

Music Therapy Treatment of Active Duty Military: An Overview of Intensive Outpatient and Longitudinal Care Programs

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ABSTRACT: In recent years, there has been increased demand for music therapy services within military treatment facilities to treat combat-related injuries. This demand is partly due to increased research output related to music interventions in neuro-rehabilitation as well as an increased prevalence of signature injuries including traumatic brain injury and posttraumatic stress disorder for which interdisciplinary patient-centered care is recommended. The complexity of traumatic brain injury, posttraumatic stress, and military service itself presents challenges for music therapists when creating patient-centered program models. As military healthcare increases access to new treatments as a standard of care, it is important for music therapists to provide descriptions of effective treatment models in military settings. Outlining established music therapy models of care is essential to the successful addition of music therapy in the treatment of service members' complex injuries. This paper outlines current program models at two facilities, the National Intrepid Center of Excellence at Walter Reed National Military Medical Center and Intrepid Spirit Center at Fort Belvoir.

Keywords: Military, Music Therapy, TBI, PTSD, Creative Arts Therapies

Background

Music therapy as a profession has its origins in military settings, dating back to World Wars I and II (American Music Therapy Association, 2014; Taylor, 1981). While music has been utilized for its healing properties for thousands of years (Rudhyar, 1982), medical applications of music first appeared in collegiate training programs in 1919 at Columbia University. Taught by a British musician, Margaret Anderton, Musicotherapy was offered based on her experience working with Canadian soldiers returning from WWI (AMTA, 2014; Taylor, 1981). Another pioneer in this area, Isa Maud Ilsen, promoted the use of music with injured American soldiers (Davis, 1993; De l'Etoile, 2000). Harriet Ayer Seymour, who

established the National Foundation of Musical Therapy, also provided music therapy services to war veterans during World War I and claimed to have trained more than 500 music therapists between 1941 and 1944 (Davis, 1993).

World War II brought an unprecedented surge in interest in the use of music in hospitals, and the American Service Forces officially recognized music as a necessary treatment for its wounded soldiers. The Army's Reconditioning Program stated that music interventions were designed to "return wounded military personnel to duty or to civilian life in the best possible physical and mental condition" (Rorke, 1996, p. 190). By 1946, most of the 122 Veterans Administration (VA) hospitals used music in the treatment of the wounded, and 44 hospitals had a full-time music specialist on staff (Rorke, 1996; Tyson, 1981). Anecdotal reports of using music with veterans during the aforementioned service eras suggested that music promoted healing and recovery. This laid the groundwork for the regulation of music therapy as a profession (AMTA, 2014; Bradt, 2006).

The legacy of these pioneering musicians is continued by trained music therapists who work with service members affected by modern conflicts in the VA and the Department of Defense (DoD). Notable initiatives include Resounding Joy's Semper Sound Military Music Therapy program, integrated on military installations in southern California since 2010, and the National Endowment for the Arts (NEA) Creative Forces Military Healing Arts Network, which started in the National Capital Region in 2012. Creative Forces has since expanded to 11 clinical sites, including nine Intrepid Spirit Centers, one VA facility, and a telehealth initiative to support remote creative arts therapies. Creative Forces is a partnership between the NEA and the DoD focused on expanding the capacity for creative arts therapies programming within the DoD, examining its impact on clinical outcomes, and connecting service members to community-based arts programs to promote continue arts engagement (NEA, 2017). This paper will focus on music therapy program models that exist within Creative Forces, specifically those offered at the National Intrepid Center of Excellence (NICoE) at Walter Reed National Military Medical Center (WRNMMC) in Bethesda, Maryland, and Intrepid Spirit Fort Belvoir (ISFB), the first Intrepid Spirit Center, located at Fort Belvoir army base in Virginia.

The Military Health System is presented with significant challenges in response to recent conflicts. With higher survival rates due to advances in military medicine and technology, service members engaged in combat operations are

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presenting in large numbers with signature injuries including traumatic brain injury (TBI), posttraumatic stress disorder (PTSD), and other psychological health concerns. Since 2000, these invisible wounds, as per the Defense and Veterans Brain Injury Center (DVBIC), include 361,092 reported cases of TBI, varying in severity within the DoD (DVBIC, 2017). The Defense Centers of Excellence (DCoE) estimate that up to 20 percent of the more than 2.6 million service members deployed in support of Operation Enduring Freedom, Operation Iraqi Freedom, and Operation New Dawn present with or may develop symptoms of PTSD (Denning, Meisnere, & Warner, 2014). Between 2000 and 2014, new-onset PTSD was diagnosed in 149,000 active-duty service members within the Military Health System (Denning et al., 2014). It is important to note that these numbers do not include service members who do not self-report, who receive diagnosis after active service, or whose injuries go entirely unreported. These signature wounds of war create challenges for both service members and the systems that support them. Addressing these injuries can present complex difficulties because of overlapping symptoms due to co-morbidity, stigma of receiving care in military culture, and treatment options available within the Military Health System.

It is essential to employ program models that accommodate these unique barriers to achieve effective assessment, treatment, and continued care. A movement toward interdisciplinary team approaches and patient-centered care models is evident at many military treatment facilities, such as NICoE, ISFB, and other Intrepid Spirit Centers that are being developed on military bases across the United States to form a partnership network that extends the interdisciplinary care model to multiple military bases (DeGraba et al., 2014). Patients in these clinics present with a wide range of symptomatology stemming from military-related experiences that inhibit daily functioning across multiple domains. The military has increasingly valued holistic treatment models in order to treat co-morbid diagnosis with a personalized approach. Including creative arts therapies in these novel paradigms is supported by research that suggests patient outcomes are improved within this model (DeGraba et al., 2014). The role of music therapy integrated with traditional disciplines in these settings is to support service members in regaining function to return to duty or prepare for the transition from active-duty service member to veteran. In addition to disciplines such as speech-language pathology, occupational therapy, physical therapy, and behavioral health services, music therapy promotes interdisciplinary collaboration through co-treatment, integrative music therapy interventions, and innovative performance platforms.

