White Paper: U.S. Military, Music Therapy, and Technology:
Strategic Use of Music to Support VA Mission

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EXECUTIVE SUMMARY

PURPOSE- This White Paper will provide the U.S. Military and federal agencies, such as the Veterans Administration (VA), State and Federal Prisons, the Department of Defense Education Activity (DODEA) and similar organizations, additional information about the impact of music therapy and its proven history of benefits to these organizations. As these organizations strive to provide solutions to total wellness care, we believe that proven best practices for treating these populations can be used with online companies that provide music education and music therapy services, using supportive digital health music-based technologies in its treatment to provide access to thousands of additional patients without a major budget impact.

SCOPE-Hope Young, Music Therapist-Board Certified (MT-BC) and Emily Morris, MT-BC from the Center for Music Therapy, Inc. will provide an in depth look at the use of music and its proven treatment benefits by the U.S. military for active duty personnel and veterans. They will discuss how technology as a delivery tool can be a solution to the resource and budget constraints that are a major cause for the growing number of veterans to go untreated. With the continued conflicts and wars that are currently taking place, coupled with humans living longer, the number of veterans impacted continues to increase. With this increase, the numbers for neurologic impaired, PTSD, depression, substance abuse, sexual traumas, and suicide continues to increase. This paper will provide an opportunity for positive outcomes to the quality of life indicators, a key measuring tool for the VA, using music therapy as part of the government's total wellness care initiatives.

EXPECTATIONS- Provide a solution to reach the growing demand for care to our veterans, by combining music education, music therapy and technology. With the history of using music therapy for treatment and successful pilot programs by the VA combining music therapy and online solutions, we are confident that thousands of additional veterans and service members can have access and receive the needed treatments they require for sacrificing their lives for our freedom.

History of Music Based Programs in the DOD

The Department of Defense (DOD)-funded research has proven effective the use of music to support and care for veterans. This was due to the detailed programming recommendations established by the Office of the Surgeon General in the 1945 U.S. War Department Technical Bulletin 187. This white paper addresses the need for rapid, pervasive, and effective DOD implementation of music throughout the VA and similar government programs seeking solutions to overcome treatment obstacles of overworked staffs and resource shortages to help support total health and wellness programs in a timely manner. The VA is utilizing music-based programs across the entire care cycle for veterans, and this paper will address opportunities to reach more veterans without the costs associated with significant staff increases. This paper will focus on the impact to key areas of interest such as:

- *Overall Physical and Mental Wellness*

- *Anxiety and Stress Management*
- *Reduction in Opioids use*
- *Memory Enhancement*
- *Improved Communication*
- *Physical Rehabilitation*

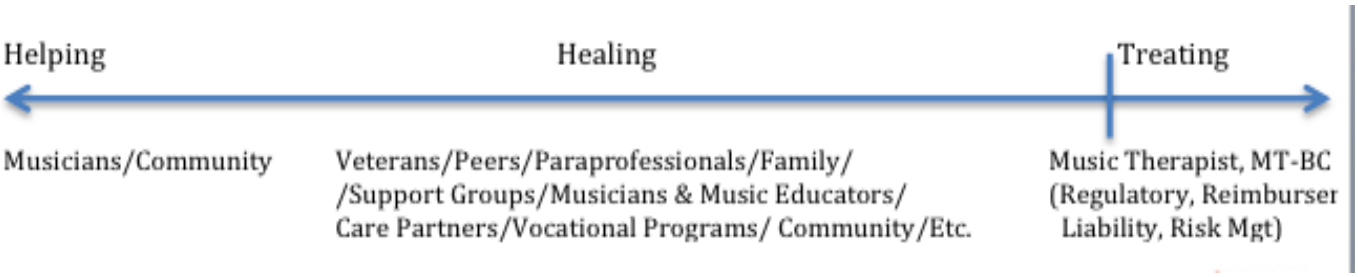
In this paper, we will use three classifications to define the point within the care cycle that music might have the most impact to the desired outcomes for the veterans. Each classification will correlate with the appropriate level of support and recommend resources to empower successful access to veterans while using music to reach their desired physical and mental health outcomes.

The three classifications are:

HELPING veterans through music

HEALING veterans through music

TREATING veterans through music



(*Corresponding levels of support, resources, professional requirements for implementation of each level of through the use of music within the Veterans cycle of care.)

Below are current examples of music's use with veterans within each classification.

HELPING: Humans are intrinsically musical beings. Whether it is through concerts, church services, date nights, dances, bedtime routines, media, bands, choirs, and socialization, the pervasiveness of music is in and all-around mankind. This natural ability helps us connect to ourselves and each other in deeply profound and meaningful ways across the world, even across cultural, social, and economic barriers including war-related trauma. As Hans Christian Anderson said, "when words fail, music speaks." We feel united through music. Music penetrates the isolation of Post-Traumatic Stress Disorder (PTSD) and injury for veterans, widowed, and orphaned. Music provides a means to communicate and share experiences with friends and family. Music brings veterans back into our everyday human experience of community.

