MUSIC THERAPY IN NEUROLOGY: A SHORT INTRODUCTION

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Disclosure

We, Meredith Sharpe and Penny Roberts, have no financial interests or relationships to disclose.

AGENDA

Overview of Music Therapy

Overview of Neurologic Music Therapy (NMT)

Research

Experiential

MUSIC THERAPY

Research and evidence based

Music interventions

Certified professional

Non-musical goals

- Playing the piano: Fine motor
- Drumming: Communication

Neurologic Music Therapy (NMT)

Domains

- Cognitive
- Sensory motor
- Communication

Thaut, M. H., & Hoemberg, V. (Eds.). (2014). *Handbook of neurologic music therapy.* Oxford University Press.

COGNITION

The Relationship Between Music and Cognitive Abilities

Research: MUTY and Cognition?

- Improved frontal lobe function in Parkinson's' Disease[1]
- Improved long term memory storage and retrieval in MS[2]
- Improved global cognitive state, long and short-term memory in patients with MCI[3]
- Evoke white matter neuroplasticity in TBI[4]
  - Improved executive function

[1] Spina, E., Barone, P., Mosca, L. L., Lombardi, A., Longo, K., Iavarone, A., & Amboni, M. (2016). Music therapy for motor and nonmotor symptoms of Parkinson's disease: a prospective, randomized, controlled, single-blinded study. *J Am Geriatr Soc*, *64*(9), e39.[2]Impellizzeri, F., Leonardi, S., Latella, D., Maggio, M. G., Cuzzola, M. F., Russo, M., ... & Calabrò, R. S. (2020). An integrative cognitive rehabilitation using neurologic music therapy in multiple sclerosis: A pilot study. *Medicine*, *99*(4).[3] Domínguez-Chávez, C. J., Murrock, C. J., Guerrero, P. I. C., & Salazar-González, B. C. (2019). Music therapy intervention in community-dwelling older adults with mild cognitive impairment: A pilot study. *Geriatric Nursing*, *40*(6), 614-619..[4]Sihvonen, A. J., Siponkoski, S. T., Martínez-Molina, N., Laitinen, S., Holma, M., Ahlfors, M., ... & Särkämö, T. (2022). Neurological music therapy rebuilds structural connectome after traumatic brain injury: Secondary analysis from a randomized controlled trial. *Journal of clinical medicine*, *11*(8), 2184.

COMMUNICATION

The Relationship Between Music and Language

Research: MUTY and Communication?

- Significant improvement in aphasia quotient, naming, and repetition with Music Therapy[1]
- Enhances recovery of cognitive abilities post-stroke[2]
- Supports maintenance of vocal abilities in Parkinson's Disease[3]
  Volume, quality, and glottal function
- Fluency in patients with Alzheimer's Disease[4]
- Acquisition of speech sounds and word approximations, articulation of words and phrases in children with ASD[5]

[1]Lim, K. B., Kim, Y. K., Lee, H. J., Yoo, J., Hwang, J. Y., Kim, J. A., & Kim, S. K. (2013). The therapeutic effect of neurologic music therapy and speech language therapy in post-stroke aphasic patients. *Annals of rehabilitation medicine*, *37*(4), 556–562. https://doi.org/10.5535/arm.2013.37.4.556

[2]Xu, C., He, Z., Shen, Z., & Huang, F. (2022). Potential Benefits of Music Therapy on Stroke Rehabilitation. *Oxidative medicine and cellular longevity*, *2022*, 9386095. https://doi.org/10.1155/2022/9386095

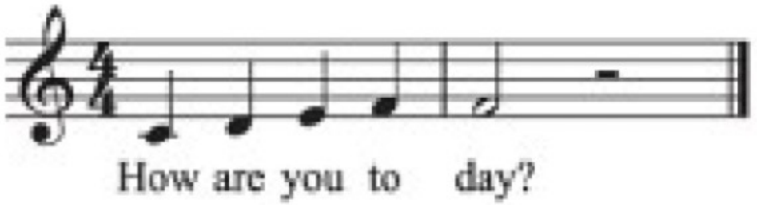
[3]Matthews, R. Acoustic, respiratory, cognitive and wellbeing comparisons of two groups of people with Parkinson's disease participating in voice and choral singing group therapy (VCST) versus a music appreciation activity. *Mov. Disord.* **2018**, *3* (Suppl. 2), 33

[4]Lyu, J., Zhang, J., Mu, H., Li, W., Champ, M., Xiong, Q., ... & Li, M. (2018). The effects of music therapy on cognition, psychiatric symptoms, and activities of daily living in patients with Alzheimer's disease. *Journal of Alzheimer's Disease*, *64*(4), 1347-1358.