Even though the Scope of Music Therapy Practice situates music therapists within treatment teams (American Music Therapy Association & Certification Board for Music Therapists, 2015), integrating interdisciplinary program models and military medicine is not without challenges. Many patients receive services without certainty of duration of treatment due to unique characteristics of military lifestyle. Patients are scheduled for clinical sessions around their assigned military duties, creating an unpredictable balancing act that can be difficult to navigate. Service members can receive orders to change duty stations, which unexpectedly halts treatment. Moreover, separation from the military can occur with limited

notice. In addition to unpredictable treatment length, stigma of reporting injury or illness may result in service members' fear of negative impact on their military career. This frequently causes service members to underreport symptoms or postpone treatment. Under-identification of acute injuries in combat zones is quite prevalent, resulting in a gap between incident and treatment for service members with mild TBI (mTBI). As a result, multiple concussive events can be accumulated before evaluation. Gaps in time of incident and treatment may further alter the manner in which the initial and subsequent injuries present (Terrio et al., 2009). These factors combined create an unclear treatment path, which necessitates patient-centered program models that allow for individualized care, customized treatment plans, and flexibility for each unique case.

Music Therapy Program Models

The music therapy programs at the NICoE and ISFB are supported by the NEA Creative Forces Military Healing Arts Network. At these sites, music therapy programming—alongside other creative arts therapies—is standard of care within the interdisciplinary patient-centered model, optimizing comprehensive treatment and recovery processes. Music therapy is utilized as a targeted and stand-alone treatment as well as in co-treatment with other disciplines to support patient goals in the realms of speech and language, cognition, motor coordination, social integration and engagement, psychological health, and spousal/family support. All music therapy sessions are facilitated by board-certified music therapists. We first present a brief description of the clinical setting to help contextualize music therapy program models. This is followed by a presentation of typical goal areas and associated music therapy interventions used for treatment. We then present the specific models of music therapy employed at NICoE and ISFB.

Description of Clinical Settings.

The National Intrepid Center of Excellence at Walter Reed National Military Medical Center. The NICoE is a clinical research facility that offers high-quality, innovative treatment of TBI and psychological health conditions for service members and families.

Intensive outpatient program. The NICoE 4-week intensive outpatient program (IOP) is comprised of an interdisciplinary care model. The NICoE receives referrals from providers throughout the Military Health System for patients who have not responded to conventional treatments and who present with persistent symptoms from service-related injuries. Service members engage in a full-time schedule of patient-provider encounters across approximately 25 different disciplines. Patients are able to access up to 25 different services, and providers coordinate treatment within the interdisciplinary team. Patients undergo extensive neuroimaging and diagnostic evaluations to address presenting symptomatology from TBI and PTSD. This includes chronic pain and disruptions pertaining to personal, occupational, and familial functioning. The interdisciplinary model, which encompasses creative arts therapies (e.g., music therapy, art therapy, dance/movement therapy, and therapeutic writing) as a standard of care, is fundamental to the success of the NICoE.

Longitudinal care. The music therapy program at the NICoE may provide continuing care to non-IOP patients who have varying levels of TBI. Patients are referred to music therapy by

medical professionals such as doctors, nurses, social workers, case managers, medical staff, occupational therapists, and speech language pathologists, or are self-referred. Music therapy uses a standardized assessment process consisting of provider referrals, patient eligibility, and presence of non-musical goals that can be addressed through music. For each referral, the music therapist consults with other providers, such as the service member's nurse case manager, to determine eligibility, necessity, and projected effectiveness of music therapy services. The music therapist reviews additional information (i.e., medical records) to glean insight regarding injury and schedules a music therapy assessment to determine an appropriate treatment plan. This then leads to either patient intake for continued services, referral to other resources such as recreational music programs on base or in the community, or recommendation of a hybrid program. Long-term TBI outpatients receive individual music therapy sessions at the frequency of one session per week for 60, 90, or 120 minutes, as determined by the music therapist and treatment team. Due to individualization of long-term music therapy treatment, the IOP program will be the focus of the NICoE music therapy program presented in this article.

Intrepid Spirit Center at Fort Belvoir Community Hospital. ISFB opened in September 2013 as the first Intrepid Spirit Center, serving the local military population in a long-term, outpatient treatment setting. ISFB is a department under the Fort Belvoir Community Hospital, which serves all military branches and is the second largest military treatment facility in the National Capital Region. It serves active-duty military and veterans with mild to moderate TBI and their families. Each patient is individually evaluated by multidisciplinary professionals, and receives his or her own holistic treatment plan. The team uses a wide variety of interventions to address the patients' complex needs.

University model. ISFB uses an innovative treatment model similar to a university education curriculum, known as the Intrepid Spirit University. In this model, patients and providers customize a curriculum with treatment and educational courses at the core. This model focuses on five pillars: sleep, nutrition, physical movement, pain management, and adaptive resiliency (Fort Belvoir Community Hospital, n.d.). The five pillars serve as a focused approach for goal setting, treatment planning and implementation, and evaluation of patient progress. An individualized curriculum is aimed at mitigating stress, promoting beneficial neuroplasticity, and empowering the patient to engage in his or her recovery. Patients collect course credits and work toward a commencement ceremony marking the completion of their treatment. This model optimizes treatment, provides a clear path and timeline for both clinician and patient, and sets expectations for patient to reach clinical goals.

Music Therapy Goal Areas with Associated Music Therapy Interventions

Music therapy interventions implemented at NICoE, ISFB, and other military installations where Creative Forces music therapists work are evidence based and research informed. Music therapy interventions are geared toward skill building, stress management, and improving functional outcomes. Music therapy is integrated into varying program models—IOP and longitudinal care—to meet the diverse needs and goal areas of the patient population. Elements of military service

can impact length of treatment; therefore, strategic selection of interventions requires consideration by the therapist of how to support best possible outcomes for each patient. Neurologic Music Therapy interventions are incorporated into treatment to improve function in areas of cognition, motor responses, and speech-language comprehension and execution (Thaut & Hoemberg, 2014), alongside interventions targeted at treatment of behavioral health issues and psychoeducation for patients and their families. Music therapy can simultaneously address and uniquely treat functionality and emotional health by attending to interactions of symptomatology that accompanies co-morbid diagnosis. Figure 1 outlines common goal areas for the treatment of patients with co-morbid TBI and PTSD diagnosis.

Common areas of needs in TBI

Service members with TBI present with a wide variety of cognitive, motor, speech and language, and behavioral health issues. Symptoms can manifest in a variety of ways, but the most commonly reported are outlined below.

