

Neurologic Music Therapy: Increasing Cognitive, Sensorimotor, & Language Functioning after a Brain Injury

Music Therapy is the “Clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional (MT-BC) who has completed an approved music therapy program.” -American Music Therapy Association

Neurologic Music Therapy (NMT) is a specialized area of music therapy, defined as the “therapeutic application of music to cognitive, sensory, and motor dysfunctions due to neurologic disease of the human nervous system.”

Treatment techniques are standardized and applied to therapy as *Therapeutic Music Interventions* (TMI), which are adaptable to the individual’s needs. Currently there are twenty standardized techniques. Several are mentioned below:

- **SENSORIMOTOR TRAINING**
 - **Rhythmic Auditory Stimulation (RAS)**- Rhythmic motor cueing to facilitate training of movements that are intrinsically and biologically rhythmical.
 - **Therapeutic Instrumental Music Performance (TIMP)**- Playing of musical instruments to exercise and simulate functional movement patterns in motor therapy.

- **COGNITION TRAINING**
 - **Music Psychotherapy & Counseling (MPC)**- Uses musical performance to address issues of mood control, affective expression, cognitive coherence, reality orientation, and appropriate social interaction.
 - **Musical Executive Functions Training (MEFT)**- Improvisation or composition exercises to practice executive functioning skills such as organization, problem solving, decision-making, reasoning, and comprehension.
 - **Musical Attention Control Training (MACT)**- Musical elements cue different musical responses to practice sustained, selective, divided, and alternating attention functions.

- **SPEECH & LANGUAGE TRAINING**
 - **Oral Motor Respiratory Exercises (OMREX)**- Vocalization and wind instrument playing to enhance articulatory control, respiratory strength, and function of the speech apparatus.
 - **Developmental Speech & Language Training Through Music (DSLTM)**- Utilizes music, as well as related materials (e.g. singing, chanting, playing musical instruments, and combining music, speech, and movement) to enhance and facilitate speech and language development.
 - **Melodic Intonation Therapy (MIT)**- Used mostly with Broca’s aphasia. Functional sentences are translated into song by translating the speech inflection patterns into musical prosody.

Neurologic Music Therapy (NMT) is “based on the neuroscience model of music perception and production, and the influence of music on functional changes in nonmusical brain and behavior functions”.

- “By combining these developments- brain imaging, insight into plasticity, and finding that musical and non-musical functions share systems- therapists finally could build a powerful, testable hypothesis for using music in rehabilitation: Music can drive general reeducation of cognitive, motor, and speech and language functions via shared brain systems and plasticity.” (Thaut, 2010) *Michael Thaut (Pioneer of NMT)
- “Music Therapy can retrain auditory perception, attention, memory, and executive control (including reasoning, problem solving, and decision- making).” (Thaut, 2010)
- The *Basal Ganglia* controls motor coordination and voluntary movement among other functions.
 - Dopamine receptors record specific interval lengths/patterns when walking.
 - This is how we walk to the “beat of music”, we ANTICIPATE the beat or rhythm.
 - An external rhythm with consistent meter (RAS) can facilitate rhythmical movements such as walking.
- *Mirror Neurons* are activated when watching an action such as someone playing piano.
 - The neuron system attempts to replicate the same condition/action in our own mind.
 - Recent studies have found *Mirror Neurons* are activated even when hearing music .
 - Neuroscientist, Vilayanur Ramachandran, coined the term “empathy neurons”, suggesting mirror neurons may be the basis for empathetic emotions.
 - Therefore, the theory suggests that since music activates mirror neuron systems and many regions of the brain, music can be used to engage the motor neuron systems for learning.
- Research shows music learning changes the brain. “Auditory and motor areas in the brain grow larger and interact more efficiently.” (Thaut, 2010)
- Music activates the *temporal and frontal brain* areas differently than speech.
 - Learning word lists in a song activates temporal and frontal brain areas on both sides of brain, while spoken language only activates areas on the left side.
 - It stands to reason that singing can therefore bypass damaged language areas. (TMI: MIT, DSLM)
- Many neural networks are involved in the cognition and perception of auditory rhythm and music
 - *Cerebellum*- Schmahmann (1997) found consistent engagement of distinct neural circuits in the cerebellum across musical-rhythmic tasks, suggesting that the cerebellum has a central role in temporal organization of cognitive and perceptual processes in music.
 - Wan and Schlaug (2010) found that neural network training may produce cross modal effects on other behavioral or cognitive operations.
 - Simply put, “The neuronal activation patterns that precisely code the perception of rhythm in the auditory system spread into adjacent motor areas and activate the firing patterns of motor tissue.” (Thaut, 2005)
- The *hippocampus* plays an important role in memory.
 - Wantanbee (2008) found suggestions that the right hippocampus contributes to the accuracy of music retrieval outcome.
- The *amygdala* has a primary role in the processing and memory of emotional reactions.
 - Grady et al (2001) found that enhanced short term memory functioning in Alzheimer’s Disease activated prefrontal-amygdala connections.
- *Neuroplasticity* is defined as the ability of the brain to change as a result of one’s experience.
 - Thaut (2010) found that veterans with TBI, who participated in NMT, had better performance scores on decision-making tests after receiving the therapy.

