

Music Therapy and Neuroplasticity



Neuroplasticity is the brain's ability to reorganize itself by creating and pruning neural connections in response to changes in behavior or environment.

Music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship.

Music therapy is the use of music by a credentialed professional as an intervention to improve, restore, or maintain a non-music-related behavior in a patient or client.

NOISE: Exposure to noise can be stressful and can impair cognition and memory. But music is essentially the opposite of noise, with high levels of consonance. Thus, music therapy may provide a clear acoustic signal to help patients learn desired non-music-related behaviors.

Music therapists' work with a wide range of patients and clients to change many behaviors not related to music. These include patients going through painful procedures and/or trauma, for which music can reduce pain, fatigue, and anxiety, perhaps decreasing the amount of sedation and analgesia needed.

Music therapists can also play an integral part in helping children with special needs by using music to increase vocalization/verbalization to improve effective communication.

4 WAYS MUSIC IMPACTS THE BRAIN

1. Regulation of Neurotransmitters

Listening to music releases dopamine which is interpreted as a reward. This creates and strengthens new neural pathways.

2. Music Provides a Clear Signal

Music is acoustically clearer than noise and speech and more easily processed by the brain.

3. Music Synchronizes Neural Activity

Music therapists pair non-music behaviours with music to integrate and organize learning.

4. Engagement of Multiple Brain Areas

Specific elements of music can be utilized to stimulate plasticity in targeted brain regions.

MUSIC THERAPY IN ACTION

Music has shown positive effects in a variety of patient populations for improving symptoms related to different diseases and disorders. Here's a sampling of some of the more common uses of music therapy.

PATIENT POPULATION	NONMUSIC BEHAVIORS
Autism spectrum disorder	Movement, communication, speech and language, social skills, attention, cognition, activities of daily living
Alzheimer's disease and dementia	Memory, mood, social interaction
Traumatic brain injury	Movement, communication, speech and language, social skills, attention, memory, cognition
Mental health and mood disorders	Self-esteem, awareness of self and environment, expression, reality testing, social skills, attention, cognition
Pain management	Anxiety and stress, mood, feelings of control
Cancer	Anxiety and stress, mood, feelings of control, coping skills
Movement disorders and stroke	Movement, speech and language, swallowing , respiratory control, memory, cognition
Hospice	Anxiety and stress, mood, feelings of control, coping skills

TRAINED MUSICIANS

One way to show the effect of music training on the brain is to see what trained musicians' brains look like compared with untrained people who just enjoy music.

- Highly trained pianists showed changes in the micro organization of axons.
- Musicians demonstrate faster encoding in the auditory cortex and have very rapid evoked responses to unexpected tones.

- Musicians can tell emotion in voice and determine identity in voice better.
- The speed of the transmission from the motor cortex to median nerve is faster.
- Even when unfamiliar with Mandarin, musicians can distinguish syllables better. The brainstem pitch center is stronger.
- Musicians are less affected by background noise.
- Musicians had faster encoding in cortex, and evoked responses to unexpected changes. A cortical effect on motor neurons was faster.

Music taps many regions of the brain simultaneously and uses and improves a wide range of capacities. The multi-sensory nature of music stimulates unique neuroplasticity, including improvement of brain capacities unrelated to music such as learning new sensory and motor skills, and abstract concepts.

QUIZ

1. True or False- Music has shown positive effects in a variety of patient populations for improving symptoms related to different diseases and disorders.

2. True or False- Music taps very few regions of the brain simultaneously and uses and improves a wide range of capacities.

3. True or False- Musicians demonstrate faster encoding in the auditory cortex and have very rapid evoked responses to unexpected tones.

4. Fill in the blanks:

_____ is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship.

5. Fill in the blanks:

_____ is the brain's ability to reorganize itself by creating and pruning neural connections in response to changes in behavior or environment.

6. Some of the more common uses of music therapy are:

- a) Autism spectrum disorder
- b) Pain management
- c) Movement disorders and stroke
- d) All of the above

QUIZ ANSWERS

1. True

2. False

3. True

4. **Music therapy** is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship.

5. **Neuroplasticity** is the brain's ability to reorganize itself by creating and pruning neural connections in response to changes in behavior or environment.

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Sources

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