Cognition and memory. A common result of mTBI is damage to white matter in the brain, often causing dysfunction of cognitive processes including executive function, ability to multitask, and other processes that require communication between several brain regions. These symptoms are commonly addressed through speech and occupational therapies, where compensatory training can involve adaptive strategies such as environmental modifications to improve attention, as well as establishing and practicing new techniques to support daily functioning. Patients often report subjective deficits in memory function, confirmed by cognitive and neuropsychological testing. These symptoms are often treated with compensatory strategies, organizational tools, and education on cognitive rehabilitation (Department of Veteran Affairs & Department of Defense, 2016).

Motor control and response. TBI can result in a wide range of impairments to motor responses, including compromised balance and loss of motor control. Disparity between muscle groups, and presence of chronic spasticity, are most commonly apparent in severe TBI, although usually they do not present in mTBI (Thaut & Hoemberg, 2014). Peripheral vestibular dysfunction and damage to the inner ear can exist in isolation or in combination with central balance dysfunction as a result of blast injury. Often both systems are affected with damage to the vestibular system in combination with a disconnection between sensory input and motor response. This can result in vertigo, dizziness, and balance issues (Scherer & Schubert, 2009).

Speech and language. Treating patients with mTBI includes understanding how speech and language mechanisms are affected. The following are common effects of mTBI and blast injury on speech and language abilities: difficulties with concentration and memory; problems participating in conversational language; disorganized verbal expression; dysfluent speech; word-retrieval problems; and difficulties with planning, problem-solving, judgment, decision-making, and sociobehavioral engagement, all of which may manifest in communication challenges (Cornis-Pop et al., 2012). Damage to the central and peripheral auditory systems is also prevalent in service members exposed to high-intensity blast and

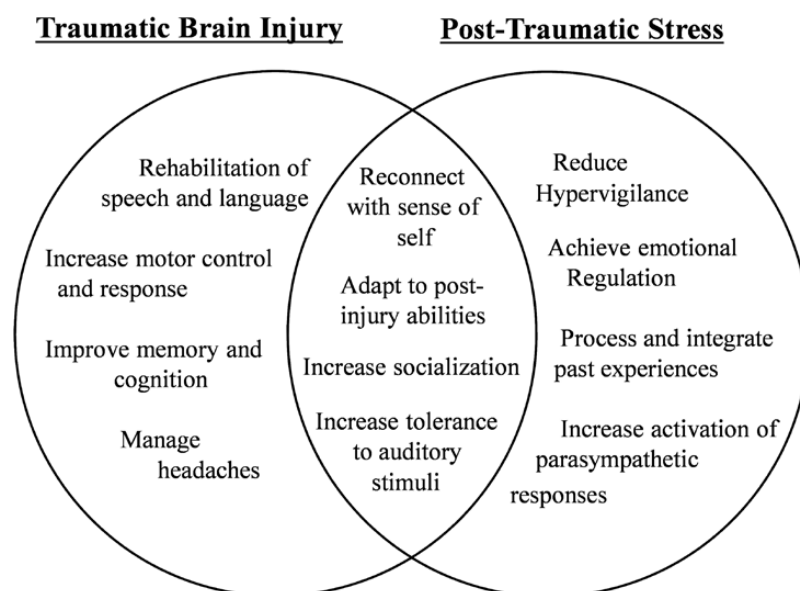


Figure 1. Functions of Music Therapy Interventions

can result in difficulty processing auditory stimuli, including understanding verbalized speech, identifying environmental sounds, and decreased appreciation for music (Gallun, 2012). These issues can be addressed through various interventions focused on improving cognition, perception, and communication.

Headaches. One of the most common blast-related and post-concussion symptoms is headaches of varying severity. Service members who experience headaches report interference with their ability to perform military duties as well as with participation in familial responsibilities and daily living. Non-pharmacologic management of these symptoms can potentially include psychoeducation (e.g., stress management and sleep hygiene), structured physical exertion, integrative medicine techniques (e.g., acupuncture, mindfulness training), biofeedback, and cognitive behavioral therapy (VA/DoD, 2016).

Behavioral health. Many patients report difficulty with emotional regulation and expression, and often present symptoms of depression, anxiety, and other mental health diagnoses. Techniques that promote self-reflection and self-regulation, leading to increased functional independence, are recommended for treating TBI-related behavioral health issues (VA/DoD, 2016).

Common areas of need in PTSD

Patients with PTSD present with complex symptomology, which is often further compounded by co-morbidity with TBI. We briefly describe here common areas of needs in service members with PTSD.

Hypervigilance. Service members may experience hypervigilance in relation to environmental stimuli, which can prevent them from actively participating in their social, familial, and occupational responsibilities. Anxiety induced by sensory sensitivity is due to an overactive sympathetic nervous system; therefore, relaxation techniques are a core component in treating symptoms associated with physiological hyper-reactivity (DVBIC, 2017).

Sleep disturbance. Nightmares and sleep dysfunction are common in service members with PTSD. Common interventions include sleep hygiene psychoeducation, pre-sleep relaxation exercises, and stress management techniques, which support the overarching goal of empowering the patient to regulate his or her sleep (VA/DoD, 2016).

Isolation. Social isolation is often a byproduct of patients with PTSD experiencing other simultaneous symptoms. In turn, symptoms of depression and anxiety can worsen when individuals are disconnected from the world around them, often seen through self-isolation. Non-verbal expression and communication are important in assisting service members' (re)engagement in social experiences.

Overlapping areas of need

Symptoms of mTBI and PTSD can manifest similarly, and may present with increased severity in patients with a history of co-morbid PTSD and mTBI. Over one-third of personnel deployed in Operation Enduring Freedom or Operation Iraqi Freedom reporting a history of mTBI also self-report PTSD symptom levels consistent with probable PTSD. Many patients who sustain an mTBI experience difficulty with cognition following injury, although most regain cognitive function during the acute recovery phase (DVBIC, 2017). Some patients report new, persistent, or worsening symptoms in weeks, months, or years following initial injury and often present with co-morbid conditions. The VA and DoD list other influencing factors such as depression, anxiety, chronic pain, negative self-beliefs and expectations, limited psychosocial support, decreased coping mechanisms, and poor physical health as possible barriers to post-mTBI rehabilitation. Clinical practice guidelines recommend complementary and integrative health interventions as a component of personalized, patient-driven care in managing patients with chronic multi-symptom illnesses, including mTBI and PTSD. Based on these recommendations, implementing music therapy within an interdisciplinary setting can enhance the treatment team's ability to address the complexities of dual diagnoses.