EXAMPLES:

***VET TIX*:** https://www.youtube.com/watch?v=Zk8BNkdBDsQ

***VETS ROCK*:** https://www.youtube.com/watch?v=_ZQHUg7wuCY

HEALING: Veterans can use music intentionally to self-regulate sleep, emotions, and behaviors, as well as coping with stressful situations and relationships. Veterans can use music to create, redefine, and rebuild self-identity and adjust to

new norms. Music can increase motivation to improve both physical and mental health through exercise and movement. Veterans can use the act of learning and making music with others to explore and discover bonds that may be broken and reweave the fabric of their relationships. These new skills can transition into a renewed sense of capability within themselves. Through music education, performances, and peer mentoring, veterans can apply their skills to benefit themselves, fellow veterans, and the greater good.

EXAMPLES:

Full Battle Rattle: Healing the wounds of war with music:
https://www.youtube.com/watch?v=ao6WnXo8Fbo

Voices of Service: http://www.cammomusic.org/

Guitars for Vets: https://www.youtube.com/watch?v=-A9F_XPtI5M

TREATING: 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 and the Certification Board for Music Therapist (CBMT) has credentialed. Music therapy is part of an individualized treatment plan. Specific interventions may address cognitive, physical, communication, emotional, and social needs of individuals across the life span. After assessing the strengths and needs of each client, the qualified music therapist designs and implements individualized treatment protocols (B. Else, 2014) . Federal and State regulatory bodies recognize that MT-BC and all MT-BC's adhere to regulatory standards, protocols as well as follow professional ethics, standards of practice, and code of conduct established by the CBMT.

EXAMPLES:

Chicago VA PTSD: https://www.youtube.com/watch?v=0i7aIULU7MQ

Walter Reid Hospital NICoE specialized treatment team includes music therapist.
https://www.youtube.com/watch?v=GcUGm7VWH7A

PBS The Healing Power of Music: https://www.youtube.com/watch?v=Ketz-mJ-x-Q

1775-2019 U.S. ARMY-DEPARTMENT OF DEFENSE (DOD) HISTORICAL PRECEDENCE FOR USE OF MUSIC

The United States DOD's strategic use of music to effectively support mission readiness and a resilient military and veteran population is documented from its very beginnings to current history. According to the Mount Vernon Archives (Music in the Revolutionary War), music has been a part of the US Army since its inception in 1775. George Washington organizationally instituted music's use in three areas 1. Morale Booster, 2. Communication and 3. Regimentation. Partnering with musicians has been the key in the daily standardized use of music by our armed forces. Beginning in 1775, our military forces collectively and individually drilled to music with musicians providing clear and precise musical patterns for individuals and units to coordinate their movements. Music education and training for specialized military forces comprehensively covered the 24/7 routine of military personnel's day. The military standardized music patterns and instrument choices to communicate when to wake up, fetch wood/provisions, worship, assemble, parade, salute, march, and retire.

The military so valued music that musicians existed to expedite communications on the battlefield. Music was the most effective carrier of information for active battle scenarios. The music was loud and distinct enough for soldiers to hear during combat. The military used high-frequency range of the fife and decibel amplitude of the drums for their varied and distinct frequencies that could carry commands for troops to respond to their officers' orders without confusion. Music signaled the troops to battle, charge, retreat, and more. There were music communication signals to call medical assistance to the field for a wounded soldier, music to call for water and to attribute rank, such as the First Sergeant's call.

