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EVIDENCE-BASED MUSIC THERAPY TREATMENT TO ELEVATE MOOD DURING ACUTE STROKE CARE

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EVIDENCE-BASED MUSIC THERAPY TREATMENT TO ELEVATE MOOD
DURING ACUTE STROKE CARE

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy
in the College of Health Sciences
at the University of Kentucky

By

Jessica L. Rushing

Lexington, Kentucky

Co- Directors: Dr. Gilson Capilouto, Professor of Communication Sciences & Disorders
and Dr. Lori F. Gooding, Professor of Music Therapy

Lexington, Kentucky

2019

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ABSTRACT OF DISSERTATION

EVIDENCE-BASED MUSIC THERAPY TREATMENT TO ELEVATE MOOD DURING ACUTE STROKE CARE

Stroke is the fifth leading cause of death in the U.S. with approximately 795,000 Americans experiencing a stroke each year. In addition to common difficulties with communication and physical impairments following stroke, psychosocial impacts warrant assessment and treatment. Experiencing a stroke can lead to depression, mood disorders, and difficulties with emotion regulation. It is well documented that post-stroke depression (PSD) affects a third of stroke survivors. Higher levels of depression and depressive symptoms are associated with a less efficient use of rehabilitation services, poor functional outcomes, greater odds of hospital readmission, negative impacts on social participation, and increased mortality. The acute phase of stroke recovery may be a key factor in influencing the depression trajectory with early depression predicting poor longitudinal outcomes. The current approach to treating PSD is medication. However, psychotherapy approaches have demonstrated more promise in preventing PSD. Investigations into music-based treatments have shown encouraging results following acquired brain injuries with active music therapy interventions demonstrating large effect sizes for mood improvement. Therefore, the purpose of this three-part dissertation was to examine the effects of active music therapy on mood and describe the clinical decision making process of using music therapy to target mood elevation for hospitalized adults following a first-time acute ischemic stroke.

The first study examined the effect of one treatment of active music therapy on mood following a first-time ischemic stroke during acute hospitalization. Active music therapy was defined as music making interventions that elicit and encourage active participation from participants. The Faces Scale was used to assess mood immediately prior to and following treatment. Forty-four adults received at least one treatment. A significant change in mood was found following one treatment. Content analysis indicated that participants viewed music therapy as a positive experience.

The second study investigate the impact of receiving two treatments of active music therapy on mood as compared to one. No significant difference was found between those who received one treatment and those who received two. Both dosing groups

demonstrated significant mood improvement; however, Group 2 (two treatments) had more severe strokes and did not improve until the second session.

The purpose of the third study was to describe the clinical decision-making (CDM) process of a music therapist targeting mood elevation for hospitalized patients following a first-time acute ischemic stroke. The Three Phase Process Model of Collaborative Self-Study was selected as a guiding qualitative methodological framework. Data was collected from four sources: (a) electronic medical records, (b) audio recordings of eight music therapy treatments, (c) a researcher journal, and (d) patient and caregiver/visitor comments. Results indicate that factors influencing CDM included progression through a four-stage treatment process, use of a variety of music-based and therapy-based techniques, and the monitoring and influencing of participant levels of arousal, affect, salience, and engagement.

In conclusion, active music therapy during acute hospitalization following a first-time ischemic stroke is effective in significantly improving mood. Components of clinical decision making to elevate mood are illustrated in a provided conceptual framework. Continued investigation is warranted with consideration of stroke severity, dosing amounts, and additional outcomes of interest. Longitudinal investigation is needed to evaluate the impact of treatment on the trajectory of post-stroke depression.

Keywords: Stroke, Mood, Depression, Music Therapy, Clinical Decision Making

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07/25/2019

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DURING ACUTE STROKE CARE

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DEDICATION

To all of those impacted by stroke; to those who participated in this research allowing music therapy and myself to be a part of their journey; and to all of those who have received, or will receive music therapy from myself or someone I have taught, or will teach. May this pursuit of knowledge contribute to your quality of life.

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Chapter 1: Introduction

Stroke is the fifth leading cause of death in the U.S. with approximately 795,000 Americans experiencing a stroke each year (Benjamin et al., 2017). Impairments following stroke can be present in cognitive, sensorimotor, communication, and or socioemotional systems of functioning. Commonly presenting symptoms may include weakness, coordination difficulties, sensory deficits, aphasia, dysarthria, cognitive neglect, visual field deficit, major depression, and changes to memory, attention, and executive functioning (Miller et al., 2010). Much of impairment recovery is thought to occur during the first three to six months following stroke (Cramer & Seitz, 2009; Kwakkel, Kollen, & Lindeman, 2004; Wieloch & Nikolich, 2006). During this time, recovery is spontaneous as well as learning-dependent and involves processes of restoration, substitution, and or compensation (Langhorne, Bernhardt, & Kwakkel, 2011). Because the first few months following stroke are considered critical, facilitation of recovery is encouraged to begin early (Hallett, 2002), occur within an interprofessional team (Langhorne et al., 2011; Miller et al., 2010; Winstein, et al., 2016), maximize on principles of neuroplasticity (Kleim & Jones, 2008), and address psychological needs (Eriksen, Gay, & Lerdal, 2016; Lincoln, Kneebone, Macniven, & Morris, 2012).

In addition to changes in motor, sensory, cognitive, and communication abilities, survivors experience feelings of fear, loss, anxiety, challenges to self-identity, and of interest in the line of research being presented, post-stroke depression (PSD) (Burton et al., 2013; Crowe et al., 2016; Kouwenhoven, Kirkevold, Engedal, & Kim, 2012). PSD is

consistently reported to affect approximately one third of stroke survivors (Hackett, Yapa, Parag, & Anderson, 2005; Towfighi et al., 2017). Higher levels of depression and depressive symptoms are associated with less efficient use of rehabilitation services and poor functional outcomes (Gillen, Tennen, McKee, Gernert-Dott, & Affleck, 2001; Towfighi et al., 2017), greater odds of hospital readmission (Ottenbacher et al., 2012), and increased mortality (Kouwenhoven, Kirkevold, Engedal, & Kim, 2011). Due to these impacts, the importance of addressing PSD is now part of the American Heart Association and the American Stroke Association guidelines for rehabilitation and recovery (Winstein, et al., 2016).