Music and neuroplasticity. As the brain heals after injury, regaining function is reliant upon engaging in treatments that utilize concepts of neuroplasticity. Blast injury often results in damage to white matter and connective tissue in the brain. In addition, psychological trauma resulting in PTSD disrupts processes in multiple brain regions, heightening some systems while subsequently deactivating others. For example, recalling traumatic memories shows deactivation in the Broca’s area, primarily associated with expressive speech, and conversely heightened activation of the limbic system, specifically the amygdala. This produces a physiological response often experienced as fear or anxiety (van der Kolk, 1998). The encoding of traumatic events creates an interruption in connecting cause and effect in memories, often resulting in trauma recalled as physical sensations rather than verbal or linguistic encoding (van der Kolk, 2014). As a result, patients often have trouble expressing or understanding these sensations verbally, and can encounter unexpected reactions to environmental sensory triggers reminiscent of the trauma event. Awareness of these neurobiological processes is important for the music therapist in order to understand patient expression, as well as avoid re-traumatization, as auditory stimuli can often be associated with trauma (Bensimon, Amir, & Wolf, 2008).

When multiple neural circuits are damaged, it is difficult to solely treat patients using cognitive-based rehabilitation strategies. Music has a strong effect on multiple neural networks, and can assist with rebuilding connections between various regions of the brain (Sihvonen, Särkämö, Leo, Tervaniemi, Altenmüller, & Soinila, 2017; Stegemöller, 2014). Neuroimaging studies suggest that music plays an important role in increasing neuroplasticity. Musicians’ brains have been shown to exhibit unique abilities and structural differences in comparison to non-musicians, suggesting application for functional rehabilitation (Herholz & Zatorre, 2012; Kraus &

Chandrasekaran, 2010; Schlaug, 2001). This phenomenon has increasingly been explored in the context of neurorehabilitation, specifically adopting music as the agent of change in recovering function after brain injury (Särkämö et al., 2016). For addressing patients with neurologic impairment due to blast injury and/or trauma, music has a unique ability to engage multiple neural networks capitalizing on the plasticity of the human brain (Herholz & Zatorre, 2012). In addition, fMRI studies show that the brain’s reward circuitry releases dopamine during music listening. This promotes motivation, learning, and reward-seeking behavior. Thus, listening to music can create an optimized learning environment in which the pairing of dopaminergic neurons can result in rebuilding damaged neural connections (Stegemöller, 2014).

Music Therapy Interventions Targeting Common Goal Areas

Table 1 shows the connection of goal areas and the commonly used music therapy interventions that promote functional outcomes in treating TBI, PTSD, or dual diagnosis.

Music Therapy in the NICoE Intensive Outpatient Program

NICoE music therapy programming supports patients through integration of group and individual music therapy sessions into a 4-week Intensive Outpatient Program (IOP).

Group sessions. The music therapy program at NICoE is structured to support patients—in cohorts of 4 to 6 service members—through weekly group music therapy sessions throughout the 4-week IOP program. Cohorts receive 4 group music therapy sessions at the frequency of 1 group per week for 60 or 90 minutes, as represented in Figure 2. Music therapy is provided as integrated care and stand-alone treatment to: promote relaxation, improve auditory perception and tolerance, edify emotional regulation, inform mind body connections, address focused attention to task, enhance problem-solving

Table 1
Music Therapy Interventions for Specific Goal Areas

Goal		Music therapy intervention(s)
Rehabilitation of speech and language	→	Melodic intonation therapy Rhythmic speech cueing Therapeutic singing Musical mnemonics training
Inform interpersonal communication	→	Song share Musical reminiscence/discussion
Increase motor control	→	Therapeutic instrumental performance Patterned sensory enhancement
Improve cognition, sustained/focused attention, divided attention/multitasking	→	Musical executive function training Musical attention control training Musical sequencing
Emotional regulation	→	Music listening with grounding techniques Music for relaxation Personalized playlists
Increase tolerance of auditory stimuli	→	Sound exposure to various live instruments and/or recorded music
Reconnect with sense of self	→	Personal music inventory/Life soundtrack Lyric analysis, Songwriting
Support familial bonding/social engagement	→	Songwriting Group music making Improvisation, performance

skills, assist with interpersonal communication, support family dynamics, explore self-preferences of music, and process treatment experiences. Groups in weeks 1 and 4 are co-facilitated with a dance/movement therapist (DMT) who is also the wellness coordinator at NiCoE. This group focuses on integrating music therapy with other creative arts therapies and mindfulness practices. Exclusive music therapy sessions are offered in weeks 2 and 3.

Week 1. Movement, music, & meditation. This 60-minute group session provides patients with opportunities to engage in different aspects of music-based authentic movement to inform mind/body connections through kinesthetic awareness (Musicant, 1994). Session introductions include sharing of current mindfulness/meditation practices, and providing rationale for body and breath practice to build physical and physiological awareness. This session has 4 interventions; the first three are approximately 4 minutes in length, and the fourth is approximately 10 minutes. Check-in and check-out/processing are approximately 10–15 minutes each. Interventions include:

Shaking to rhythmic stimulus. There is physical and psychological functionality in shaking one's body rhythmically, as demonstrated by athletes when they jump and shake before an athletic event. This can also be observed in musicians' pre-performance regimens. Live or recorded Caribbean rhythms are recommend for this intervention, such as Bachata, Rhumba, or other Afro-Caribbean beats. Live rhythms can be played

using shakers and other percussive instruments, or high-quality recorded rhythm samples can be used, for example those programmed in the Yamaha Clavinova CVP 705. Tempo is modified throughout the 4 minutes by gradually increasing the speed, strengthening the downbeat, and then decreasing the tempo at the end to inform and structure movement. Music is provided in accordance with facilitated movement instruction to shape and support patient participation.

Authentic movement to music. Facilitators encourage patients to use the kinesthetic awareness produced from the shaking intervention to engage in mindful movement practices, moving the body within parameters of physical ability and functionality. The music therapist supports and structures observed movements of patients by providing music balanced in melody and rhythm, using combined fingerpicking and strumming on the guitar, harp, or other stringed instruments.

