



MUSIC THERAPY: HEALING EFFECTS FROM CHILDHOOD TO OLD AGE

Kayley Tigges^{1,2}, Lidya K. Yassin³, Ashley Haywood⁴ and Paula Pérez-Núñez^{5*}

¹Department of Psychological Science, College of Sciences and Mathematics, Belmont University, Nashville, TN, United States

²Department of Songwriting, Mike Curb College of Entertainment and Music Business, Belmont University, Nashville, TN, United States

³Department of Anatomy, College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, United Arab Emirates

⁴Independent Researcher and Advocate, Albemarle, NC, United States

⁵Faculty of Health Sciences, Department of Psychology, University of Deusto, Bilbao, Spain

YOUNG REVIEWERS:



ÁGOSTON

AGE: 14



HARIN

AGE: 11



JOSEPH

AGE: 14

How does a familiar melody evoke memories from years past? Have you ever noticed how your mood shifts when your favorite song begins to play? When we hear a song that once held significance for us, parts of the brain that handle memory and emotion, like the hippocampus and amygdala, help us relive old moments and feelings. This connection is especially powerful with songs from our teenage years, when learning lyrics or playing instruments creates lasting neural pathways. This article explores how music affects the brain areas involved in cognition, emotion, and movement. It also examines how music therapy, a clinical practice that uses music to enhance physical and mental wellbeing, supports people with memory loss

and those recovering from trauma. Overall, this shows how music transforms the brain while touching memory and emotions.

WHAT IS MUSIC?

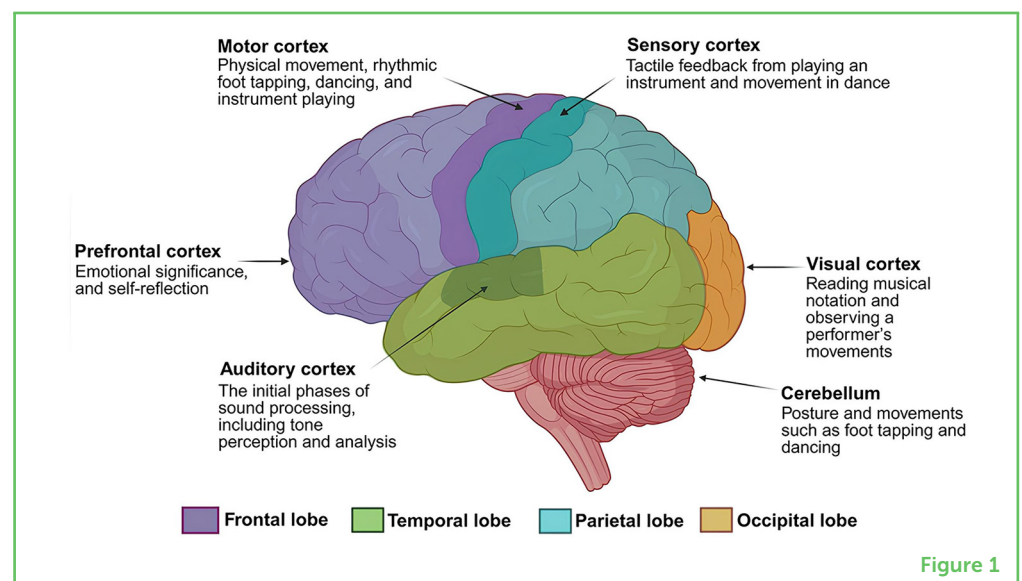
Music has existed for tens of thousands of years and is far more than sound. It is composed of elements that work together to create a piece of art [1]. These elements include rhythm, which describes when and for how long sounds are played. Rhythm makes you want to tap your foot or dance to a piece of music. Pitch denotes the high and low quality of a sound, while timber indicates the sound of a musical instrument. Tempo describes the speed at which music is performed. These basic elements give rise to music through melody and harmony. Melody is a sequence of notes that creates a recognizable tune. Harmony is what makes music sound full, adding depth to a melody and even changing the mood of a song [1].

MUSIC AND THE BRAIN

The brain is divided into four main parts, called lobes: the frontal, temporal, parietal, and occipital lobes, along with the cerebellum (Figure 1). Each lobe performs specific functions. For example, the frontal lobe is crucial for planning movements. The temporal lobe handles hearing and memory, the parietal lobe manages motor movements and spatial skills, and the occipital lobe processes visual information. Lastly, the cerebellum is responsible for emotional experiences and the planning of movements [1].

Figure 1

A side view of the brain showing the four main lobes and the cerebellum. Key areas involved in music processing include the motor cortex, sensory cortex, auditory cortex, visual cortex, and prefrontal cortex, with each having its own assigned function (Created with BioRender.com).



