

Music Therapy & Acquired Brain Injury

The neuroscience of music and its therapeutic application

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Music and Health

Music and health have been associated since ancient times.

Throughout history, this association has primarily focused on music's potential influence on mental health.

Recent developments:

fMRI: interest in music's influence on the brain



Various disciplines are interested in music's influence on the brain

- ★ Music Perception
- ★ Music Performance
- ★ Speech Therapy
- ★ Athletics



Recent research evidence of music's influence on the brain has impacted music therapy.



NMT

Science based music therapy → Neurologic Music Therapy
(NMT) (Thaut, 2005)

NMT is based on the fact that “music can access control processes in the brain related to control of movement, attention, speech production, learning and memory”. Music can therefore help retrain and recover functions lost to injury or disease. (Thaut & Hoemberg, 2013)

NMT has developed standardized music therapy interventions.

NMT = medical model of music therapy



“Music does not only engage “music areas” but also engages neural networks (including spinal, cortical, and subcortical areas) that mediate cognitive and motor controls” (from Thaut & Hoemberg, 2013)

Goal: use music’s stimulus on the brain for therapeutic purposes.



Therapeutic Applications

My clinical work: rehabilitation following ABI

Goal Areas: Speech

Motor

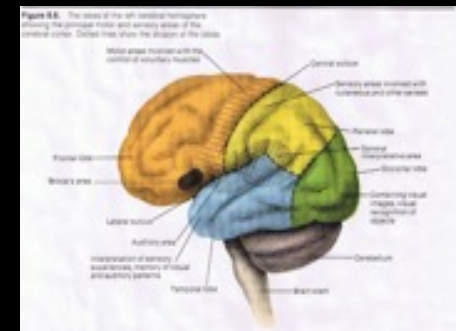
Cognition

Psychosocial



Acquired Brain Injury

- ◆ An acquired brain injury (ABI) is any damage to the brain that occurs after birth. ABI/TBI
- ◆ The severity of the injury does not necessarily predict the level of dysfunction. The size, cause, the survivor's pre-injury level of functioning, and the location of injury will determine the functional outcome and level of impairment.
- ◆ There is a broad range of ABI outcomes.
- ◆ Individual client goals are set, according to above.



Speech Rehab

Why music for speech rehab?

- ☑ Neural sharing between speech and singing
- ☑ Role of Melody
 - ☑ Role of Rhythm



Possible Speech Goals:

★ Word Retrieval (MIT)

★ Articulation

★ Breath support



Example of Melodic Support for Speech



Example of Rhythmic Support for Speech



Motor Rehab

Why music for motor rehab?

- ☑ Auditory-motor coupling *
- ☑ Neurologic Music Therapy: Rhythmic Auditory Stimulus (RAS) (Thaut & Hoemberg, 2015)



Other...

- ◆ Sonification of movement

NMT: Patterned Sensory Enhancement (PSE)

- ◆ Purposeful movement

- ◆ Clear auditory feedback



Possible motor rehab goals:

- ★ Regulate movement (improve control & quality)
- ★ Increase range-of-motion
- ★ Strength/endurance



Example of movement sonification



Example of rhythmic support for movement



Cognition

Why music for cognitive rehab?

- ◆ Musicians' enhanced attention and cognitive control
- ◆ Musicians' enhanced non-musical abilities

Music therapy:

- ◆ Music-based attention tasks.
- ◆ Therapeutic Music Education (TME): Greater cognitive demand



Psychosocial

Music allows for:

- ☑ Self-expression: verbal and/or non-verbal
- ☑ Empowerment
- ☑ Celebrates abilities



Conclusion

Music is a unique and powerful stimulus on the brain.

Music's influence on the brain can be used to work towards therapeutic goals. These include rehab goals in the areas of speech, motor, and cognition. Because of music's emotional and expressive qualities, it can also be used to address psychosocial needs.



Thank you for your interest in a medical model of music therapy and its application to rehabilitation following acquired brain injury.

Cheryl Jones

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