Body scan/meditation. The DMT verbally facilitates a body scan while the music therapist plays music at a slow tempo. The music therapist creates a dynamic melodic contour on the piano, cello, or other melodic instruments, aligned with the body scan trajectory.

Creating visual art representation of body scan. Finally, patients are given a handout outlining the human body and are invited to use arts materials to visually depict their sensory (physical, auditory) experiences throughout the session and process how their body feels at the end of the session.

WEEK	SESSION TITLE	DESCRIPTION
Week 1	Movement, Music & Meditation Group	Music therapy and wellness program co-facilitation using music to inform mind/body connection through kinesthetic awareness.
Week 2	Introduction to Music Therapy Group	Music to evaluate and edify auditory perception; emotional regulation, relaxation, diaphragmatic breath and entrainment via music listening; and increased task attention (sustained and divided), and auditory tolerance through drumming.
Week 3	a. Music Therapy: Jam Group b. Individual Encounters	a. Music to assist with social engagement, effective communication skills (verbal and nonverbal), and problem solving through active music making and songwriting. b. Further exploration of music to meet patient preferences, interests, needs, and goals in a 1:1 setting.
Week 4	a. Creativity & Closure Group b. Spousal/Family Sessions	a. Music therapy and wellness program co-facilitation to process experiences in creative arts therapies and wellness programming using improvisational music and creative writing collectively to create final expressive works spoken to live music improvisation. b. Music for appropriate communication, active listening, positive familial interaction, and encouragement of overall healthy family dynamics.

Figure 2. NiCoE IOP 4-Week Group Music Therapy Treatment Model

Week 2. Introduction to music therapy. The protocol for this 90-minute group session is presented in [Figure 3](#). The following core concepts are addressed: 1) reducing stress and anxiety, 2) identifying pleasant/unpleasant sounds, 3) managing auditory triggers and symptoms of TBI and PTSD, 4) learning music-based emotional regulation techniques, 5) enhancing cognitive functioning via memory recall and rhythmic sequencing, and 6) team-building and social engagement through group music-making. Rationale for the use of music interventions to address these core areas is as follows:

Autonomic function through music entrainment. Organized sound, as a sensory stimulus, can impact the autonomic nervous system, affecting heart rate variability, respiratory rate, and other physiological responses ([van der Kolk, 2014](#)). Music listening at a set tempo consistent with resting heart rate (~60 beats per minute) promotes bodies to naturally entrain to external rhythms, which can improve parasympathetic tone ([Thaut & Hoemberg, 2014](#)). Heart rate variability and breath can be monitored using the emWave®, a biofeedback device that assists with learning how to control heart rhythm pattern to create psychophysiological coherence ([McCraty, Atkinson, Tomasi, & Bradley, 2006](#)).

Cognition. Extensive research evidence exists regarding the impact of music and music therapy on cognition ([Magee, Clark, Tamplin, & Bradt, 2017](#); [McGraw Hunt & Legge, 2015](#); [Pearce & Rohrmeier, 2012](#)). The processing of music simultaneously engages a wide variety of cortical areas involved with perception, cognition, and emotional processes, rendering it an ideal therapeutic medium for people with brain injuries ([Magee et al., 2017](#); [Sihvonen, Särkämö, Leo, Tervaniemi, Altenmüller, & Soinila, 2017](#)). In their review of research studies on music interventions in neurological rehabilitation, [Sihvonen and colleagues \(2017\)](#) suggest that because music-based rehabilitation has many elements in common with music training and learning, music-based neurological rehabilitation likely stimulates similar structural and functional neuroplastic changes found in healthy adults who receive musical training. Because a detailed discussion of the impact of music-making and music listening on cortical activity is beyond the scope of this article, readers are referred to the excellent review article by [Sihvonen et al. \(2017\)](#).

Social integration. Interactive music-making in group settings allows for multiple patterns of social engagement and positively impacts psychological well-being ([Irle & Lovell, 2014](#)). Such patterns are often reflective of social interaction patterns in daily life. Practicing and experiencing different interaction patterns in improvisational music making may impact interactions with family, friends, command, and/or overall social exchanges. This can lead to improved self-image, appropriate self-expression, a sense of connectedness, and increased socialization ([Solli, Rolvsjord, & Borg, 2013](#)).

Emotional regulation. Functional neuroimaging studies have shown that music can modulate activity in brain structures that play a crucial role in emotion, such as the amygdala, nucleus accumbens, hypothalamus, hippocampus, insula, cingulate cortex, and orbitofrontal cortex ([Koelsch, 2014](#)). Activation of the mesolimbic system through music releases dopamine and endogenous opioids ([Salimpoor, Benovoy, Larcher, Dagher, & Zatorre, 2011](#)). This, in turn, produces a sensation of pleasure and enhanced mood, and could partly explain the recovery

in cognitive-emotional areas in patients with neurological disorders ([Sihvonen et al., 2017](#)). The potential of music to modulate activity in these brain structures has important implications for the use of music for emotional regulation in service members with PTSD and psychological health issues ([van der Kolk, 2014](#)). In addition, music perception research has identified the role of specific musical structures (e.g., timbre, tempo, tonality) in music-evoked emotional responses ([Gabrielsson & Lindström, 2001](#); [Zentner, Grandjean, & Scherer, 2008](#)).