To create a complete experience of music that captures all its aspects including rhythm, melody, and lyrics, various brain regions must work

together [1]. The cerebellum's timing circuits, which help the brain keep track of beats and pace, regulate rhythmic movements, such as tapping along with music. Performing music—either by playing an instrument or singing—involves the frontal lobe for behavior planning, the motor cortex in the frontal lobe for movement control, and the sensory cortex in the parietal lobe for tactile feedback, meaning the sense of touch and pressure you feel when your fingers press piano keys or guitar strings [1]. Reading music is managed by the visual cortex in the occipital lobe. Interestingly, when listening to familiar music, the hippocampus—a structure deep in the brain that aids in storing memories and recognizing music—becomes active, while the amygdala processes emotional reactions to music (Figure 2).

Figure 2

A sagittal view of the brain—showing a section cut down the middle—highlights the hippocampus, which is associated with memory for music, along with the amygdala, which plays a role in emotional responses (Created with BioRender.com).

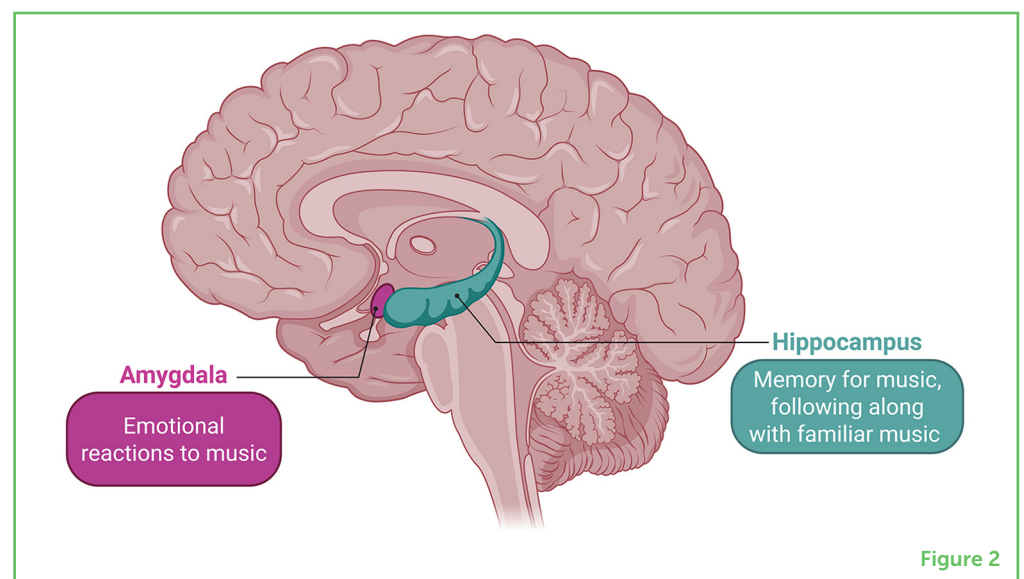


Figure 2

MUSIC THERAPY

A medical practice that uses elements of music, such as melody, rhythm, and harmony, to improve emotional, cognitive, and physical wellbeing. It can include listening, singing, or playing instruments.

MUSIC THERAPIST

A qualified healthcare professional who uses music to improve people's health. They design personalized sessions to treat various conditions and work in hospitals, schools, and rehabilitation centers.

WHAT IS MUSIC THERAPY?

Music therapy is a medical practice that uses music to address the physical, mental, emotional, and social needs of patients. It is done by trained **music therapists** who work in hospitals, schools, and mental health centers. Music therapy falls into two main categories: active and receptive. In active music therapy, the patient gets to play an instrument, learn how to play one, or sing songs. This kind of therapy helps with self-expression, builds confidence, and teaches new skills. In receptive music therapy, the patient listens to music chosen by the therapist and then talks about it. Sometimes, the patient might look at lyrics and explore the feelings the music brings up [2]. Before starting, the music therapist gets to know the patient's physical and mental abilities, music preferences, and any trauma triggers. After taking the patient's history and identifying their needs, the therapist will set the session's goals, design an appropriate therapy plan, and select active, receptive, or a combination of both forms of music therapy.

ALZHEIMER'S DISEASE

A brain disorder that is usually associated with long-term memory loss.

SANFILIPPO SYNDROME

A rare genetic disease that affects how a child's body breaks down certain sugars. Over time, these sugars build up and can cause problems with thinking, movement, and overall health.

