that music therapy can be a valuable resource for the development of music perception in people with HI who use CI. Although L's performance does not seem notably significant for the test responses before/after, an improvement could be observed, indicated by the increased number of correct answers of the participant for both melody and timbre, which tend to be difficult elements of music for CI users (ALVES et al., 2015; ARAÚJO et al., 2018; JIAM; CALDWELL; LIMB, 2017; RODRIGUES, 2019; SPANGMOSE; HJORTKJÆR; MAROZEAU, 2019).

Furthermore, the participant's speech revealed that it was easier for him to perform the retest, as he reported that he needed to repeat only two or three samples, while the first time he felt the need to repeat several samples and several times.

By correlating the participant's reports during the process with his answers to the MUMU, it was concluded that music is very present and part of his daily life. It plays an important role in his life and is an activity that he performs for pleasure, improving his mood, bringing emotional satisfaction, and relaxing him. The participant can identify the most common instruments within the musical genres he listens to the most, which can be due to the repetition and familiarity with the timbre of the instruments.

In the MUMU, L indicated the piano as an instrument he can identify well, but not as one he enjoys listening to. Nevertheless, the piano sound turned out to be the most pleasant for L among the



instruments used during the sessions. He reported having had a preference for the piano due to finding its timbre pleasurable - the 3rd, 4th, and 5th octaves being the most pleasant for him - and also for the ease of finding the notes and playing them, once he learned how to locate them.

It is also important to highlight that pre-lingual and post-lingual CI users show differences in their music perception, due to pre-CI hearing and neuroplasticity. Pre-lingual CI users have no listening references prior to the CI, as they have been using it since they were young. Thus, upon listening to music, they do not compare the period before HI and the time after the CI as post-lingual users do, and as a result, they have a better music appreciation (JIAM; CALDWELL; LIMB, 2017).

CONCLUSION

From the participant's answers to the MUMU and his reports over the MT sessions, it can be concluded that music is of great importance for him and is part of his daily life, being an activity that brings him pleasure and emotional satisfaction.

In addition, a clear difference became evident when the music perception test was reapplied compared to the previous responses, by the higher number of correct answers, the reduced need to repeat the samples, and the participant's statements, which revealed differences and also a facility when performing the test for the second time.

During the sessions, it was also clear that the participant could recognize changes in tempo and dynamics, understand and keep simple rhythmic patterns, perceive changes in rhythm, differentiate timbres of musical instruments, distinguish the notes' pitch, and present notions of consonance and dissonance, associating them with pleasant and unpleasant sounds.

Therefore, the results revealed that MT can be a valuable resource for developing music perception in individuals with HI who are CI users.

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APPENDIX – MUNICH MUSIC QUESTIONNAIRE

Questionário de Música de Munique

Nome: _____

Data (dd/mm/aa): ____/____/____

Data de nascimento (dd/mm/aa): ____/____/____ Por

favor, assinale todos os dispositivos que você utiliza:

Implante coclear direito Implante coclear esquerdo

Aparelho auditivo direito Aparelho auditivo esquerdo

Implante coclear /DUET direito Implante coclear/DUET esquerdo

1. Com que frequência você ouve e/ou ouvia música?

Por favor, assinale a resposta que mais se aplica.

Com que frequência você ouvia música antes de perder a audição?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Com que frequência você ouvia música após a perda auditiva e antes de receber o implante coclear (IC)?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Com que frequência você ouve música atualmente, após receber o implante coclear?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

2. Que papel a música desempenhou/desempenha em sua vida?

Por favor, assinale a resposta que mais se aplica.

Antes do início da sua perda auditiva?

Muito importante 10 9 8 7 6 5 4 3 2 1 Nenhum

Após a sua perda auditiva, antes de receber o implante coclear?

Muito importante 10 9 8 7 6 5 4 3 2 1 Nenhum

Atualmente, desde que recebeu o implante coclear?

Muito importante 10 9 8 7 6 5 4 3 2 1 Nenhum

3. Quando você ouve/ouvia música, durante quanto tempo o faz/fazia?

Antes do início da perda auditiva

Menos de 30 minutos

De 30 minutos a 1 hora

De 1 a 2 horas

Mais de 2 horas

O dia todo

Após a perda auditiva, antes de receber o implante coclear

Menos de 30 minutos

De 30 minutos a 1 hora

De 1 a 2 horas

Mais de 2 horas

O dia todo

Atualmente, desde que recebeu o implante coclear

Menos de 30 minutos

De 30 minutos a 1 hora

De 1 a 2 horas

Mais de 2 horas

O dia todo

4. Como a música geralmente lhe soa aos ouvidos quando você usa o implante coclear? Por favor, assinale a resposta que mais se aplica.