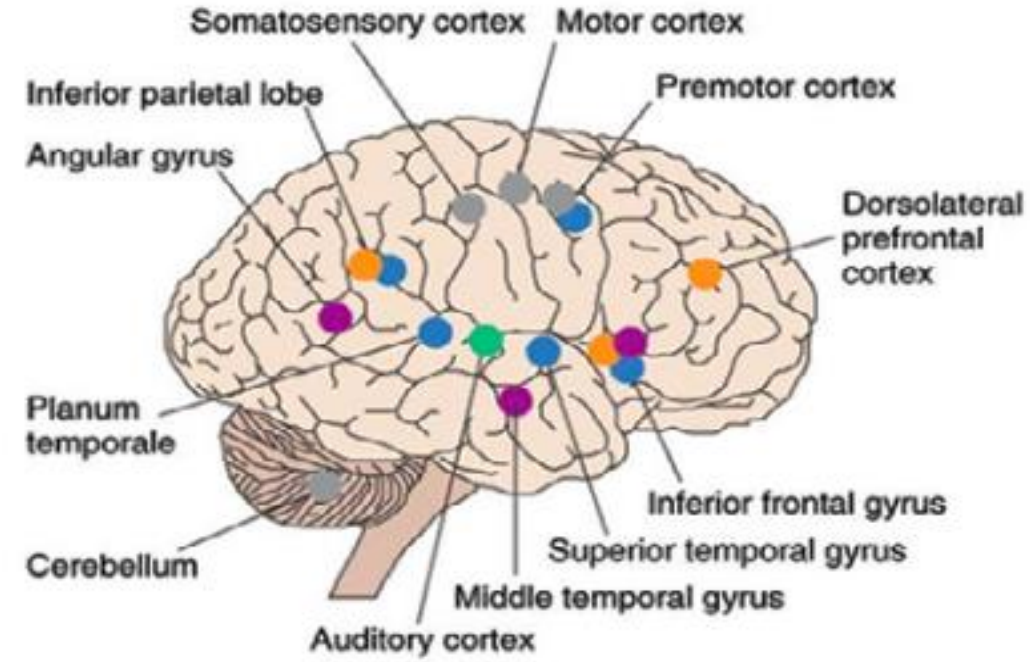
Boosting morale continues to be a priority for music's use today, although the U.S. military has advanced music's role and use through generations of innovations. By the Civil War, the Army replaced the fife with the bugle, with radio and satellite communication replacing today's communication functions (Stewart, R. W. 2009). The historical record shows the evolution of music beyond boosting morale to music being used as a form of treatment for pain, PTSD, addiction, recovery of movement, speech, and other areas. Ken Burns' "America At War" Documentary Film series archives the U.S. Civil War through the Vietnam War. Excerpts are abundant about music's dominant role in our U.S. military culture and life. Letters to home, medical entries, and personal diaries tell tales of wounded soldiers singing who couldn't speak, doctors observing medical benefits of music in surgical units, and music transcending the morally conflicted and ravenous conditions soldiers survived or experienced as they faced death.

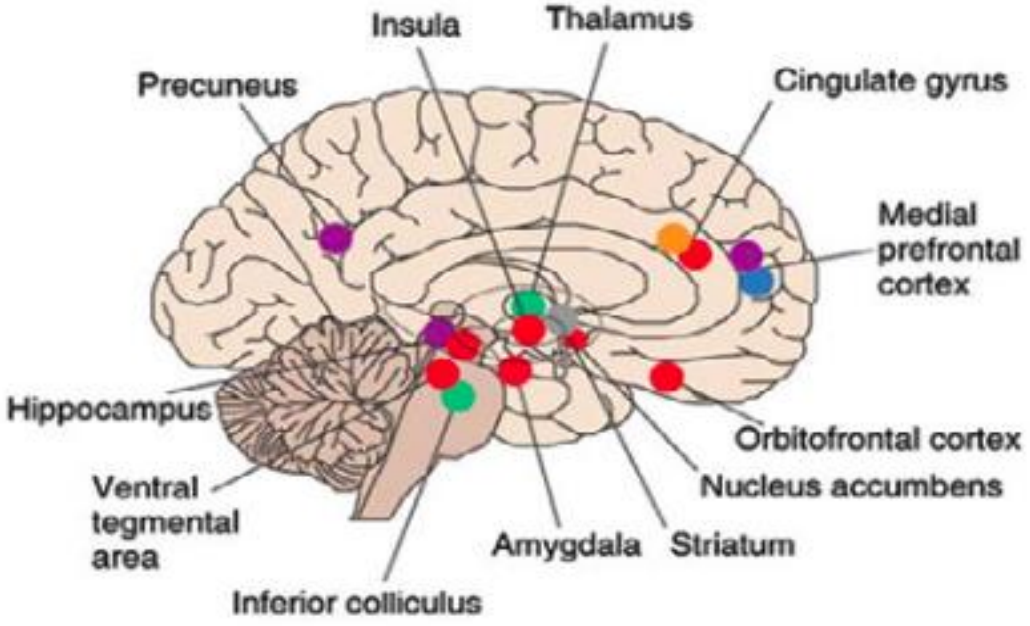
By WWI, music's use to care for our American Expeditionary Forces in Europe would be so impactful that a completely new field of study and licensed occupation was discovered around the therapeutic use of music due to our armed forces. A young musician named Wilhelmina Harbert was a WWI concert artist placed with our American Expeditionary forces in France. She and some military medical doctors and staff would observe changes in patients' behaviors when musicians sang and performed for soldiers in the hospitals and other places Wilhelmina performed for troops. After WWI Ms. Harbert married a physician in 1923, Dr. Ellis Harbert. She became interested in the scientific methods of research and applied these methods in her study of psychology of music with the military populations that she continued to work with once stateside. By 1937, she was a professor of Music Education and in 1938 began teaching courses under Musical Guidance and Therapy at the University of the Pacific, Stockton, CA. By 1946, these courses officially became a major known as music therapy. In 1948, the California State Board of Mental Hygiene gave legislative status/approval to a budget to provide professional status to music therapy. Music therapists in CA had a civil service status before the formation of the National Association of Music Therapy. Due to music's long-standing prominent role in military care and support, as well as the partnership she maintained since WWI with US Forces, Ms. Harbert was able to expand the use of music for the care of soldiers. She established music therapy in Army and Navy hospitals and United Service Organization (USO) Clubs for future decades by promoting a new formalized and scientific method in the use of music to improve outcomes in the treatment for our military and veteran populations (O'Connell, 1990) Due to Ms. Harbert's key partnership with the military by the 1980's, the VA was the largest single employer of music therapists in the country. Historically, generations of military leadership committed significant resources to the use of music to care for and support troops.