MUSIC THERAPY FOR ALZHEIMER'S IN ADULTS

Alzheimer's disease is a brain disorder that causes a continuous decline in memory, thinking, and organizing skills. The first sign of Alzheimer's is memory loss, which becomes worse as the disease progresses. Individuals with Alzheimer's may not recognize who they are when they look in the mirror, and they may not recognize their loved ones. Some Alzheimer's patients can recall songs from their teenage years, between the ages of 14 and 18. Why that specific age? During this developmental period, the medial prefrontal cortex, responsible for linking emotions to personal identity, is highly active, making music from that time meaningful. Additionally, the first memories encoded are often the last to fade. So, if we play a piece of music from an Alzheimer's patient's youth, it allows them to profoundly reconnect with a part of themselves they had lost [3]. While this does not cure or slow Alzheimer's symptoms, it can help revive certain memories [1, 3].

Music therapy not only helps preserve memories but also lessens the symptoms of Alzheimer's by reducing agitation and improving mood [2]. Interestingly, there is a type of memory, called motor memory, which is responsible for physical movements. A combination of auditory (sound-based) and motor memory can help a person with Alzheimer's who has lost the ability to make certain movements in the advanced stages of the disease [3]. Music therapy with a strong rhythmic base can trigger spontaneous movement and keep the limbs and joints flexible and active [3].

MUSIC THERAPY FOR ALZHEIMER'S IN KIDS

Imagine Alzheimer's disease in children. That is basically what every family with children who have **Sanfilippo syndrome** faces. Often called "childhood Alzheimer's", Sanfilippo syndrome is a rare genetic disease that causes children to lose all the skills they have gained [4]. Children with Sanfilippo syndrome appear healthy at birth. Although research on Sanfilippo syndrome is limited, music therapy has shown healing effects on affected children, helping them calm down, stimulating verbal and nonverbal communication, and promoting memory [4]. Music therapy also encourages the expression of positive emotions, such as smiling, and it helps these children to pay attention [4]. Click this [link](#) to watch an interview with Ms. Ashley Haywood, as she shares the impact of music on her 9-year-old daughter with Sanfilippo syndrome, Ms. Sadie Haywood.

As noted in the interview, music plays an important role in Ms. Sadie Haywood's life, helping her family to connect and communicate with her. While Sadie has not received formal music therapy, her story highlights the potential of music as a powerful tool. The support that music therapists provide for children with Sanfilippo syndrome can

make a profound difference, by bringing smiles and creating special moments in the face of significant challenges.

MUSIC THERAPY AND POST-TRAUMATIC STRESS DISORDER IN ADULTS

When a traumatic event happens to adults, they may not recover from that stress for a long time. For example, some war veterans might feel scared or jumpy when they hear unexpected loud noises, like fireworks or explosions, because these can remind them of battle. This is called **post-traumatic stress disorder** (PTSD). The symptoms of PTSD include reliving painful memories, avoiding certain places or sounds, and emotional disturbances like fear or anger [5]. For example, veterans with PTSD may suddenly have flashbacks of combat if they hear noises that sound like gunfire, making them feel like they are back in a dangerous situation. Avoidance might involve staying away from loud environments that remind them of their bad experiences. Emotional disturbances can include intense anger that affects their relationships. Music therapy can have a positive influence on all these symptoms [3, 5].

When veterans experience flashbacks, listening to calming music can help them stay focused on the present instead of reliving trauma. However, music therapy might also bring buried memories to the surface. Music therapists can reduce this risk by watching patients closely for emotional reactions and ensuring their safety. Veterans in drumming therapy said it eased their anger and helped them feel more comfortable reconnecting with others [5].

Interestingly, songwriting helps alleviate veterans' PTSD symptoms of avoidance [3]. For example, writing a personal theme song can help create feelings of safety and empowerment, while working with others to write a song supports emotional expression and trauma processing.

Refugees who endure extremely traumatic experiences in their home countries and during perilous escapes are another example. Leaving their homes behind means losing their culture and family, which is very emotionally disturbing. Music can be a powerful link to their past, and it is the one possession they can take with them [3].

MUSIC THERAPY AND PTSD IN KIDS

PTSD is not limited to adults—children can also experience it. There are many kinds of hurtful childhood experiences, including traumas that affect children's physical, mental, or emotional wellbeing [6]. These experiences can have lasting health consequences, including PTSD. Therapeutic songwriting has been used with teenagers to help them

POST-TRAUMATIC STRESS DISORDER (PTSD)

A mental health condition that can occur after experiencing or witnessing a traumatic event, and which results in a range of symptoms that impact an individual's life.

process and bounce back from childhood trauma [6]. Songwriting can help people connect with others. If someone has gone through a personal trauma, it is recommended that their music therapy is one-on-one. However, in cases where people have gone through a similar traumatic event, like war veterans, refugees, and victims of childhood trauma, group music therapy work is extremely powerful, as it allows people to connect socially and can eventually help them to change.