Depression following stroke can be immediate and persistent. Depressed mood in the first week following stroke has shown to increase the likelihood of disability throughout the first year (Willey et al., 2010). It is therefore recommended that psychosocial support begin in the acute phase of recovery (Eriksen et al., 2016). To treat and prevent post-stroke psychological distress, pharmacological therapy and psychosocial treatments such as problem solving, group support, motivational interviewing, and music therapy have demonstrated promise (Hackett, Anderson, House, & Halteh, 2008; Lincoln et al., 2012; Winstein, et al., 2016).

Researchers describe music therapy as an accepted, inexpensive, and safe intervention showing improvement in psychological outcomes for a variety of patient populations (Higgs & Jones, 2000; Maratos, Gold, Wang, & Crawford, 2008; Raglio et al., 2015; Zhang et al., 2012). Several recent reviews have examined the evidence for music therapy to improve mood and depression following stroke (Ard & Wheeler, 2016; Magee, Clark, Tamplin, & Bradt, 2017; Raglio et al., 2015; Rushing, Gooding, & Uhl,

2015). Authors came to similar conclusions: that evidence suggests music-based intervention may be beneficial in improving psychological outcomes following stroke; however, methodological rigor is poor and intervention reporting lacks clarity (Ard & Wheeler, 2016; Raglio et al., 2015; Rushing et al., 2015). Additionally, research on music-based treatment for patients with acquired brain injuries (ABI), such as stroke, that are still in the acute hospital setting, is very limited.

In the acute medical setting, brief music therapy consisting of patient preferred live music (PPLM) (a patient selected song or type of song played live by a music therapist) has shown to have a positive impact on mood outcomes following a single session. (Bergh & Silverman, 2018; Cassileth, Vickers, & Magill, 2003; Crawford, Hogan, & Silverman, 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015; Madson & Silverman, 2010; Rosenow & Silverman, 2014; Silverman, Letwin, & Nuehring, 2016). Authors contend that PPLM can aid in motivating patients to participate in more active interventions such as those that may be required in neurorehabilitation (Silverman et al., 2016). More than one session of PPLM also has yielded positive impacts on mood, inviting further investigation into optimal dosing. For example, total mood disturbance has been shown to continue to improve with continue music therapy for patients hospitalized for autologous stem cell transplantation (Cassileth et al., 2003). Music therapy following ABI has demonstrated dosing effects related to socialization, motivation, and family ratings of participant mood (Wheeler, Shiflett, & Nayak, 2003). Therefore, further examination of dosing following ABI in the acute hospital and exploration of intervention efficacy is warranted.

A barrier to identifying intervention and dosing effectiveness is the use of several interventions within one session (Raglio et al., 2015; Rushing et al., 2015). For example, Jun, Roh, and Kim (2012) demonstrated improvement in state mood (and physical outcomes) following group music therapy during the first eight to ten weeks post stroke. Participants engaged in group stretching to music, movement to music, singing, playing instruments, music listening, and verbal processing all within one treatment session (Jun, Roh, & Kim, 2012). Using multiple interventions or techniques during treatment is not uncommon in healthcare. In fact, complex interventions are defined as interventions that involve multiple interactive components (Craig et al., 2008). Complex interventions present can be challenging to standardize and evaluate (Craig et al., 2008).

One way music therapy researchers have sought to understand and describe interventions with interactive components has been to look at processes related to clinical decision making (CDM). Several authors have provided insight into navigating CDM within the field of music therapy offering guidance for intervention and treatment planning (Beer, 2011; Dvorak, 2016; Kern, 2011; Thompson, 2013). Forsblom and Ala-Ruona (2012) investigated the competencies and skills of music therapists working in acute stroke care finding that music therapists adjust interventions to meet individual needs based on the therapist's observation of changes. Three critical factors to clinical reasoning and decision-making were found. These included knowledge of neurology and neuropsychology, interaction with participants, and accurate physiological and psychological participant observation.

Collectively, the current research base of music therapy applications to target mood improvement following ABI is promising, but it has been difficult to consolidate

findings and isolate efficacious interventions. Likewise, guidelines for music therapy in neurorehabilitation immediately following stroke have yet to be developed. It is therefore of interest to examine treatment effectiveness, schedule (such as dosing), and clinical decision-making (CDM) within a patient-centered, multi-intervention approach.

The purpose of this dissertation work was threefold: (1) to evaluate the effectiveness of active music therapy (AMT) treatment on mood during acute hospitalization following stroke; (2) to evaluate if two treatments of AMT are more effective than one; and, (3) to investigate the clinical decision-making process of music therapy for mood elevation acutely following stroke. This research aligns with The American Heart Association and American Stroke Association (AHA/ASA) recommendations to further examine approaches to treating and preventing PSD as well as “Improving Access and Quality: Music Therapy Research 2025” (MTR2025) recommendations to target research of music therapy with ABI and to utilize clinical expertise as a form of evidence (American Music Therapy Association, 2015a; Winstein, et al., 2016).

Specific Aims

Specific Aim 1 examines the impact of a single treatment of active music therapy (AMT) on mood for participants ($N = 44$) following a first-time acute ischemic stroke during acute hospitalization. Previous research has shown promising impacts of music therapy on mood at various stages of stroke recovery and for single-sessions of music therapy in acute medical settings. It is hypothesized that one AMT treatment during acute hospitalization following a stroke will have a positive impact on mood as measured by a change in The Faces Scale taken prior to and after AMT.

Specific Aim 2 examines the effects of two AMT treatments, as compared to one, on mood for adults following a first-time acute ischemic stroke during acute hospitalization. Previous research has revealed positive impacts of music therapy on mood following single-sessions in acute medical settings. Authors suggest further exploration of dosing effects. To examine dosing effects, participants will be stratified for analysis into two groups. Group 1 will consist of participants who receive one AMT treatment and Group 2, participants who receive two AMT treatments. Variations in group characteristics will be explored. It is hypothesized that two AMT treatments will have a greater impact on mood as compared to one as measured by change in The Faces Scale administered immediately prior to the first AMT treatment received and immediately following the last (either AMT treatment one or two depending on group).