Week 3. Songwriting/jam group. This 60-minute group session provides a safe and supportive space for patients to learn about the benefits of engagement in songwriting and group music-making. Songwriting strategies can be used as an alternate tool for journaling, deeper processing of thoughts/feelings/ideas, and a non-threatening method of communication. Group instrument playing supports positive social interaction through a musical context. The interventions used address a wide variety of need areas, including: verbal and non-verbal communication skills, confidence building through real-time music performance, social engagement, temporal structure, cognitive organization, reasoning and comprehension, memory retention/retrieval, and mood state associations. This session consists of two main interventions that are 25 minutes each. Check-in and check-out/processing each take approximately 5–10 minutes. The music therapist introduces the session as a means for expression and communication and an opportunity to further explore emotions and thoughts that service members may have expressed in other creative arts therapies sessions (e.g., creative writing, art therapy, DMT). The therapist briefly demonstrates the Blues pattern as one songwriting method. The Blues song structure is deconstructed into three steps that can be used for problem-solving: 1) state a problem, situation, or experience and associated feelings, 2) repeat the problem/situation/feeling for emphasis/validation, and 3) create a solution. Service members are given options to participate via instrument playing, lyric writing, singing, or as active audience members. The music therapist strategically places the patients in small groups pertaining to their chosen modes of participation. The music therapist facilitates instruction and provides strategies for patients to collectively learn, play, and/or write a Blues song in a standard key. The music therapist facilitates the group in playing the Blues by accompanying on a strong rhythmic instrument (drums/percussion, bass, or rhythm guitar). Song lyrics can be added to the music, either spoken or sung by patients or the music therapist. The music therapist facilitates session closure by asking clients to share their overall experience and identify concepts that they can utilize in their rehabilitation processes and activities of daily living. Dissemination of take-home resources regarding the Blues (writing and playing) for self-care and expression is designed to accommodate autonomous and interactive musical engagement. The music therapist also offers additional application by incorporating the minor-six chord (vi) in a given key. This provides patients with an abundance of potential song choices for independent music-making.

Week 4. Creativity and closure group. This 60-minute session provides a platform for patients to process the experiences of their overall rehabilitation at NICoE as facilitated by the music therapist and DMT/Wellness Coordinator. Patients engage in creative expression through improvisational

Part 1. Introduction and check-in with rapport building.

This intervention contextualizes rapport building by inviting patients to share music-related information with the group. Examples may include discussions of preferred musical artist or song, most memorable concert experience, musical aspirations, and/or musical history of formal/informal training.

Goals:

- Establish rapport/information sharing
- Activate memory recall and reminiscence
- Promote connection to past or present musical experiences

Part 2. Relaxation through deep breathing and intentional active listening.

Patients are invited to take deep breaths, inhaling through the nose and exhaling through the mouth, as music therapist first facilitates deep breathing and grounding techniques to promote respiratory awareness. Music therapist then plays multiple instruments and patients are encouraged to actively listen and discern between sounds of the different instruments (electric and acoustic guitar, piano, HAPI drum, Reverie Harp, and voice) to determine which sounds are most beneficial in promoting relaxation. Patients are encouraged to use their emWave® device to promote awareness of their physiological responses and heart rate variability during this exercise.

Goals:

- Induce relaxation/physiological entrainment to music
- Reinforce deep breathing/relaxation/regulation techniques
- Identify auditory preferences

Part 3. Group drumming to facilitate selective/divided attention.

Patients are introduced to various Afro-Caribbean rhythms by playing them on hand drums. To initiate attention, rhythms are first taught in isolation to the group as a whole. To facilitate selective attention, each rhythm is then assigned to 1-2 patients to motivate listening to how the parts layer together rhythmically. To facilitate divided attention, patients are instructed to attempt listening and hearing rhythms that other cohort members are playing. The music therapist may facilitate cuing through musical mnemonics and the use of focal points (visual, auditory) to assist patients in accomplishing this task.

Goals:

- Facilitate sustained/selective/divided attention
- Increase social integration through non-verbal communication
- Encourage emotional expression

Part 4. Check-out and evaluation completion.

The session closes with patients sharing their overall experiences and identifying learned skills/techniques helpful for self-use. Music therapist asks clients to report results of the emWave® throughout the session. For example, did the reading correlate to their physiological states during music therapy session? Were there any peaks or declines in the emWave® frequency reading? Music therapist administers a standardized post-group evaluation that assesses the patient experience in each intervention.

Figure 3. Introduction to Music Therapy Protocol (Session 2)

music-making, creative writing, collective performance, and music and movement such as gentle stretching or walking a labyrinth. This group has three main interventions, each lasting approximately 15 minutes. Check-in and check-out/processing each take approximately 5–10 minutes and include group objectives, namely reflection of NICoE experiences through mindfulness exercises and the creation of a group poem read at the close of the session. Interventions include: 1) music/movement experiential, guided meditation to live

music facilitation, or group music-making via improvisation; 2) processing of patients' experiences and perceived benefit of the NICoE care model with regard to creative arts therapies. Patients identify what has been most helpful and share strategies they will continue to use and incorporate into daily lives; and 3) transcription and sequencing of patient feedback into poem form. In addition, the music therapist works with the patients to create improvised musical accompaniment for the final written work to be read/sung. Patients are provided

Table 2
NICoE IOP Individual Music Therapy Model

Domain	Indications	Goals	Interventions
Emotional Regulation	a. Agitation as evidenced by facial affect, physical symptoms, overall disposition b. Disclosure of stress, sadness, anger, or fear	1. Induce relaxation response 2. Introduce active music listening to patient-selected music 3. Utilize iso-principle in music	- Patients actively participate in music-based relaxation exercises facilitated by music therapist - Music provides added structure for intentional listening, grounding techniques, and improvisation
Sense of Self	a. Desire to reconnect with past musical experiences b. Interest in initial musical exploration for learning new skills or unfulfilled musical aspirations c. Need for healthy leisure activities	1. Encourage positive sense of self 2. Initiate reframing of difficult emotions 3. Develop healthy coping mechanisms and leisure activities	- Patients encouraged to examine past and present use of music to inform current integration of music in daily life - Music assists to develop healthy past time activities and foster skills via song sharing, active music listening, instrument playing, and other interventions
Interpersonal Relationships	a. Difficulty with communication of thoughts and expression of feelings b. Need for safe space and (re) discovery of “voice” due to not feeling heard	1. Improve capacity for understanding others 2. Promote tools for communication and enhance ability to connect with others 3. Provide tools for spousal, familial, and social bonding	- Patients engage in projective song selection to relay thoughts and promote communication - Music supports creative expression through lyric analysis, writing original songs, and music production and recording

copies of the poem, and the group closes with a summary of group topics.

Individual music therapy sessions. The music therapy program at the NICoE includes one 60-minute individual session during week 3 of treatment. Additional individual sessions are provided per patient request and availability, but most patients receive no more than two individual sessions. Due to the acute nature of the IOP model, individual music therapy sessions often focus on the domains of emotional regulation, sense of self, and interpersonal relationships. Through these sessions, service members commonly address: 1) benefits of music for self-management of TBI and trauma-related symptoms, 2) reconnection to past musical experiences (e.g., instrument playing, song associations), 3) learning music-based emotional regulation techniques, 4) enhancing communication and emotional expression, 5) increasing awareness of self and others, and 6) using music as an integrative tool to enhance lifestyle. Table 2 shows common music therapy interventions used in acute individual sessions.