Natural 10 9 8 7 6 5 4 3 2 1 Artificial

Agradável 10 9 8 7 6 5 4 3 2 1 Desagradável

Nítida 10 9 8 7 6 5 4 3 2 1 Indistinguível

Menos metálica 10 9 8 7 6 5 4 3 2 1 Mais metálica

Menos reverberante 10 9 8 7 6 5 4 3 2 1 Mais reverberante



5. Normalmente, você liga a música diretamente no processador de fala? (por exemplo, usando a entrada que conecta dispositivos de áudio, tais como MP3)

Sim Não

6. Como você ouve música?

Como música de fundo
 Como meu único foco de atenção/sem distrações
 Ambos

7. Por que você ouve música?

Por favor, assinale todas as respostas que se apliquem.
 Por motivos profissionais Satisfação emocional
 Por prazer
 Melhorar o humor Para ficar acordado Para dançar Para relaxar

8. Caso você ouça música com seu implante coclear, quando começou a ouvir música regularmente após receber o implante?

Logo após o primeiro ajuste (ativação) Após 1 semana Após 1 mês
 Após 3 meses Após 6 meses Após 1 ano
 Após 2 anos Mais tarde

9. Você prefere ouvir solos de instrumentos ou orquestras/bandas?

Solo de instrumento Orquestra/banda Não tenho preferência

10. Caso você ouça música, quais elementos da música você consegue ouvir?

Tons agradáveis, Sim Não
mas não melodia Sim Não
Ritmo Sim Não
Apenas sons desagradáveis Sim Não
Melodia Sim Não

11. Você consegue distinguir as notas agudas das notas graves?

Sim Não

12. Qual(is) instrumento(s) você consegue identificar bem?

Por favor, assinale todas as respostas que se apliquem.
 Violino Flauta Trompete Tuba Piano
 Trompa Violoncelo Xilofone Trombone Sanfona
 Harpa Bateria Violão Saxofone
 Outro instrumento de corda
 Outro instrumento de teclado
 Outro instrumento de sopro
 Algum outro instrumento que não foi mencionado

13. Qual(is) instrumento(s) que você gosta de ouvir?

Violino Flauta Trompete Tuba Piano
 Trompa Violoncelo Xilofone Trombone Sanfona
 Harpa Bateria Violão Saxofone
 Outro instrumento de corda
 Outro instrumento de teclado
 Outro instrumento de sopro
 Algum outro instrumento que não foi mencionado

14. Onde você já ouviu música ou onde você ouve música atualmente?

Por favor, assinale todas as respostas que se apliquem.

Antes do início da perda auditiva

No rádio, em casa No rádio do carro Em eventos sociais
 Na televisão LP/CD/MC/MP3 Em instituições religiosas

Após a perda auditiva, antes de receber o implante coclear

No rádio, em casa No rádio do carro Em eventos sociais
 Na televisão LP/CD/MC/MP3 Em instituições religiosas

Atualmente, desde que recebeu seu implante coclear

No rádio, em casa No rádio do carro Em eventos sociais
 Na televisão LP/CD/MC/MP3 Em instituições religiosas

15. Que tipo de música você ouve? Por favor, assinale todas as respostas que se apliquem.

Antes do início da perda auditiva

Clássica Ópera/opereta Religiosa Sertaneja/country
 MPB Rock Jazz/blues Música para dançar

Após a perda auditiva, antes de receber o implante coclear

Clássica Ópera/opereta Religiosa Sertaneja/country
 MPB Rock Jazz/blues Música para dançar

Atualmente, desde que recebeu seu implante coclear

Clássica Ópera/opereta Religiosa Sertaneja/country
 MPB Rock Jazz/blues Música para dançar

16. Como você classifica seu prazer em ouvir música agora?

Por favor, assinale a resposta mais adequada.

Música clássica	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
Ópera/opereta	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
Música religiosa	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
Música sertaneja/country	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
MPB	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
Rock	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
Jazz/blues	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer
Música para dançar	Muito prazer	10 9 8 7 6 5 4 3 2 1	Nenhum prazer

17. Você toca/tocava/já tocou algum instrumento?

Por favor, assinale a resposta mais adequada.