Specific Aim 3 seeks to describe the clinical decision-making process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute stroke. Two main areas will be explored: 1) What are the components of the clinical decision making (CDM) process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute ischemic stroke?, and 2) What determines the clinician's course of action (i.e., what influences progression through the stages of the treatment process)? A challenge to determining treatment efficacy for mood elevation following ABI is the use of multiple interventions in treatment. A qualitative approach to self-study will be used to explore CDM and to increase understanding of music therapy treatment for mood improvement following stroke.

Limitations

1. The first study produced encouraging findings with a comparatively moderate sample size for medical music therapy literature. However, it was a single-arm study with a narrow cohort of older adults who were white, and receiving care in one university affiliated hospital in central Kentucky. Additionally, due to brevity of hospitalization, changes in depression and cognitive impairment are to be interpreted with extreme caution. Relatedly, no follow up measures were collected to evaluate long-term effects of AMT on mood or post-stroke depression. Lastly, while guidelines for AMT were established, ambiguity in treatment fidelity limits replicability of exact treatment processes.
2. The main limitation of the second study was the lack of randomization. Participants were not randomized by number of AMT treatments received rather, participants received one or two AMT treatments based on availability. The results indicated that participants who received two AMT treatments presented with more severe strokes and likewise longer hospitalizations. Additionally, a variance of one treatment difference between doses may not be enough to observe a dosing effect.
3. The third study was limited by the multiple roles of the principal investigator as researcher, clinician, and subject of study. Findings from this study are thus isolated to one clinician's practice despite strategies used to reduce bias.

Delimitations

1. Participants were recruited from a large university affiliated medical facility in central Kentucky. Participants were mostly older adults and all were white. Only

participants experiencing a first-time acute ischemic stroke were included. These factors should be taken into consideration before generalizing findings and when considering the impacts of geography, age, culture, and medical experiences on the application of music within a therapeutic context.

2. These studies had a single-arm. Randomization strategies were therefore not utilized. To this end, comparisons cannot be drawn between other treatment approaches or control cohorts.
3. Within each of the three studies presented, measures were taken to ensure reliability and validity of results. Each study discusses methods in detail. However, one researcher was largely responsible for data collection and analysis and treatment application.

Chapter 2: Review of Literature

This chapter provides a review of literature on the role of music therapy in post-stroke rehabilitation with a focus on music therapy for emotion modulation following stroke.

The chapter is organized by the primary research question addressed by each of the three projects: active music therapy to improve mood acutely following stroke, the impact of dosing (one and two treatments of active music therapy) on mood improvement following acute stroke, and clinical decision making for elevating mood following acute stroke. Applicable literature related to each area will be explicated.

Research Question 1: What is the Effect of Active Music Therapy Intervention on Mood Following a First-Time Acute Ischemic Stroke?

Introduction to Stroke

What is stroke? The American Heart Association and American Stroke Association (AHA/ASA) define a stroke as “a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH)” (Sacco et al., 2013, p. 2). The main categories of stroke are hemorrhagic and infarction, also known as an ischemic stroke. Stroke due to hemorrhage is a result of bleeding caused by events such as a blood vessel rupture or trauma. Hemorrhages are categorized as either subarachnoid or intracerebral (Norrving, Leys, Brainin, & Davis, 2013; Sacco et al., 2013). Hemorrhagic strokes are less common than ischemic strokes, with ischemic strokes accounting for about 87% of all strokes (AHA/ASA, 2018). Ischemic strokes are thus the focus of the presented research.

The World Health Organization (WHO) defines a cerebral ischemic stroke as an “acute focal neurological dysfunction caused by focal infarction at single or multiple sites of the brain or retina” (Norrving et al., 2013, p. 1). Infarction is cell death due to vascular disruption and can be identified through neuroimaging and through monitoring symptoms persisting for at least 24 hours (Norrving et al., 2013; Sacco et al., 2013). Disruptions are caused by obstructions within blood vessels. Types of obstructions include thrombosis and embolism. A thrombosis is a clot that develops within a vessel and blocks blood flow. An embolism is a clot that develops elsewhere and travels until it blocks a smaller vessel (Association, 2018). Damage due to an ischemic stroke is localized to a focal region based on the perfusion area of the obstructed artery (Sacco et al., 2013).

Incidence and prevalence of stroke. Stroke is the fifth leading cause of death in the U.S., with approximately 795,000 Americans experiencing a stroke each year (Benjamin et al., 2017). Globally it is the second-leading cause of death, with 6.5 million lives lost to stroke in 2013 (Benjamin et al., 2017). The risk of stroke increases with age. More than two-thirds of patients hospitalized in the U.S. for stroke are 65 years old or older (Hall, Levant, & DeFrances, 2012). From 1989–2009, the average length of hospitalization following stroke in the U.S. decreased from 10.2 days to 5.3 days (Hall et al., 2012). Stroke statistics across the globe indicate that age-standardized incidence, mortality, prevalence, and disability declined between 1990 and 2013. However, the burden of stroke continues to increase, likely due to population growth and aging (Feigin, Mensah, Norrving, Murray, & Roth, 2015).

Cost of stroke care. Despite decreases in stroke-related outcomes such as length of hospitalization and mortality, the financial burden of stroke has risen. According to the American Heart Association, cardiovascular disease and stroke accounted for 14% of total health expenditures in the U.S between 2012–2013; more than any other major diagnostic group (Benjamin et al., 2017). In 1990, the average lifetime cost for a first-time stroke was documented at \$103,576 (Taylor et al., 1996). Costs have continued to rise since then with total direct costs (not including the cost of nursing homes or accounting for loss of wages) projected to increase from \$396 billion in 2012 to \$918 billion by 2030 (Benjamin et al., 2017). The majority of stroke-related costs include short-term, in-hospital care and early critical care. This is followed by additional costs of long-term care and indirect expenditures, such as nursing home care, ambulatory care, and lost earnings (Demaerschalk, Hwang, & Leung, 2010). Effective preventive therapy, early critical care, and acute rehabilitation are key elements in reducing the cost burden of stroke in the U.S.