Music Therapy at Intrepid Spirit Fort Belvoir

Music therapy programming at ISFB has adapted the NICoE IOP model to accommodate an outpatient interdisciplinary care model. In contrast to the NICoE, patients receiving treatment at ISFB are often local to the National Capital Region, working and living in close proximity to the clinic. They receive treatment for variable lengths of time and tend to have more schedule disruptions due to military duties than those engaged in an IOP treatment model.

Program structure. Approximately 30% of service members treated at ISFB receive a referral for music therapy by a primary care provider within the clinic. Patients can begin music therapy at any stage of their treatment process. Group and individual sessions target individualized goal areas, as specified by patients’ treatment plan and referral rationale. Once referred,

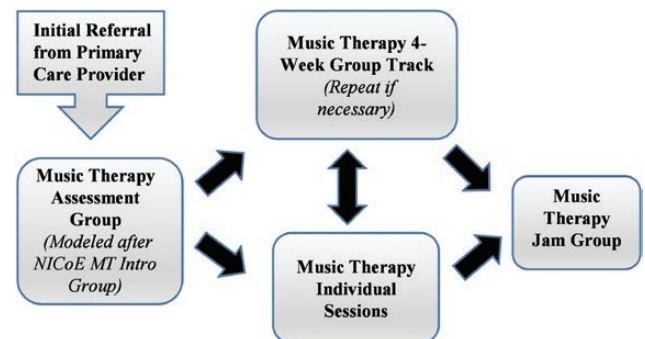


Figure 4. ISFB Music Therapy Program Model



Figure 5. Group Music Therapy Interventions for ISFB 4-Week Music Therapy Track

patients are scheduled for a group session (average of 5 patients per group) utilizing the Introduction to Music Therapy protocol as outlined in the NICoE IOP music therapy model presented

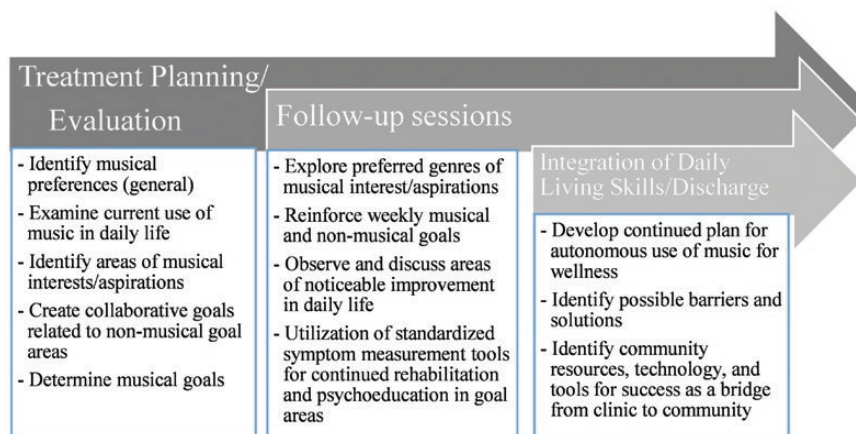


Figure 6. Music Therapy Individual Longitudinal Treatment Model

in Figure 3. This initial group functions as an assessment, and at the end of the session, service members complete the standardized evaluation also utilized in the Introduction to Music Therapy Group. In a follow-up session, this information is reviewed with the service member and a joint decision is made about whether the patient would be best served by continuing treatment in the individual, group track, or both (Figure 4).

Group music therapy sessions. The 4-week group track is non-progressive and service members can enter the track at any point; however, they are encouraged to complete 4 successive sessions. One 90-minute group session per week is offered. Each of the 4 sessions focus on a different music therapy intervention, namely: 1) music listening, 2) active music-making, 3) music for relaxation, and 4) songwriting/music composition (Figure 5). The type of intervention used in each session is based on patient preference (determined in initial assessment) and the in-the-moment needs presented by the group. Figure 5 outlines examples of specific music therapy interventions within the non-progressive structure. Service members can decide to participate in an additional 4-week sequence if (s)he and the care team feel that further rehabilitative benefits can be gained by additional treatment.

In long-term treatment models, group therapy methods prove to be effective in assisting patients achieve growth across all domains. Music therapy interventions are aimed at facilitating therapeutic factors such as installation of hope, universality, group cohesion, interpersonal learning, and catharsis (Yalom, 1995). Music provides an alternative method of communicating and understanding one's own experiences, while the group context provides peer support for expressive processing (Bensimon et al., 2008).

Individual music therapy sessions. Individual music therapy sessions shown in Figure 6 are provided either as sole treatment or in combination with group music therapy sessions and focus on the development of music-based skills to address a wide range of symptoms. Emphasis is placed on developing a strong set of individual coping mechanisms and removing barriers that prevent successful implementation of coping skills outside clinical sessions. Music functions as an accessible and motivating vehicle for psychoeducation, aligned with information patients receive in other disciplines. An example of this would be a patient gaining understanding that stress reduces cognitive efficiency and that music listening can counteract some of these unwanted processes. Successful

outcomes in military treatment include readiness for duty and transition to civilian life. Music therapy can support these goals by encouraging the generalization of information from clinic to the independent use of music. Although many service members frequently listen to music on their own, most are not yet using it intentionally for symptom management, emotional regulation, and enhancing cognition. In addition, long-term ongoing music therapy treatment provides opportunities for: 1) in-depth exploration and processing of emotions related to deployment experience, military service, and/or return to civilian life, 2) progressive development of self-insight and negotiation of a new identity (often necessitated by trauma and loss), 3) ongoing processing of traumatic experiences, and 4) personal growth within a supportive therapeutic relationship. Exposure to music therapy interventions in the group setting can allow patients to further individualize their care, allowing them to reflect on what interventions are the most effective at addressing their treatment goals. Thus, group music therapy often informs subsequent individual treatment. In contrast, if a treatment path begins with individual sessions and then progresses to group treatment, development of skills and coping mechanisms as well as confidence building can provide motivation to engage in a group setting. Patients with extreme sensitivities to group situations, severity of TBI requiring more individualized assessment, severe auditory sensitivity, or restrictive schedules are advised to participate in individual sessions prior to attending a group.