Further reading/information:

- Music Making as a Tool for Promoting Brain Plasticity Across the Life Span
www.musicianbrain.com/papers/Wan_Schlaug_MusicMaking_BrainPlasticity.pdf
- How Music Helps to Heal the Injured Brain: Therapeutic Use Crescendos, Thanks to Advances in Brain Science
<http://www.dana.org/news/cerebrum/detail.aspx?id=26122>
- Neurologic Music Therapy and Rehabilitation Video
<http://abclocal.go.com/ktrk/video?id=8093175>

Inside

To find out what's coming up in the next week and beyond, read the Daily Planner.

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Dance lessons planned at library

People hoping to learn some basic dance moves or advance their dance skills are invited to learn Zydeco and Cajun dance moves this evening at the Burlington County Library, 5 Pioneer Blvd., Westampton.

Beginner Zydeco and Cajun dance lessons will take place from 7 to 8 p.m. and will provide participants with the basic skills to start dancing.

Intermediate Zydeco and Cajun dance lessons will take place from 8 to 9 p.m. and will provide instruction on more difficult techniques.

The lessons are free. For more information, call (609) 267-9660.

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Our Towns Editor Bob Tulini

Program exercises memory

Brain Gym helps Alzheimer's, dementia patients

BY RENEE R. JANOWICZ
For the Courier-Post

MOORESTOWN

Colleen Fitzpatrick's job as a memory coach took on a new meaning after her mother's massive stroke.

Helping her mom recover put into perspective just how much Fitzpatrick could affect her clients' everyday quality of life.

"That was a turning point," she said. "That's when my job turned into my passion and my obsession."

Fitzpatrick is a personal trainer of sorts, pushing people with Alzheimer's

disease and dementia to strengthen their brains in ways that can improve everyday conversations and preserve treasured memories.

She saw firsthand how her mom's therapy seemed juvenile and boring to the former teacher, and she tweaked her programs accordingly. Her clients use music, art and electronic games to sharpen brain function. Fitzpatrick de-

lights in the ways one client noticed she was wearing her favorite boots — again — and another memorized key players in a family wedding.

IF YOU GO

■ Mitchell Slutzky, founder of the Brain Gym program, will lead a program seminar March 24 at CareOne at Harmony Village from 8:30 to 10 a.m. Breakfast will be included. CareOne at Harmony Village is located at 301 N. Stanwick Road, Moorestown. Reservations are required by calling **(856) 638-1244**.

"That's a lot of quality-of-life stuff," she said.

Fitzpatrick is a licensed clinical social worker and memory coach at places

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RENEE R. JANOWICZ/For the Courier-Post
Colleen Fitzpatrick uses a tambourine, electronic keyboard and other instruments in her office, The Brain Gym, at CareOne at Harmony Village in Moorestown.