Rehabilitation

Guidelines and principles of stroke rehabilitation. Surviving a stroke can result in impairments in cognition, communication skills, sensorimotor, physical, and psychosocial functioning, making rehabilitation a key component of post-stroke care. Early, interprofessional, and well-coordinated rehabilitation is recommended as the gold standard for providing comprehensive care following a stroke (Winstein et al., 2016). Langhorne et al. (2011) define stroke rehabilitation as “stroke-care interventions, which are selected after a problem-solving process that aims to reduce the disability and handicap resulting from a stroke” (p. 1695). Stroke rehabilitation seeks to promote

functional recovery and support progress towards independence (Winstein et al., 2016). The rehabilitation process is considered cyclical, involving assessment, treatment, and reevaluation of impairments and gains (Langhorne et al., 2011). Stroke rehabilitation within the United States is broad and varies greatly. Variations are seen in care setting, duration, type, intensity of intervention, and the degree to which multiple professionals are involved (Winstein et al., 2016). Despite variations, there are several overarching principles widely accepted across stroke rehabilitation. Principles of stroke rehabilitation include, but are not limited to, a coordinated interprofessional approach, early initiation of treatment, maximizing on principles of neuroplasticity, and addressing the psychological needs of patients and families, such as post-stroke depression.

Interprofessional approach. The interprofessional care team is defined as “a team of medical, nursing, therapy, and social-work staff who provide rehabilitation input and coordinate their work with regular meetings” (Langhorne et al., 2011, p. 1696). The AHA/ASA posits that a well-coordinated interprofessional team is essential in producing effective outcomes when treating stroke (Winstein et al., 2016). Researchers also argue that informal caregivers (e.g., spouses) are central team members in the rehabilitation process (Miller et al., 2010). Biopsychosocial models, which are considered “fundamental to effective patient-centered intervention” (Lincoln et al., 2012, p. 236), are integrated as a unifying theoretical framework in order for rehabilitation to be coordinated across professions and caregivers. The World Health Organization developed one such model, called the International Classification of Functioning (ICF). The ICF has been shown to aid in the communication and structure of service provision,

thus serving as a biopsychosocial scaffold for teams to communicate team roles, clarify said roles, aid in clinical reasoning, and monitor outcomes (Tempest & McIntyre, 2006).

Early intervention. Early initiation of therapy is a second hallmark of stroke rehabilitation. Scholars argue that much of the recovery process occurs in the first three months post-stroke (Cramer & Seitz, 2009; Wieloch & Nikolich, 2006). Furthermore, early persistent change in functioning is more likely to be permanent (Hallett, 2005). In the United States, the average length of acute hospitalization following an acute ischemic stroke is documented at four days (Winstein et al., 2016). The primary goal of acute hospitalization following stroke is stabilization; however, initiation of therapy services such as physical therapy, occupational therapy, and speech therapy is encouraged pending the patient can tolerate it (Miller et al., 2010). In general, the earlier the initiation of therapies the better (Winstein et al., 2016). Following hospitalization, the purpose of post-acute care is to aid in the transition from hospital to home and assist patients in “achieving the highest level of functioning possible” (Winstein et al., 2016, p. e101). Achieving high levels of functioning is driven by maximizing on neuroplasticity, or the brain’s capacity to change and adapt to the environment beginning with early initiation of rehabilitation (Eriksen et al., 2016)

Neuroplasticity. Neuroplasticity, the brain’s aptitude to change, is the basis for learning and relearning. Principles of neuroplasticity, specifically the activation of neural processes through experience-dependent learning, play an important role in functional stroke rehabilitation. Experience-dependent learning is learning specific to the task someone is engaged with (Wieloch & Nikolich, 2006). Researchers observe neuroplasticity through neuroanatomical changes in dendrites, axons, spine density,

synapses, and receptors (Pekna, Pekny, & Nilsson, 2012; Wei et al., 2015). These neuroanatomical changes are aided by dopaminergic, serotonergic, noradrenergic, and cholinergic neurotransmitter systems. Neurotransmitters facilitate neuromodulation and work alongside experience-dependent learning to support neuroanatomical growth (Wieloch & Nikolich, 2006). Because effects of intervention decline over time, early initiation of treatment within the first 30 days following stroke is valuable in order to promote neuroplasticity through experience-dependent (re)learning.

One of the most recognized principles of neuroplasticity is the Hebbian principle, which refers to the neural changes as a result of nearby neurons repeatedly impacting the firing of each other (Hebb, 1949). In other words, neural networks are created and strengthened based on the repetition and synchronization of neuron activation (Stegemoller, 2014). Thus, neuroplasticity is driven by behavioral, sensory, and cognitive experiences such as those that would be provided during physical, occupational, speech, and music therapy. Kleim and Jones (2008) identified 10 principles of experience-dependent neuroplasticity that can be useful to rehabilitation following brain damage. Examples of principles highlighted by Kleim and Jones (2008) included (a) use it or lose it, (b) use it and improve it, and (c) salience matters. The goal of applying these principles is to optimize rehabilitation efforts and functional recovery (Kleim & Jones, 2008).

Enriched environments are one way to maximize on behavioral experiences to enhance neuroplasticity following stroke. Enriched environments are characterized by the purposeful and intentional presence of physical, social, and sensory stimuli (Yang, Lu, Zhou, & Tang, 2012). In rat studies, an “enriched environment typically consists of

a larger living space, a variety of ‘toys’ to interact with, running wheels, and can include a number of other novel environmental changes” (Slater & Cao, 2015, p. 1). Results from animal models have parallel findings in human studies. For example, Janssen et al. (2014) found that following stroke, patients exposed to an enriched environment for two weeks were more likely to engage in activity during rehabilitation and were less likely to be inactive or alone or to sleep during waking hours. Music therapy has been identified as one option for creating an enriched environment in stroke rehabilitation, particularly in regard to cognitive recovery (Winstein et al., 2016).