How does music impact the military and veterans today?

Why music?

Music is a human phenomenon. It's the only sensory experience that can activate all areas of the brain simultaneously. Human anatomy hardwires individuals to respond rapidly to auditory and musical cues, which creates powerful new potential for veterans. The therapeutic use of music can develop new neural pathways and behaviors which can reactivate capabilities and resiliency within our military population.





- Perceiving the basic acoustic features of music (e.g., frequency, duration, loudness)
- Perceiving higher-order musical features (e.g., harmony, intervals, rhythm)
- Focusing and keeping track of music in time (attention, working memory)
- Recognizing music and recalling associated memories (episodic memory)
- Playing, singing and moving to the beat of music (motor functions)
- Music-evoked emotions and experiencing pleasure and reward

Schematic illustration of key brain areas associated with music processing, based on neuroimaging studies of healthy subjects. Note: Although the image displays parts of the right hemisphere of the brain, many musical subfunctions are actually largely bilateral (with the exception of pitch and melody processing, which is more lateralized to the right hemisphere). Ref: O'Kelly, Julian Winn. Music Therapy and Neuroscience: Opportunities and Challenges. Voices: A World Forum for Music Therapy, [S.l.], v. 16, n. 2, Apr. 2016. ISSN 1504-1611

Music Therapist and the impact to the military and veteran populations.

Music influences human behavior by affecting the brain and subsequently other bodily structures in ways that are observable, identifiable, measurable, and predictable; thereby, providing the necessary foundation for therapeutic applications (Taylor, D. B., 2010).

Music Therapists use these influences to drive specific treatment behaviors and outcomes. Music Therapy is useful because music triggers whole brain processes and functioning for which music therapists craft personalized, science-based protocols to measurably affect veteran's cognitive, emotional, physical functions and abilities. A music therapist is a highly specialized musician and therapist with advanced training in biomedical, neurological, psych/social and behavioral approaches. They are highly skilled to work with medical teams and medical technology. They are required to maintain professional credentials that meet all nationally recognized regulatory bodies' stringent requirements in the treatment, care, and support of veterans. With today's advanced understanding of music's function in neuroplasticity models, music therapy has become a core strategy used in leading rehabilitation, medical, and total wellness programs that are present in the U.S. military, veteran's administration, federal/state prisons and other similar government organizations.

The American Music Therapy Association Else, B. (2014). provides examples of music therapists working in VA facilities to accommodate and engage veterans quickly. Tina Haynes, MT-BC, LCAT, (Licensed Creative Arts Therapist) at the Tennessee Valley Healthcare System, York Campus, in Murfreesboro, TN, provides an example when she said, "Signature injuries of PTSD and Traumatic Brain Injury (TBI)are evident among the veterans in music therapy programs and services. The outpatient music therapy group at the York Campus includes a cohort of millennial generation veterans. Their pilot program was co-led by a music therapist and a speech language pathologist. The biweekly group met over eight weeks for intense work on building attention and cognitive endurance. The therapists used specific music therapy interventions each week to address deficits in four types of attention: sustained, selective, alternating, and divided attention. Currently, the feedback on the group is encouraging and the pilot data are promising." The therapist noted that these veterans are part of the millennial generation where technology and music are part of their lives and daily routines, which enables veterans to engage more quickly resulting in higher rates of compliance and follow through with treatment.

How music education influences the U.S. military, VA and other similar governmental organizations.

Music stimulates the whole brain simultaneously. The brain is the command center and place where all our senses and experiences come together for humans to process and understand and perceive, express, or act. Music's influence on

the entire brain activation system and functional uses was developed at least 40,000 years ago (Wilford, J.N. 2012). Music was experiential and a communal activity. After the innovation of recorded music in 1877, music's role in society became more passive with less access to opportunities to learn, play, and make music. Today many people experience music increasingly in isolation, while using headphones, cell phones and many other similar personal devices. Music, especially the making of music, influences human behavior by affecting the brain and subsequently, other bodily structures in ways that are fundamental to many essential life's functions, including creativity. Music education and participation builds human capabilities and fosters a well- roundedness. Through active engagement and learning of music skills through the opportunity to play an instrument, there are many benefits, including socialization improvements, teamwork, coping skills, creativity; and in many cases, isolation decreases. Veterans can strategically reactivate a rich history of physical, emotional, cognitive, and social action to help and heal themselves and those around them with support from music educators. Music therapists are important allies providing oversight and guidance to the music educators in their support roles to veterans.