Memory/Program offers brain exercises for elderly patients

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like CareOne at Harmony Village in Moorestown, where all residents have memory impairments. She works with them — and a few nonresidents, too — in her office dubbed the Brain Gym.

An electronic keyboard occupies a large share of the desk, alongside a tambourine and a laptop ready for musical games. A shelf stacked with books about art also is home to hand-held games that require rapt attention and quick reflexes.

This is where she works with people who struggle to follow a conversation, can't quickly recall their grandchild's name or have trouble staying on course during a walk around their home. Fitzpatrick's job is to coax their brains into forging the connections necessary to make things easier.

Some of her most important tools come from the nonprofessional side of her life: the love of music and art that she studied as a hobby but never pursued for a living.

"I never dreamed that I would find a job that would be so compatible and have such good results," she said.

She earned a bachelor's degree in psychology and art, then a master's degree in clinical social work. Along the way she also took classes in sculpture and painting, plus an intensive workshop on music's role in medicine.

In her Brain Gym, Fitzpatrick works one on one with clients by asking them to repeat strings of musical notes that get more challenging after each success. She gives clients a hand-held video

game like Nintendo DS and teaches them how to anticipate action and manipulate tiny buttons to make the animated character move forward and jump obstacles. She flips through pages of a book that show various works of art, prompting them to recall what they discussed during their last visit or how the pieces are similar.

"That's a fun way of activating those memory centers," she said.

Fitzpatrick helped prepare one man for a Christmastime visit to the home he had shared with his sister by rehearsing relatives' names and recounting past events. Curtis Brown, 80, used to get a block or two from the house and not know where he was, his sister Clara Bowe said. As they approached the home, it was clear something had changed.

"He said, 'I think I know where I am,'" Bowe said. "When he got to our house he said, 'I lived right there in that house.' This was very unusual."

Bowe, who visits her brother two or three times a week, said he has been remembering more pieces from his everyday life, and she credits Fitzpatrick and the Brain Gym. Brown, a former music teacher, has been showing Fitzpatrick how to play a new song on her office keyboard. During one visit he chastised her for messing up the same part for yet another week.

"I've never been so happy to be yelled at in my whole life," she said. "He was really paying attention."

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NEWS RELEASE

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WINSTON
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AMERICAN APPROACH TO MUSIC THERAPY IN DEMENTIA CARE 'Going For a Song' Treatment for Alzheimer's

Music composer and harpist, Teleri Dyer from Clapton in London, has recently returned from a Winston Churchill Travelling Fellowship (www.wcmt.org.uk) to the USA. The purpose of her Fellowship was to investigate how music therapy is used within dementia care, with a view to promote the use of music and music therapy in nursing homes in the UK.

Teleri reported: "Music has the power to change the lives of individuals suffering from Alzheimer's and it doesn't cost a penny. To quote John Logan: "Music is the medicine of the mind", and for many, including John, pictured below, this is true. John suffers from Alzheimer's but can charm anyone with his rendition of 'You are my Sunshine' on his green ukulele. John is a resident at Harmony Village in the state of New Jersey, and is one of the many wonderful people I met during my ten week Fellowship.

The ability to appreciate, remember and respond to music can remain long after other forms of memory have deteriorated. This is why Colleen B. Fitzpatrick, who runs a Cognitive Rehabilitation in Memory Impairment programme at Harmony Village, focuses on the use of music to improve cognitive function. Music raises the body's serotonin levels, a natural treatment for agitation and depression, but Colleen has found it also helps people recall and form memories.

I also visited the NYU Langone Medical Centre in New York. Their current project analyses the effect of a two-week music therapy course on wandering, agitation and depression in Alzheimer's patients. It incorporates the training of carers to conduct weekly music and movement sessions using iPods. This proves an effective and inexpensive way to ensure music is available to all residents.

There is no denying the human need for music; this need remains as true for individuals suffering from dementia. Music is free medicine – make the most of it!"



2 August 2010

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Full information and details on how to apply can be found on the Trust's website: wcmt.org.uk

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