Psychological functioning. According to stroke survivors, psychological concerns are related to time at home and avoiding major adverse cardiovascular events (Xian et al., 2015). A qualitative study investigating patients presenting with psychological distress within the first year following stroke found several underlying themes, including fear of subsequent stroke, loss of self, a sense of isolation and aloneness (which can be related to being away from home), and a lack of acceptance and self-compassion (Crowe et al., 2016). Similar themes arose when interviewing people who experienced depression during the acute phase of recovery, the symptoms of which included feeling trapped and losing one’s sense of self (Kouwenhoven et al., 2012). Through semi-structured interviews, White et al. (2012) found that mood disturbances could be mitigated by improvements in independence, self-esteem, and an internal locus of control in terms of personal health.

In light of findings such as the above, the AHA/ASA recognizes that the psychological impacts of experiencing a stroke are “real and warrant assessment and treatment as early as possible and on an ongoing basis” (Winstein et al., 2016, p. e111).

Psychological difficulties following stroke can include depression, anxiety, emotional lability, anger, apathy, and coping and adjustment challenges (Lincoln et al., 2012). Eriksen et al. (2016), argue that psychological support beginning in the acute phase can impact psychological and physical outcomes long-term. Furthermore, emotional functioning is included in the World Health Organization's ICF core set for stroke under the category of body function (Geyh et al., 2004). This suggests that early initiation of intervention to address psychological functioning is just as critical as intervention for physical and other target areas of functioning.

Recommendations for PSD and other psychological disorders include routine evaluation, stroke education, counseling, opportunities to talk about the impact of the illness, social support, exercise, medication, and early treatment (Winstein et al., 2016). Specific to PSD, the impact of pharmacological or non-pharmacological treatment is unclear, though a combination of both may be considered (Winstein et al., 2016). Motivation and engagement of patients and caregivers is increasingly viewed as being associated with good rehabilitation outcomes and linked to individualized goal-setting (Langhorne et al., 2011). This is supported by research demonstrating positive results on psychosocial outcomes with nonpharmacological strategies such as motivational interviewing (Watkins et al., 2007). Authors also posited the effectiveness of music therapy to decreased distress following stroke (Lincoln et al., 2012). Taken together, literature highlights the need to identify effective treatment avenues that allow for the processing of psychological aspects of the stroke experience and integrate individualized goal setting.

The AHA/ASA offers an extensive set of guidelines for post-stroke care with references to the level of evidence-based interventions and recommendations for each area addressed in stroke rehabilitation including sensorimotor, communication, cognition, and psychosocial (Winstein et al., 2016). Music therapy is one of several nonpharmacological approaches gaining recognition in stroke rehabilitation literature for its ability to enhance recovery (Langhorne et al., 2011). Music therapy and music-based interventions (e.g., rhythmic auditory stimulation) are referenced in the AHA/ASA guidelines under enriched environments, implications for cognitive recovery, and gait training (Winstein et al., 2016). Furthermore, in *Psychological Management of Stroke*, music therapy is listed as an avenue to prevent psychological distress following stroke (Lincoln et al., 2012).

Music therapy in post-stroke rehabilitation. Music therapy is an allied health profession defined by the American Music Therapy Association (2019) as “the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program” (para. 1). The training of music therapists involves completion of a four-year bachelor’s degree or its equivalent from an approved academic institution. In addition to general education, music therapy coursework covers musical foundations such as music theory, arranging, and performance skills; clinical foundations including principles of therapy and the therapeutic relationship; and music therapy, which includes but is not limited to assessment, evaluation, methods, techniques, and the influence of music on behavior (American Music Therapy Association, 2018). Additionally, students must complete a minimum of 1200 hours of clinical training. At least 75% of clinical

supervision hours must be fulfilled during an internship following completion of coursework (American Music Therapy Association, 2018). Masters and doctoral degrees are offered in music therapy; however, a student completing coursework and clinical training at the bachelor's level is eligible to sit for the board certification exam. The Certification Board for Music Therapists (CBMT) is the certifying organization for music therapists. CBMT is accredited by the National Commission for Certifying Agencies and also offers overseas credentialing and five-year cycles of recertification. Once an individual passes the certification exam, they become board certified and carry the designation of Music Therapist Board Certified (MT-BC). There are currently approximately 8,107 MT-BCs globally (The Certification Board for Music Therapists, 2019).

Music therapists utilize music-based interventions to address social, emotional cognitive, sensory, physical, communicative, spiritual, and wellness goals (Kern & Tague, 2017; The Certification Board for Music Therapists, 2019). A few examples of specific music therapy objectives include decreasing pain, decreasing anxiety and depression, increasing coping skills, and self-express. Globally, addressing emotional skills is the second most reported goal area (76.2%) preceded only by communication skills (79.2%) and followed by social skills (64.8%) (Kern & Tague, 2017). In stroke rehabilitation, music therapists address functional goals in the areas of cognition, speech, physical abilities, and behavior (Ard & Wheeler, 2016). Following stroke, some of the more common objectives music therapists address include improving cognitive functioning (e.g., memory, attention, and executive functioning); increasing physical functioning such as strengthening of the paretic (weak) side and gait training; improving

communication; and improving psychological functioning (Thaut & Hoemberg, 2014). In fact, authors have suggested that music therapy may be an option for preventing psychological distress following stroke (Lincoln et al., 2012).

Approaches. In neurologic rehabilitation, there are two broad approaches to music therapy: rational and rehabilitative (Raglio et al., 2015). Rational approaches use psychologically based models that emphasize the interaction of the participant and therapist, whereas rehabilitative approaches use neuroscientific models in which music stimuli are utilized to drive corresponding neural activation (Raglio et al., 2015). The Neurologic Music Therapy (NMT) approach was specifically developed to define the intentional use of music as a stimulus of cognitive, affective, sensory, language, and motor functioning (Thaut & Hoemberg, 2014). The NMT approach has aided in advancing music therapy research of motor and communication outcomes following brain injury. However, generalizing findings and recommending specific applications to mood improvement has been challenging due to limited and diverse research protocols (Magee et al., 2017).