Music therapy Jam Group. Practice of learned skills can be supported during music therapy Jam Group. This group encourages patients to use skills in a social setting with less facilitation by the therapist than in the group or individual music therapy sessions. The Jam Group focuses on collaborative active music-making using patient-selected instruments and song choices, often in preparation for performance. Patients participating in this group are commonly awaiting transition in their military service, either back to full duty or military separation at end of active service. The social elements of the group serve as an analogous continuation of the camaraderie experienced by service members that can be applied to civilian life.

Patients in Jam Group have completed at least one individual music therapy session, the music therapy 4-week group series, and demonstrated the ability to engage in group music-making. Skills required for participation include: 1) ability

to play songs with a minimum of 4 chords on instrument of choice, 2) can play steady rhythm at several tempos/meters along with other instruments, 3) applies appropriate coping strategies for difficulty with auditory sensitivity, and 4) has learned emotional regulation strategies and demonstrates appropriate communication in group settings.

Patient motivation for active participation in the group is further expanded with the inclusion of a performance component. While engaging in music therapy Jam Group, patients can work toward a collective goal of performing selected music in front of a familiar audience within the clinical setting. The process includes selecting appropriate repertoire, arrangement and instrumentation, and evaluation of musical aesthetics. The music therapist aids in adaptive methods of learning and successful participation in group music-making for varying musical ability levels. This can be achieved by using reductive notation, simplifying chord progressions/rhythms, adapting instruments or other equipment, and providing verbal prompts before and during active music-making. It is important for the therapist to be aware of each patient and their unique barriers to allow them the greatest autonomous participation level possible based on their ability. Other important areas include: 1) executive functioning through music selection and performance, 2) communication, collaboration, and conflict resolution, 3) memory encoding and recall through weekly rehearsals, 4) socialization through scheduled social engagement, prompting service members to seek similar opportunities to reduce isolation post-treatment, 5) emotional expression/regulation. Selecting songs for expression can allow processing of difficult or painful emotions in a safe space. In turn, selecting songs that elicit desired emotions or mood states can further emphasize use of music for internal regulation, and 6) self-esteem through successful performance. Patients endorse that the Jam Group is an effective method for improving self-esteem, which is often damaged post-injury due to loss of previous abilities in other areas of functioning. Service members frequently report continued music engagement post-music therapy treatment in community music organizations or within their existing social groups.

Music Therapy and Community Engagement

Performance is an integral part of the creative process, is a catalyst for creative expression, and allows artists to share their diverse talents with receptive audiences. Patients are empowered by sharing the creative products of their therapeutic processes, which are uncovered or rediscovered through engagement in creative arts therapies. Performance has been used to enhance therapeutic gains with service members since the 1950s, when VA hospitals began establishing music therapy programs that included clinical music therapy treatment and community performances as a therapeutic tool for recovery (Spencer, 2013).

Creative Arts Cafe. The Creative Arts Cafe is a performing arts venue integrated into the NICoE and Intrepid Spirit Centers. It serves as a platform for patients and staff to share various facets of creative expression through performance. This may include, but is not limited to, music, art, creative writing, poetry, drama, dance/movement, wellness topics (e.g., relaxation exercises), and/or other forms of creative expression.

Research shows that performance provides opportunities for patients to grow in their recovery processes by exploring the boundaries of their comfort zones and engaging in structured

risk-taking (Baker, 2012). Creative arts therapies sessions support patients' inherent and learned creativity. Performing within a community elevates the clinical component, allowing patients to take ownership and pride in their creative expression and accompanying products (Baker, 2012).

Performance provides a context for service members to connect to an audience in their communities and offers a creative platform and innovative approach for staff and patients to interact. This can generate enjoyment for the staff as they view patients' creativity and engagement in performance, unveiling products from creative arts therapies sessions. Performance venues provide an outlet for providers and facility staff to experience creativity in the workplace, which can heighten workplace satisfaction.

Community collaboration. The Creative Arts Cafe model can be used as a first step for creative engagement outside music therapy sessions. This can generalize to the greater clinic, military installation, and surrounding community. An example of this type of collaboration was between the NICoE and the US Air Force Band of the National Capital Region. An initial collaboration began in 2016, when Air Force Band members played alongside patient performers at a NICoE Creative Arts Cafe, which continues on a quarterly basis. A feasible next step in service members participating in a greater community can exist through collaboration with local arts organizations that support veterans by encouraging their participation in open mic nights, songwriting workshops, and other performance-related events.

Evaluation of Treatment Progress

Evaluation of treatment progress is an important component of the NEA Creative Forces Military Healing Arts Network. Creative Forces employs an evaluation toolkit that is used by their creative arts therapists across clinical settings. The toolkit includes evaluation forms for the music therapy group and individual sessions outlined in this article. In addition, forms to evaluate pre- to post-session changes in specific symptoms (e.g., pain, fatigue, stress) are used across creative arts therapies. Finally, the toolkit includes several standardized measures suitable for quantifying pre- to post-treatment changes (e.g., PROMIS scales, Positive and Negative Affect Schedule). Secondary analyses of data obtained across the sites are regularly conducted for program evaluation purposes. Preliminary evaluation from the NICoE music therapy program has shown that 79% of service members who participated in one music therapy session requested follow-up: 38% requested individual sessions; 30% requested group sessions; and 35% requested both individual and group follow-up music therapy sessions.

Conclusion

As music therapy is continuing to be integrated into the Military Health System, program models such as the ones described throughout this paper will need to be developed and adapted to meet the changing needs of military populations. Within each program structure, there is flexibility for the clinician and facility to adapt and customize treatment, which provides optimal patient-centered care within an interdisciplinary setting. Publication of program evaluations and results of prospective studies examining the effects of these models on patient outcomes are needed to further validate program models, expand implementation, and provide research evidence. There is a clear need across both the DoD and VA for music therapy services, and further research can support its inclusion

as a standard of care for the treatment of military service members, veterans, and their families.

Disclosure Statement

The views expressed in this article are those of the authors and do not reflect the official policy of the Department of the Army/Navy/Air Force, Department of Defense, or US government.

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