USE CASES MUSIC THERAPY:

PHYSICAL REHABILITATION

Sensorimotor Falls Prevention-Gait-Balance Training

In the American Music Therapy Association's" Music Therapy and Military Populations" by B. Else, (2014), it recommends that the VA give priority to the use of music in its rehabilitation to address both sensorimotor and physical rehabilitation.

Rationale: Loss of mobility and related falls cost the VA system millions of dollars annually. The leading cause of loss of mobility and balance is due to Movement Disorders, with Parkinson's disease being a leading cause of falls and loss of mobility within military and veteran populations. These numbers are expected to double in the veteran population over the next 12 years due to the aging of the baby boomers and the onset of Parkinson's disease in veterans due to their exposure to chemicals.

Gait disorders, particularly freezing of gait, are among the most disabling features of Parkinson's disease and contributes to falls, which are a major cause of death among patients with this disorder. Conventional therapeutic interventions for Parkinson's disease, such as pharmacotherapy and deep-brain stimulation can be effective in managing gait abnormalities. However, music therapy interventions such as rhythmic auditory cueing (RAC) and music enhanced motor augmentation techniques have shown effectiveness as adjuncts to pharmacological and surgical treatments.

Parkinson's disease is only one of several conditions that impair patient gait, which research demonstrates improved functional gait and balance with RAC. Stroke, traumatic brain injury, and amputations can present similar gait-rehabilitative challenges. Research demonstrates RAC provides equal and even greater success with stroke and TBI (Traumatic Brain Injury):

Some know RAC as Rhythmic Auditory Stimulus (RAS).

For many years, investigators and clinicians worldwide have observed that individuals with Parkinson's disease display improved gait when provided audio pacing with a metronome. A subset of studies by specialists trained in music therapy has demonstrated that introducing RAC with music that has a strong rhythmic beat may even be more effective than a metronome in enhancing gait in patients with Parkinson's disease.

Beniot, C., Dalla Bella, S., Farrugio, N., Obrig, H., Mainka, S. (2014)., and others have demonstrated that RAC, which adapts to patients' movements, may be more effective than the rigid, xed-tempo RAC in most studies. Improved gait results not from direct therapy on dopamine-deficient brain regions, but instead from brain neuroplasticity – repurposing of tissue not ordinarily responsible for movement, but conditioned to act as such, via music-enhanced therapy.

More importantly, Calabro et al: (2019) suggest the connection and automatic engagement of motor areas during rhythm perception linking music and motor improvements in Parkinson's disease.

It is important to stress that a music therapist selects and composes specific music for Parkinson's disease rehabilitation for gait. Failure to do so can retard, rather than enhance gait performance. Thus, music therapists must oversee the assessment and implementation of programs, in addition to research and deployment of technologies, to ensure successful use of RAC protocols throughout the VA system (Young, H., MT-BC. 2017).

Video of Parkinson's patient using RAC during Co-Treatment Music/Physical Therapy:

https://www.youtube.com/watch?v=fS5NaKfR-BQ

SPEECH/COGNITION

TRAUMATIC BRAIN INJURY (TBI)/STROKE

Melodic Intonation Therapy (MIT) or Adaptive MIT:

EXAMPLE: Gunshot to Head/TBI-Gabby Gifford—Music Therapy and Speech/Cognitive Recovery:
https://www.youtube.com/watch?v=tiJ9X_wLSWM
Singing-based intervention was developed for rehabilitation of people with non-fluent aphasia. Melodic intonation therapy (MIT) expresses the intonation of speech as low and high pitches. Training with a music therapist can achieve production of linguistic phrases, first by intoning (singing) them at a slow pace and steady rhythm supported by tapping, then following a hierarchy of steps that eventually transforms communication from singing to speech. Training starts with singing two-syllable words and proceeds gradually to phrases (Music-based interventions in neurological rehabilitation, Lancet Neurol 2017).

USE CASES: MUSIC EDUCATION ALLIED WITH MUSIC THERAPY

POST TRAUMATIC STRESS DISORDER (PTSD):

In Else, B. (2014). AMTA's 2014 "Music Therapy and Military Populations", the status report recommends the use of music in the VA's rehabilitation programs to address pain management and for social, emotional, and behavioral health.

PTSD is commonly associated with combat exposure and sexual trauma and is pervasive among veterans. The prevalence of PTSD is increasing within military veteran populations due to increased deployments and the long-term exposure to the effects of combat. The U.S. Department of Veteran Affairs estimates a range of 11% to 30% of veterans have PTSD. Primary symptoms of PTSD are depression, perceptions of cognitive failures, decreased social functioning, and decreased self-reported quality of life. Research shows veterans with PTSD demonstrate greater interference with daily activities, miss more work, are three to six times more likely to divorce, and are more likely to engage in intimate partner violence (Pezzin, 2018). Current treatment options include psychotherapy and medication management. Due to

the individual nature of PTSD, health care providers are not finding uniform success for treatment, and success requires trial and error while exploring the treatment options.