A recent publication by Moore and LaGasse (2018) discussed opportunities to enhance participant outcomes by exploring how principles of the humanistic approach can be integrated into neuroscience-informed approaches. An overarching concept relates to the engagement and motivation of the participant through consideration of human elements (as opposed to isolation of music driving neural processes), such as music preference and personal goals for health and wellness (Moore & LaGasse, 2018). This is echoed in a review by Sihvonen et al. (2017), which calls for the consideration of

the therapeutic relationship and the impact of patient-selected music on activation of reward, arousal, affect regulation, learning, and experience-driven plasticity.

Regardless of approach, one of the factor that drives therapeutic outcomes is the interactive relationship between the participant and music therapist. Authors posit that, “in order to achieve the clinical goals, there is a systematic therapeutic relationship established with the patient first, which includes assessment, treatment and evaluation” (Forsblom & Ala-Ruona, 2012, p. 9). In fact, when music therapists were interviewed to identify key competencies for working in acute stroke care, the interactive relationship was considered a critical factor (Forsblom & Ala-Ruona, 2012). Tomaino (1999), known for her work in neurorehabilitation, similarly stated that music does not function without knowing how and when to apply it based on idiosyncratic patient-centered care.

Within approaches, music therapists use an array of music-based interventions to facilitate progress towards outcomes. Broadly, music-based interventions can be receptive or active. Interventions can range from having a participant passively receive music (e.g., using music as a stimulus for comatose patients) to participants actively making music (e.g., playing a percussion instrument, such as a tambourine or hand drum), as is the case when a music therapist facilitates group music making for self-expression or to reduce stress. Common interventions used by music therapists in a variety of clinical and wellness settings include music listening, song writing, lyric analysis, improvisation, and active music making, such as singing or instrument play. While all interventions have some basis in music, music therapy delivered by a board-certified music therapist is a therapeutic process.

The therapeutic process includes referral, assessment, treatment planning, implementation, documentation, and termination (American Music Therapy Association, 2015b). Music therapy also involves the fluctuation between music-based and therapy-based strategies. As described by Silverman (2015), “music and therapy are distinct but interdependent. Music therapy cannot exist without music; nor can it exist without therapy” (p. 75). In other words, interventions like lyric analysis may involve a large amount of verbal processing as the music therapist and participant engage in discussion and exploration of lyrics. Music listening at times consists mostly of the music therapist continuously playing music; however, the music therapist still shapes the music experience to drive therapeutic outcomes, with the music functioning as the main catalyst for change in this example.

Current evidence base. Research in music-based neurologic rehabilitation is growing, with the largest body of evidence being for the efficacy of music therapy in treating stroke and dementia (Sihvonen et al., 2017). Researchers have specifically explored the impact of music therapy on cognition, speech, physical abilities, behavior, mood, and unilateral neglect among individuals who have suffered a stroke (Ard & Wheeler, 2016). A recent Cochrane review of music therapy for acquired brain injury found evidence for the application of rhythmic auditory stimulation to improve gait parameters following stroke (Magee et al., 2017). Other significant highlights from the review included the use of music-based interventions to improve upper extremity functioning after stroke, communication for people with aphasia following stroke, and overall quality of life. Factors contributing to positive outcomes included the use of a strong beat *with* music as opposed to a beat *without* music and the recommendation that

music-based intervention be delivered by a trained music therapist (Magee et al., 2017). In addition to the common target areas of communication and motor function in neurorehabilitation, scholars have also posit that music-based interventions can reduce psychological distress (Lincoln et al., 2012; Raglio et al., 2015).

Music therapy interventions used to address post-stroke dysfunction are numerous. They range from specific melody-based protocols for eliciting speech from patients with non-fluent aphasia, to any combination of passive and active interventions. Ard and Wheeler (2016) conducted an integrative review of music therapy in stroke rehabilitation and found many different interventions depending on the specific goal of rehabilitation. For example, interventions that include singing of familiar songs or use of rhythmic speech cues can address speech impairments, whereas playing instruments and rhythmic auditory stimulation can target physical impairments (Ard & Wheeler, 2016). However, the authors did not report details of mood-specific interventions, possibly since interventions and research addressing mood have proven difficult to consolidate and generalize due to the variety of interventions used (Ard & Wheeler, 2016; Magee et al., 2017; Rushing et al., 2015).

Forsblom and Ala-Ruona (2012) found that music therapy interventions in acute stroke care are adjusted to meet individual needs and are idiosyncratic based on the therapist's observation of changes. For example, if a clinician observed that a participant was becoming agitated they may increase the volume, tempo, or harmonic complexity of the music to match the participant's level of agitation or remove an element of the music, such as lyrics to reduce the amount of stimuli potentially causing agitation. Raglio et al. (2015) identified nine music-based studies that specifically addressed mood

following stroke, All music therapy interventions had a positive effect on mood. Furthermore, interventions often included a combination of approaches, which again illustrates how customized therapy is and underscores the challenge of treatment specificity. Rushing et al. (2015) conducted a systematic review of trials investigating the effects of active music therapy interventions following acquired brain injury to improve mood. Findings demonstrated moderate and large effects on mood constructs with multiple interventions being delivered in one session. For example, Nayak, Wheeler, Shiflett, and Agostinelli (2000), conducted group and individual music therapy sessions across the duration of inpatient neurorehabilitation to improve mood and socialization. The researchers used “a variety of music therapy procedures...based on the needs of the group” (Nayak et al., 2000, p. 277). Procedures included an opening song or activity, instrumental improvisation, singing, music composition, instrument play, music performing, lyric substitution, and music listening (all using live music).

Taken together, the current research base for music therapy applications in neurorehabilitation is promising. Literature specific to targeting mood improvement in neurorehabilitation is emerging, but it has been difficult to consolidate findings and isolate efficacious interventions. Furthermore, guidelines for music therapy in neurorehabilitation immediately following stroke have yet to be developed.