Quando criança?

Caso você não toque ou nunca tenha tocado um instrumento, pule a pergunta 18 e vá para a pergunta 19!



17. Você toca/tocava/já tocou algum instrumento?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Antes do início da perda auditiva?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Após a perda auditiva, antes de receber o implante coclear?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Atualmente, desde que recebeu o implante coclear?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Caso você não toque ou nunca tenha tocado um instrumento, pule a pergunta 18 e vá para a pergunta 19!

18. Qual(is) instrumento(s) você já tocou ou toca atualmente?

Por favor, assinale todas as respostas que se aplicarem.

Quando criança:

Flauta doce Flauta Metais Clarinete

Piano Teclado Sanfona Violão

Violino Percussão Saxofone

Outro instrumento de corda

Outro instrumento de teclado

Outro instrumento de sopro

Algum outro instrumento que não foi mencionado

Antes do início da perda auditiva:

Flauta doce Flauta Metais Clarinete

Piano Teclado Sanfona Violão

Violino Percussão Saxofone

Outro instrumento de corda

Outro instrumento de teclado

Outro instrumento de sopro

Algum outro instrumento que não foi mencionado

Após a perda auditiva, antes de receber o implante coclear:

Flauta doce Flauta Metais Clarinete

Piano Teclado Sanfona Violão

Violino Percussão Saxofone

Outro instrumento de corda

Outro instrumento de teclado

Outro instrumento de sopro

Algum outro instrumento que não foi mencionado

Atualmente, desde que recebeu o implante coclear:

Flauta doce Flauta Metais Clarinete

Piano Teclado Sanfona Violão

Violino Percussão Saxofone

Outro instrumento de corda

Outro instrumento de teclado

Outro instrumento de sopro

Algum outro instrumento que não foi mencionado

19. Você canta ou já cantou? Assinale a resposta adequada.

Antes do início da perda auditiva?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Após a perda auditiva, antes de receber o implante coclear?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Atualmente, desde que recebeu o implante coclear?

Frequentemente 10 9 8 7 6 5 4 3 2 1 Nunca

Caso você não cante/nunca tenha cantado, pule as perguntas 20 e 21 e vá diretamente para a pergunta 22!

20. Caso você cante/já tenha cantado, informe onde canta/cantava.

Assinale todas as respostas que se aplicarem.

Antes do início da perda auditiva

Em um coral Em um grupo Em casa, sozinho

No carro Em instituições religiosas Com amigos

Após a perda auditiva, antes de receber o implante coclear

Em um coral Em um grupo Em casa, sozinho

No carro Em instituições religiosas Com amigos

Atualmente, desde que recebeu o implante coclear

Em um coral Em um grupo Em casa, sozinho

No carro Em instituições religiosas Com amigos

21. Caso você cante/já tenha cantado, informe o que canta/cantava.

Por favor, assinale todas as respostas que se aplicarem.

Antes do início da perda auditiva

Música sertaneja Música clássica Canções de Natal Jazz/blues

Música religiosa Ópera/opereta MPB/rock

Após a perda auditiva, antes de receber o implante coclear

Música sertaneja Música clássica Canções de Natal Jazz/blues

Música religiosa Ópera/opereta MPB/rock

Atualmente, desde que recebeu o implante coclear

Música sertaneja Música clássica Canções de Natal Jazz/blues

Música religiosa Ópera/opereta MPB/rock

22. Você teve aulas de música fora da escola (aula de instrumento e/ou canto)?

Sim Não

Caso não tenha recebido aula de música, pule a pergunta 23 e vá para a pergunta 24!

23. Quanto tempo você fez aula de música fora da escola (aula de instrumento e/ou canto)?

Menos de 3 anos Mais de 3 anos

24. Você já ouviu música após receber o implante coclear?

Sim Não

Caso não tenha ouvido música após receber o implante, pule a pergunta 25!

25. Em que circunstâncias você ouviu música após receber o implante coclear?

Assinale todas as respostas que se aplicarem.

Ouvi músicas conhecidas repetidamente

Li e toquei música

Ouvi músicas desconhecidas repetidamente

Toquei músicas conhecidas repetidamente sem ler a música em questão

Ouvi e li música

Treinei ouvir música durante a minha recuperação

Tive aulas de música

Agradecemos sua contribuição!