Music Therapy and music education in treatment have shown significant results in treating PTSD. Interventions include, but are not limited to instrument lessons, lyric analysis, composition, improvisation, relaxation, guided imagery, and music oriented coping skills. One study of veterans with PTSD reports a 22% decrease in overall PTSD symptoms, as measured by the Post-traumatic stress disorder Checklist - Civilian (PCL-C) scale, as well as a 28% reduction in depression symptoms. Health-related quality of life, as measured by the EuroQoL, improved by 21%, and self-reported cognitive difficulties decreased by 13% (Pezzin et al., 2018). These outcomes were observed after six weeks of intervention. Similar studies also show an increase in self-regulation, decreased anxiety and panic, and decreased dissociations (Lightstone et al., 2015). These studies are positive outcome measures achieved through music therapy's use in the VA which enables the governments push to increase total wellness care initiatives for veterans.

Researchers are continually exploring and studying music therapy's effect on PTSD with veterans as well as refugees. A significant overall benefit for the use of music as treatment is the patient's adherence to treatment. The drop-out rate for music therapy is significantly lower than other therapeutic interventions, allowing for a more consistent and thorough treatment (Beck et al., 2018).

ANXIETY/STRESS/PAIN MANAGEMENT AND SUBSTANCE ABUSE

Deaths due to opioid overdose have been on the rise, leading to a public health crisis in the United States. Opioid addiction and subsequent opioid overdose in the Veterans Health Administration closely mirrors the same trajectory as non-veteran statistics (Wilder et al., 2015).

The research conducted on the human brain's response to music is extensive and thorough. Chanda and Levitin have found that listening to and engaging in music contributes to the production of dopamine, oxytocin, and vasopressin (Chanda et al., 2013). These chemicals, among others, are responsible for the creation of social bonding, pain management, and improving mood.

A study that others have replicated multiple times shows an increase in pain tolerance, a decrease in pain intensity, and a decrease in pain unpleasantness when listening to music (Choi et al., 2017). Using music to reduce one's perception of pain could allow for a decrease in pain medication.

Music stimulates the brain to produce the same chemicals that opioids produce. Therefore, the music therapist and medical team can ween veterans off medications to lower dosages; thus, reducing risk of dependence and addiction, and providing important skills and non-pharmaceutical tools for managing stress and anxiety.

MEMORY: Working and Episodic

Memories which are paired to familiar music immediately produce recall of episodic memory even when injury or disease otherwise make memory recall difficult. For the VA population, this is an extremely powerful use of music, which can quickly help or hurt a veteran. Example: Improvised Explosive Device (IED) explosion coupled with music memory. When a veteran is listening to a music playlist while traveling during a patrol, hit by IED, in a vehicle with fellow soldiers the music can be linked by the brain's memory recall to traumatic memories caused by the IED explosion. This same music heard by the veteran after the explosion can trigger immediate body sensations, memories, and

survivors' guilt for the veteran. For this reason, music educators, music therapists and all care team members collaborate throughout the cycle of the veterans' care. Education, insight and awareness are important for all care team members in order to ensure good observation of both positive and unintended negative impacts when using music. Music therapists and medical care staff need to carefully manage the negative impacts of music paired with injury, PTSD, and grief to process and develop new ways of moving through trauma for the veteran. Music educators and music therapists become important allies in enabling the necessary attention and focus for learning new working memory skills such as how to read music, play an instrument and perform a new song. These new skills help to build a bridge to living well after trauma, disease, or injury. Music therapists carefully guide new music experiences. The new music experiences allow new associations with music, which enable the veterans to reclaim the music as safe and enjoyable. The ability to intentionally build new memories and experiences through music provide an opportunity for positive outcomes which can be observed and measured by quality of life indicators, a key measuring tool for the VA.

Science supports that music is an effective tool for memory and more:

Sihvonen, A. J., Särkämö, T., Leo, V., Tervaniemi, M., Altenmüller, E., & Soinila, S. (2017). Music-based interventions in neurological rehabilitation. *The Lancet Neurology*

Sample of study results of effects on memory from music listening and singing:

"Both music listening and singing groups improved behavioral disturbances (p=0·04, *d*=0·42) and physical signs (p=0·008, *d*=0·52) more than the control group. Effects not present six months after the intervention; singing was beneficial, especially in improving working memory in people with mild dementia and in maintaining executive function and orientation in young people with dementia. Music listening was beneficial in supporting general cognition, working memory, and quality of life, especially in people with moderate dementia not caused by Alzheimer's disease who were in institutional care. Both music interventions alleviated depression, especially in people with mild dementia and Alzheimer's disease. The musical background of people with dementia did not influence the efficacy of the music interventions; music listening improved the patients' mood (p=0·001, *d*=0·80), orientation (p=0·005, *d*=0·71), episodic memory (p=0·036, *d*=0·54), attention and executive functions (p=0·039, *d*=0·48), overall cognitive performance (p=0·041, *d*=0·47), and the quality of life (p<0·001, *d*=0·99). Singing resulted in additional improvement in short-term memory and working memory (p=0·006, *d*=0·75) and improved caregiver well-being (p=0·026, *d*=0·85)."