Post-Stroke Depression (PSD)

Emotion regulation following stroke. Depression is linked to difficulties with emotion regulation (Rive et al., 2013). Emotion regulation refers to, “our efforts to influence emotions in ways we think will increase the chance that they will be helpful rather than harmful” (Gross, 2015). In other words, the dysregulation of emotions can

lead to mood disorders such as depression (Hofmann, Sawyer, Fang, & Asnaani, 2012). Depression can be triggered by an event such as having a stroke (Hofmann et al., 2012). Stroke survivors have been found to have significant difficulties with emotion regulation, particularly in the areas of awareness of emotions, impulse control when experiencing negative emotions, and utilizing strategies perceived as effective in regulating emotions (Cooper, Phillips, Johnston, Whyte, & MacLeod, 2015). Difficulties with emotion regulation following stroke at both the acute and chronic phases are predictive of decreased social participation (Cooper et al., 2015). Researchers posit that difficulties with emotion regulation following stroke are immediate, persistent, and present as a barrier to participation (Cooper et al., 2015).

Combating emotional dysfunction is a goal-directed, active process aimed at decreasing negative emotions and increasing positive emotions through strategies such as cognitive reappraisal (Hofmann et al., 2012; John & Gross, 2004). In other words, combating emotional dysfunction requires helping patients change the way they think about a situation. In the context of health, it is essential to use strategies to regulate emotions that are health-promoting (Denollet, Nyklíček, & Vingerhoets, 2008; Gross, 2015). Stroke survivors present with difficulties in awareness of emotions, impulse control when experiencing negative emotions, and utilizing strategies to cope with emotions. Consequently, these could be target areas for intervention and explored during the earliest stages of stroke recovery prior to the onset of PSD.

Depression following stroke is “characterized by low mood, loss of interest and pleasure in activity, changes in appetite and sleep, suicidal ideas or morbid thoughts, feelings of guilt or worthlessness, decreased energy, and difficulties in thinking and

concentration” (Lincoln et al., 2012, p. 283). PSD affects one-third of stroke survivors (Hackett et al., 2005; Towfighi et al., 2017). The acute phase of stroke recovery may be a key factor in influencing depression trajectory with early depression predicting poor longitudinal outcomes (Eriksen et al., 2016; Kouwenhoven et al., 2011; Townend et al., 2007). PSD has been recognized in 40.9% of survivors within the first 7–10 days following stroke (Willey et al., 2010). Additionally, depressed mood in the first week following stroke has shown to increase the likelihood of disability throughout the first year (Willey et al., 2010). It is therefore recommended that psychosocial support begin in the acute phase of stroke recovery (Eriksen et al., 2016).

The main approach to treating PSD is pharmacological intervention (Paolucci, 2008). However, psychotherapeutic approaches (as compared to non-pharmacological controls) have demonstrated the ability to prevent PSD And result in fewer reported adverse events (Hackett et al., 2008). In contrast, pharmacological therapy has not proven effective in preventing PSD (Hackett et al., 2008). Effective psychotherapy has involved talk-based interventions such as motivational interviewing and problem-solving (Hackett et al., 2008). During treatments, participants often explore thoughts and resultant behaviors to promote problem-solving and facilitate motivation. These types of interventions may be particularly effective as problem-solving and reappraisal strategies to improve emotional regulation (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Risk factors and long-term outcomes. Addressing PSD is important as higher levels of depression and depressive symptoms are associated with a less efficient use of rehabilitation services and poor functional outcomes (Gillen et al., 2001; Kutlubaev & Hackett, 2014; Towfighi et al., 2017). In addition, higher depression and greater

depressive symptoms increase the risk of hospital readmission (Ottenbacher et al., 2012) and mortality (Kouwenhoven et al., 2011; Townend et al., 2007). Lastly, PSD results in activity limitations and participation restrictions due to poor outcomes with a growing concern for the impact of PSD on social participation (Cooper et al., 2015) and caregiver burden (Rigby, Gubitz, & Phillips, 2009).

A recent review identified predictors of PSD to be pre-stroke depression, stroke severity, and physical deficit in acute and later phases of stroke recovery (Kutlubaev & Hackett, 2014). According to the authors, age, gender, lesion location, hemisphere, and pathological subtypes were not found to be consistently associated with PSD (Kutlubaev & Hackett, 2014). Additionally, findings did not indicate a clear association between depression and cognitive impairment (Kutlubaev & Hackett, 2014). Depression was consistently associated with poor functional outcomes (Kutlubaev & Hackett, 2014).

Recent systematic reviews and meta-analyses have investigated associations between PSD and lesion side, type of stroke, location, and subgroups of stroke phases (Douven et al., 2017; Wei et al., 2015; Y. Zhang, Zhao, Fang, Wang, & Zhou, 2017). When looking at stroke phase, left-sided stroke demonstrated 26% higher odds of PSD in the acute phase and the post-acute phase (1–6 months) (Douven et al., 2017). In contrast, PSD was found to be significantly associated with right hemisphere stroke, but not left, during the post-acute phase (Wei et al., 2015). One group found females to be more susceptible to PSD during both acute and post-acute phases (Zhang et al., 2017). Frontal strokes were found to have 54% higher odds of PSD with significance only found in the post-acute phase (Douven et al., 2017). Overall, basal ganglia lesions were significantly associated with PSD. However, when stratified by phase, significance

remained for only the post-acute phase (Douven et al., 2017). When stratified by phase, hemorrhagic strokes had higher odds of PSD during the acute phase, and ischemic strokes had higher odds of PSD during the post-acute phase (Douven et al., 2017). One group of researchers looked at degree centrality to evaluate connections within brain networks based on three lesion sites: frontal, temporal, and parietal compared to healthy controls (Shi et al., 2017). Overall, findings indicated similar brain responses for all three lesion locations (Shi et al., 2017).