[5]Wan CY, Bazen L, Baars R, Libenson A, Zipse L, Zuk J, et al. (2011) Auditory-Motor Mapping Training as an Intervention to Facilitate Speech Output in Non-Verbal Children with Autism: A Proof of Concept Study. PLoS ONE 6(9): e25505. https://doi.org/10.1371/journal.pone.0025505

Musical Speech Stimulation-MUSTIM

- Musical Speech Stimulation: MUSTIM
  - (1) deeply ingrained and over- learned associations between music and words to familiar songs
  - (2) anticipatory character that provides temporal cues to fill in, initiate, or complete words and sentences
  - (3) its affective arousal character: deep-layered speech circuitry and mediating more reflex like speech.[1]
- Patients:
  - Left hemisphere stroke or injury, some cognitive damage
  - Non-fluent aphasia- can access undamaged subcortical thalamic speech
- Clinical Application



Prosody of speech =
prosody of music
Cadence
Rhythm
Stress

[1]Michael Thaut. (2005). Rhythm, Music, and the Brain : Scientific Foundations and Clinical Applications. Routledge.

Example/Video

SENSORY MOTOR

The Relationship between Music and Movement

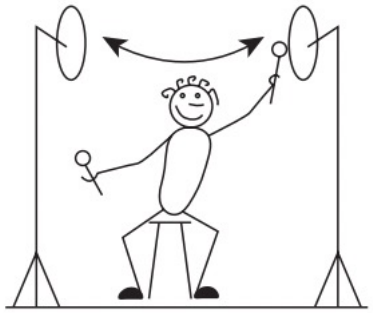
Research: MUTY and Motor?

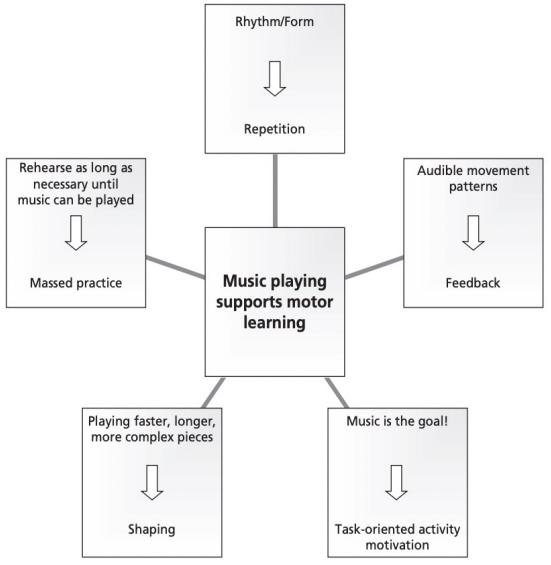
- Improvements in gait in Parkinson's Disease[1]
  - Stride length, swing time & cadence
- Gait velocity in Huntington's Disease[2]
- Overall hand and arm performance in Cerebral Palsy[3]
- Decrease in stereotypical motor stimming in ASD[4]

[1]Benoit, C. E., Dalla Bella, S., Farrugia, N., Obrig, H., Mainka, S., & Kotz, S. A. (2014). Musically cued gait-training improves both perceptual and motor timing in Parkinson's disease. *Frontiers in human neuroscience*, *8*, 494.[2]Wittwer JE, Webster KE, Hill K. Rhythmic auditory cueing to improve walking in patients with neurological conditions other than Parkinson's disease—what is the evidence? Disabil Rehabil. 2013;35(2):164–76.[3] Marrades-Caballero, Santonja-Medina, ،Sanz-Mengibar, Santonja-Medina. (2018) .Neurologic music therapy in upper-limb rehabilitation in children with severe bilateral cerebral palsy: a randomized controlled trial. European Journal of Physical and Rehabilitation Medicine, 54(6):866-872[4]Srinivasan, S. M., Park, I. K., Neelly, L. B., & Bhat, A. N. (2015). A comparison of the effects of rhythm and robotic interventions on repetitive behaviors and affective states of children with Autism Spectrum Disorder (ASD). *Research in autism spectrum disorders*, *18*, 51-63.

Therapeutic Instrument Playing- TIMP

- Therapeutic Instrument Playing- TIMP
  - (1) Choosing instruments, their spatial configuration and therapeutically designed musical patterns
  - (2) Addresses unhealthy coping/compensation habits
  - (3) Utilizes neural connections between motor and auditory systems to create motor mapping templates [1]
- Patients:
  - Non-progressive disorders (spina bifida, TBI, cerebral palsy, etc.)
  - Neurodegenerative issues (Parkinson's, inflammation/tumors of the CNS, Huntington's, etc.)
- Clinical application





1Mertel, K. (2014). Therapeutic Instrument Playing (TIMP). In Thaut, M. H., & Hoemberg, V. (Eds.). (2014). *Handbook of neurologic music therapy*. Oxford University Press.

Example/Video

MUSIC THERAPY

THANK YOU

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