THE VA's READINESS FOR USE OF MUSIC:

According to the VA, there are currently 170 VA Main Medical Center Campuses**,** and 1,063 VA Community-Based Outpatient Clinics (CBOC's). The VA also operates over 100 VA Nursing Home systems at the VA Main Hospital Campuses.

As of 2014, the VA had only 59 music therapists providing services to the then 152 VA hospitals in the U.S. Less than half of all VA hospitals have music therapy services, and 23 states go completely without this vital service (Else, B. 2014). Music therapists and qualified allied music educators underserve the 1,063 Outpatient Clinics and hundreds of VA Community Living Centers. Music as a service has been deemed so vital that the U.S. War Department created a specific Technical Bulletin 187 in 1945 detailing a program created by the Office of the Surgeon General and Walter Reed General Hospital on the use of music for reconditioning soldiers convalescing in Army hospitals. The DOD followed this up with a 3.5 years' research longitudinal study, which proved music's effectiveness as a treatment for military populations (Else, B.,2014). "Numerous case reports and published articles resulted from this study describing the importance and impact of music interventions among service members in rehabilitation."

With such a long-documented U.S. history of DOD detailed planning for implementation of the use of music, what might be some of the factors inhibiting pervasive execution? Identified below are current prohibitive factors:

- Scale issues to address expanding VA market not identified or addressed
- In person/On Site-service delivery model cannot scale.
    - Healing and helping music education/recreation services traditionally done in small/large groups.
    - Highly specialized music therapy treatment services performed by MT-BC traditionally done 1:1 or small groups.
- Gaps in access to a skilled workforce to fill the demand.
    - According to the Department of Defense Manpower Data Center (DMDC) report, May of 2019, there are 1,342,404 active duty military personnel in the United States.
    - The Certification Board of Music Therapist (www.cbmt.org) currently list 8,226 Music Therapists – Board Certified in the United States, with only 57% of music therapists practicing 34 hours+ weekly. (AMTA 2017 Workforce Member Survey and Workforce Analysis)
    - The most robust growth for sourcing a skilled music work force is through global platforms. Ted Gee, CEO of Live Music Tutor states "There are 640,000 + music educators in the United States with this number growing annually."
    - Currently, GS-0638 Civil Service Classification inhibits rapid market sourcing of talent.
- Remote and Isolated areas difficult to reach.
    - Transportation - cost prohibitive for in-person service delivery
- Lack of rapid deployment of technologies to address problem
- Innovation in music-related service delivery has not kept pace.

Lessons Learned:

Recent DOD history shows that from 2001 onward, keeping pace in innovation and rapid deployment of medical technologies have been drivers in joint medical mission success. We've seen a successful trend in how DOD joint medical services have accelerated the rapid deployment of medical technologies and strategies to increase the survival rate of 1.64 million troops deployed in Operation Enduring Freedom and Operation Iraqi Freedom. This innovative success at saving lives in the line of service has led directly to a growing unintended problem of an overwhelming number of underserved surviving veterans. These surviving veterans and their families need increased access to proven health-related programs for their service-related injuries, illnesses, and disabilities. Expanded health costs related to this trend are compounding the problem, inhibiting service expansion ubiquitously to our military veterans.

As with every problem, this offers opportunities for innovation through strategic key partnerships to robustly and rapidly deploy new technologies to address serving military veterans. In 2019, we can turn to technology to bridge access and address scale issues, which earlier were identified as factors inhibiting pervasive execution of music solutions. Below are examples of the disruptive technologies which can be deployed:

- Remote service delivery using integrated music and telemedicine technologies with HIPAA compliant platforms.
- Outsourced workforce recruitment and fulfillment partners
- Education and training of community partners for helping and healing veterans via digital platforms and integrated technologies.
- Rapidly deploying Health Information Technology (HIT) music enhanced health devices and solutions.
    - Incorporate and regulate music services and technologies within VA HIT.
    - Require all deployable music therapy-based technologies to be capable of data, information, and communication sharing within the Electronic Medical Record (EMR).

Expand research capabilities through HIT platforms capable of multi-site trail management.

