

Music Mends Minds Research Facts

Music Mends Minds is a 501(c)(3) non-profit that creates musical support group bands for patients with neurodegenerative diseases such as Alzheimer's, dementia, and Parkinson's as well as traumatic brain injury, stroke and PTSD.

- *5.7 million people suffer from Alzheimer's (www.alz.org/facts) -*

- *Every 3 seconds someone in the world develops dementia (https://www.alz.co.uk/research/statistics) -*

- *Parkinson's disease afflicts 1 million Americans, costing \$25 billion each year (www.parkinson.org) -*

The Interplay Between Music, Neuroplasticity, and Brain Development: Brain Health, Cognitive Aging, and Developmental Trajectory Implications

• **Neuroplasticity and Clinical Practice: Building Brain Power for Health**

In this review, Dr. Joyce Shaffer summarizes the current literature regarding how neuroplasticity may be positively influenced using evidence-based interventions to combat cognitive decline and achieve general health improvements. Enriched environments saturated with mental stimulation, learning, foreign languages, and music have been associated with improved health and neuroplasticity. Music education, specifically, has been associated with increased neuroplastic response and better cognitive outcomes later in life. The roles of exercise, diet and inflammation; love, perception, and reduced stress; and sleep on neuroplastic processes and brain health are also discussed (Shaffer, 2016).

• **Memory for Music in Alzheimer's Disease: Unforgettable?**

This review discusses the current literature pertaining to the phenomenon of musical memory preservation in patients with Alzheimer's Disease (AD). In line with various models of general memory, the authors propose the existence of multiple forms of musical memory that may be differentially impaired in AD. Implicit musical memory (e.g., ability to play a musical instrument), is often spared in musicians with AD; however, explicit musical memory (e.g., recognition of familiar or unfamiliar melodic content), is typically impaired. This work suggests that music is completely unforgettable in AD. Rather, the ability to play a musical instrument may be unforgettable in some musicians with AD while memories of certain melodic content may be more susceptible to memory loss (Baird et al., 2009).

• **Music-Based Interventions in Neurological Rehabilitation**

Within this larger review of music-based rehabilitation interventions, the authors review the literature on such interventions on patients with dementia and Parkinson's Disease. Patients with dementia have been shown to demonstrate improvements in attention, executive functioning, orientation, verbal and episodic memory, and short-term and working memory. These patients also presented with less neuropsychiatric symptoms, reduced anxiety and agitation, decreased depression, mood improvements, and increase quality of life reports. For patients with Parkinson's Disease, musical and rhythmic interventions aided in overall improvements in mobility, reductions in disease-specific motor symptoms, and improved quality of life percepts (Sihvonen et al., 2017).

• **Rapid and Flexible Creativity in Music Improvisation: Review and Model**

Music improvisation has been used as a model to study musical creativity apart from other creative processes. When classically trained musicians are asked to improvise, several brain regions have been shown to demonstrate differential levels of activation. Several regions of the frontal lobe, temporal lobe, cingulate cortex, and cerebellum show alterations in activity when improvising. The brain deactivates the areas involved in self-monitoring while simultaneously experiencing increased activation in regions linked with self-expression (Loui, 2018).

• **Neurologic Music Therapy Improves Executive Function and Emotional Adjustment in Traumatic Brain Injury Rehabilitation**

In a pre-test post-test quasi-experimental design, 54 subjects (23 control; 31 treatment) with either traumatic brain injury, cerebrovascular accident, seizure disorder, or brain tumor were recruited to participate. Control participants engaged in a pre-test, 30 minutes of rest, and then a post-test. Instead of resting, the treatment group participated in four treatment sessions on four separate days that focused in one of four rehabilitation aspects: attention, memory, executive function, and emotional adjustment. The treatment group showed improvement in executive function and emotional adjustment, and reduced levels of depression, sensation seeking, and anxiety. Control participants improved in emotional adjustment and lessening of hostility, but demonstrated decreases in memory, positive affect, and sensation seeking behavior (Thaut et al., 2009).

• **Moving with Music for Stroke Rehabilitation: A Sonification Feasibility Study**

Four patients who suffered from moderate stroke-induced upper extremity motor impairments were included in a clinical pre-post feasibility study and were trained with sonification training. Upper-extremity functions and their psychological states were assessed before and after training. Two patients received 9 days of musical sonification therapy (music group, MG) and the other two patients received an equal time of sham sonification training (control group, CG). Procedurally, the only difference between these protocols was that no sound was played back to the CG patients. Training consisted of the patients exploring the acoustic effects associated with their arm movements. At the end of the training the patients played simple melodies by making simple arm movements. The MG patients improved in nearly all motor function tests after the training compared to the CG patients, and also self-reported being less impaired by the stroke (Scholz et al., 2015).

• **Creative and Opportunistic Use of Everyday Music Technologies in a Dementia Care Unit**

This review presents recent findings that demonstrate the positive effects of music training on non-musical cognitive abilities, which could reflect the occurrence of plastic alterations in musicians' brains. Larger anterior corpus callosum volumes, reduced left-right motor cortex volume discrepancy, larger cerebellar volumes in males, and increased motor, auditory, and visuospatial cerebral areas are apparent in the brains of musicians versus their non-musician counterparts. Further, a more structurally sound right posterior internal capsule is implicated in musicians. Greater cortical activation is observed in musicians in response to piano tones. In terms of cognitive domains, musical training has been associated with improvements in verbal (e.g., verbal memory, immediate and delayed verbal recall) and visual (e.g., visual attention, visual memory, visual and visuospatial processing) abilities (Rodrigues et al., 2010).

The benefits of music on our patients are undeniable. In addition, we witness these effects on our caregivers, families, and audience members at every rehearsal.

Retired RAND Corporation Economist, Sue Hosek, and MMM have created a research survey that will provide data on the benefits of our music program and for quality assurance.

Dr. Mary Mittelman of NYU, together with MMM, have created a New York City Band to provide data for a rigorous evaluation of the effects of playing a musical instrument on the well-being of patients with Alzheimer's and/or dementia.

Sources for all of the above research facts can be found on our website at:
www.musicmendsminds.org/research