WHAT WE NOW KNOW AND HOW IT CAN HELP

Music therapy is a type of treatment that uses rhythm, pitch, tempo, and melody to support emotional and physical healing. Music therapy must be done by a trained professional and can take place in the therapist's office or, once the patient is taught how to do so, in the patient's home. If you are passionate about music, consider becoming a music therapist. This job would allow you to help children and adults with movement and psychological needs regain their abilities and find joy. You could also become a researcher exploring the effects of music therapy on the brain and on patients' overall wellbeing. As our knowledge grows, so does its potential as a rehabilitative tool to enhance quality of life, making music therapy a field full of exciting opportunities for progress.

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AI TOOL STATEMENT

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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REFERENCES

1. Levitin, D. J. 2006. *This is Your Brain on Music: The Science of a Human Obsession*. New York, NY: Dutton Penguin.
2. Jiménez-Palomares, M., Garrido-Ardila, E. M., Chávez-Bravo, E., Torres-Piles, S. T., González-Sánchez, B., Rodríguez-Mansilla, M. J., et al. 2024. Benefits of

- music therapy in the cognitive impairments of Alzheimer's-type dementia: a systematic review. *J. Clin. Med.* 13:2042. doi: 10.3390/jcm13072042
3. Levitin, D. J. 2025. *I Heard There Was a Secret Chord: Music as Medicine*. New York, NY: W.W. Norton & Company.
 4. Pérez-Núñez, P., Lázaro, E., Amayra, I., López-Paz, J. F., Caballero, P., Martínez, O., et al. 2021. Music therapy and Sanfilippo syndrome: an analysis of psychological and physiological variables of three case studies. *Orphanet J. Rare Dis.* 16:486. doi: 10.1186/s13023-021-02123-6
 5. Landis-Shack, N., Heinz, A. J., and Bonn-Miller, M. O. 2017. Music therapy for posttraumatic stress in adults: a theoretical review. *Psychomusicology*. 27:334–42. doi: 10.1037/pmu0000192
 6. Viega, M. 2017. Developing faith in the transition to adulthood: an analysis of songs written by adolescents who have had adverse childhood experiences. *Jahrbuch Musikther/Music Ther Annu.* 13:73–93. doi: 10.29091/9783752001952/008

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YOUNG REVIEWERS

ÁGOSTON, AGE: 14

My name is Ágoston, I am currently 14 years old. I like science and making photos.



**HARIN, AGE: 11**

My name is Harin and I am in sixth grade. I like to play the violin and the piano, and love listening to songs! I love to read books, mostly about fantasy fiction, and usually spend my free time reading another book. My favorite subject in school is math and science because it always has a precise answer.

**JOSEPH, AGE: 14**

This young reviewer is a 14-year-old boy with unnecessarily long hair and amusing friends. He quotes, "I like grass, but I am too lazy to go out and touch it.", and his last name is frequently mispronounced. Often found putting his dexterous skills into action, he has hobbies such as playing the drums and making things with his hands.

AUTHORS**KAYLEY TIGGES**

Kayley Tigges is a research assistant in the Psychological Science Department at Belmont University. She has a deep interest in the causes of mental illness and how research relates to actual treatment. She hopes to become a mental health therapist in the future. In the music realm, she is interested in the music business and holistic music practices, how music relates to mental illness and how it can improve it, and she works on her own personal music projects outside of research.

**LIDYA K. YASSIN**

Lidya K. Yassin is a research assistant in the Department of Anatomy at the College of Medicine, United Arab Emirates University. She advocates for individuals with rare genetic conditions. Lidya's interest in music therapy was sparked by Ms. Kayley Tigges, who inspired her to study the connection between music and mental health. Lidya is especially grateful to Ms. Ashley Haywood for the opportunity to learn from her about Sanfilippo syndrome and deepen her understanding of its impact on children and families.

**ASHLEY HAYWOOD**

Ashley Haywood is a dedicated mother, advocate, and community leader who paused her career in clinical research to become a full-time caregiver to her daughter, Sadie, who was diagnosed with Sanfilippo Syndrome. For nearly a decade, Ashley has passionately raised awareness and funding for Sanfilippo research both locally and internationally through events, public speaking, and media interviews. She serves on the Onboarding Committee for the Cure Sanfilippo Foundation and is widely recognized as a fierce advocate not only for Sadie, but for all individuals with special needs.

[Cure Sanfilippo Foundation](#) | [To cure Sanfilippo Syndrome](#)



PAULA PÉREZ-NÚÑEZ

Paula Pérez Núñez holds a Ph.D. in psychology from the University of Deusto (Spain). Her main research area is music therapy, with a particular focus on its application to individuals with functional difficulties and their families. She currently combines clinical practice as a health psychologist and music therapist with academic work, serving as teaching and research staff at several universities. Her professional experience bridges therapeutic intervention and research, aiming to promote wellbeing through music-based approaches. *paula.perez@cop.es