Example: Consilix-A Clinical Trail Patient Management Platform using blockchain technology- https://www.consilx.com/

- Deploy music therapy enabled devices, strategies, platforms, and data management.
  - Available on the market today, in clinical use, there are devices and systems to deliver sensorimotor, pain, anxiety, sleep, and other music protocols into broader, more cost-effective use with documented results.
    - Examples:
      - Biodex Gait Trainer 3 instrumented treadmill with music
      - Music- Care application for pain, anxiety, reduce opioid use
  - Music Integrated Wearable Biotechnologies, not yet on the market, are in early development in the U.S.

SUMMARY:

In summary, music therapy and music education have a long history of successful alliance across the cycle of care for the military, veterans, and other governmental workers. In this paper we highlighted the history of how music therapy and music education have been used as part of the foundation for improving treatment and care outcomes. Currently, there are 1,342,404 active duty personnel in the U.S. armed joint forces. With the number of current and future veterans that have served our country, there are not enough music therapists to effectively care for all. We demonstrated there are solutions to this deficit. Solutions which leverage strategic key partnerships enabling new capabilities by deploying technology throughout the VA system. These key partnerships provide the proven benefits of music education and music therapy in alliance to support the needs of veterans. We believe that through this alliance there is a growing skilled worker pool to be tapped into to provide additional access and care which is scalable to reach the increasing number of veterans in need while reducing the budget impact. Today, many of the VA facilities are focusing on total wellness/total health programs and improving the overall quality of life indicators that help measure the effectiveness of the VA care. The benefits of music education and music therapy are a proven solution. Unfortunately, the VA is consistently under resourced and many of the facilities that provide care for both inpatient and outpatient treatment have insufficient budgets to support the increasing demand. Though effectiveness of music education and music therapy has been proven by the government and the VA agrees that it is a valuable part of the total wellness programs and quality of life indicators, many of the facilities only have one licensed music therapist to treat hundreds and often thousands of veterans. This is virtually impossible, and many veterans are missing treatment opportunities, the music therapists are being overworked and the quality of life indicators for veterans are not improving fast enough.
This white paper concludes that the military and the VA have supported music education and music therapy for decades. Now with new technologies and virtual resources, thousands of current and forecasted veterans and their families can have access to these very important treatments. Partnering with technology companies that have proven success in telemedicine and online music education companies can be a significant resource for reaching more veterans with less budget impact. These technology companies would supplement current therapy programs that are being led at the facilities by the music therapists and provide them with additional vetted licensed therapists and music educators.

Using on-line platforms which follow HIPPA and regulatory requirements to reach and provide access to more service members, can result in lower costs with less burden to the VA. The music therapists at the facilities would designate what resources and what support is required for the veterans under their supervision.

Due to innovation in advanced technologies, it is more possible than any time since 1775 to build on the past use of music to empower the VA Mission. Innovation works through the forming of key aligned partnerships to collaborate in the creation of our future solutions to today problems. This paper provides the framework necessary to address prohibitive factors for full access to music supported care across the entire VA network. Scalable music therapy, music education technologies, and platforms exist which remove remote access barriers and skilled worker gaps at a lower cost, therefore reducing major capital expense concerns. The rapid deployment of these technologies expands the capabilities for every VA facility, DODEA, and active military personnel and their families to access music services known to improve outcomes from their VA care. Some examples of proven impact include PTSD, women's sexual trauma, drug addictions, paraplegics, and brain injuries. The Lake Nona VA facility has conducted a successful pilot of one of these programs and experimented with a virtual music concert for the holidays. Veterans participating in these pilots and VA personnel involved have reported a strong sense that through the music lessons, the VA was fulfilling its promise "To care for Him who shall have borne the battle and for his Widow and his Orphan."

Reaching more veterans with treatments that provide positive outcomes would increase the care and interests of the veterans, while having additional fun and provide proven benefit to the quality of life indicators within the VA system.

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ABOUT: The Center for Music Therapy, Inc.

The Center for Music Therapy, Inc. Austin, Texas was founded in 1990 to make music therapy more accessible. It is the first for-profit music therapy facility in the world. Providing services which synchronize the power of music with human potential to change people's lives.

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About Live Music Tutor

Founded in 2011, Live Music Tutor, Inc. (LMT) is a software technology company that provides interactive virtual music lessons by LMT instructors to individuals, schools and those in need of therapy. LMT matches the needs of the individual, schools and those in need of therapy with the right instructor. Since technology is online, instructors are worldwide. Geography is no longer a constraint in finding high quality music instruction at an affordable price. Students can now spend more time learning, than driving to lessons. LMT offers a safe and convenient way to take lessons. LMT is the owner and architect of software used to conduct virtual lessons. LMT has the flexibility to leverage curriculums of its clients or can design curriculum based on the needs of the individual, school or those in need of therapy. LMT has delivered over 30,000 lessons globally. For more information about Live Music Tutor, Inc., email us at info@livemusictutor.com or go to our website www.livemusictutor.com