The monoamine hypothesis is a leading biological theory of an underlying cause of PSD (Loubinoux et al., 2012). This theory describes the interruption of the projection of neurotransmitter monoamines, such as serotonin and dopamine, due to the ischemic lesion. Loubinoux et al. (2012) reviewed animal studies and concluded that stroke lesions interrupt serotonergic, acetylcholinergic, dopaminergic, and noradrenergic pathways from the brainstem to cerebral cortex in areas such as the frontal and temporal lobes and basal ganglia. Disruption of monoamine innervation of the limbic system could contribute to PSD (Loubinoux et al., 2012). Thus, there is support for antidepressant pharmacological therapy to treat PSD.

In summary, though findings vary, associations have been found between PSD and the following variables: left-side lesions (Douven et al., 2017; Zhang et al., 2017), females (Zhang et al., 2017), and frontal and basal ganglia lesions (Douven et al., 2017). Depression is consistently associated with poor functional outcomes, pre-stroke depression, and stroke and physical deficit severity (Kutlubaevev & Hackett, 2014). To these ends, guidelines suggest combinations of pharmacological and non-

pharmacological therapies to prevent risk of PTSD and treat the impact of PTSD (Winstein et al., 2016).

Mechanisms of Music and Emotion Regulation

To understand why music can be used therapeutically, it is important to identify the mechanisms working during musical interactions. Until recently, the underlying neural mechanisms and processes were not well understood (Koelsch, 2009). However, over the past few decades, imaging studies and expert reviews have contributed to our understanding of how neural responses to music can translate into music therapy treatments and address emotional dysfunction (Moore, 2016; O'Kelly, 2016).

Music processing and neural correlates with emotion regulation. The evolution of imaging and increasing interest in the cognitive neuroscience of music has resulted in a vast body of literature related to music processing. At the most basic level, auditory information is received via the ear then transmitted along two primary pathways. The first is the auditory pathway, which passes information from the cochlea to the auditory cortex. The second is the reticular sensory pathway, which includes projections through the thalamus to cortex areas involved in consciousness and perception, limbic areas implicating emotion and motivation, and the hypothalamus impacting hormones and autonomic responses. See Figure 2.1 for an illustration of pathways and behavioral implications of auditory processing (Pujol & Irving, 2016).

Music is a complex form of auditory information. Music processing begins initially in the brainstem where identification of basic features such as frequency, duration, and loudness are encoded (Sarkamo, Tervaniemi, & Huotilainen, 2013). As musical information moves past the brainstem, many cortical and subcortical structures

are engaged. According to Levitin (2006) and Levitin and Tirovolas (2009), core brain regions associated with music perception include the prefrontal, motor, sensory, auditory, and visual cortexes: the corpus callosum, the hippocampus, the nucleus accumbens, the cerebellum, and the amygdala. For an overview of music processing laterality and associated structures based on music elements, such as pitch, rhythm, and timbre, see Levitin and Tirovolas (2009). Beyond the brain stem's processing of basic music elements, the cognition and perception of music involves multiple complex processes resulting in widespread neural activation. Sarkamo et al. (2013) identified five such processes derived from neuroimaging studies of healthy subjects and associated key brain areas. The areas and key processes identified can be seen in Figure 2.2. To these ends, music processing has been found to increase brain matter, activate language regions, activate emotion centers, and involve hemispheric specialization based on music elements (Limb, 2006).

One of the most salient processes of music cognition and perception is its impact on emotion centers in the brain. Koelsch (2009) found that “music can modulate activity in all major limbic and paralimbic brain structures, that is, structures critically involved in the initiation, generation, maintenance, termination and modulation of emotions” (p. 375). Initial observation of possible overlaps between music and emotion began when studies started demonstrating that music listening elicited chills, thrills, and shivers (Blood & Zatorre, 2001; Goldstein, 1980; Sloboda, 1991). In a hallmark study, Blood and Zatorre (2001) used positron emission tomography to study participant responses to self-selected, highly pleasurable music. Findings illustrated increases and decreases in cerebral blood flow (CBF) patterns similar to those involved in reward and motivation,

emotion, and arousal. Of note was the finding that the same patterns of activation were not seen when subjects listened to control music (i.e., music that was not their own selection) (Blood & Zatorre, 2001). In other words, listening to preferred music decreases activity in core emotion processing structures and increases activity in pleasure and reward and motivation centers (Koelsch, 2009). In addition, CBF changes during pleasant music listening have accompanied positive changes in heart rate, electromyogram, and respiration, indicating the interaction of subjective and autonomic responses to music-elicited emotion (Blood & Zatorre, 2001). The combination of autonomic and subjective responses has also been demonstrated by observed connectivity between the hypothalamus (autonomic nervous system) and nucleus accumbens (reward pathway) during music listening (Menon & Levitin, 2005).

Emotional responses to music are linked to the mesolimbic network, also known as the reward network. This network is responsible for the release of the neurotransmitter dopamine, a key component in reward, learning, and long-term potentiation (strengthening of learned neural-firing patterns) (Sarkamo et al., 2013; Stegemoller, 2014). Connectivity between the mesolimbic areas of the nucleus accumbens and ventral tegmental area have indicated an association between dopamine release and music listening (Menon & Levitin, 2005). It is theorized that maximizing activation of the reward system in tandem with potentially less pleasurable experiences, such as rehabilitation, can improve health outcomes (Stegemoller, 2017).

Emotion regulation involves the use of goal-directed strategies to influence emotions as a means of increasing the likelihood they will have a positive impact on health and well-being (Denollet et al., 2008; Gross, 2015). This is in contrast to the

elicitation of emotion or modulation of emotion that can occur without explicit effort or volitional intent. For example, if a person is walking through a store and hears a song that was played at her mother's funeral, or conversely at her wedding, emotions may be elicited even though she did not actively seek out the modulation of her current emotions. Similarly, a music therapist could use interventions to elevate a participant's mood without the participant overtly selecting that mood elevation is the target outcome. Researchers have identified key structures involved in the overlap of music processing and possible implications for emotion regulation. A vast network of cortical and subcortical correlates characterize the overlap of emotion regulation and music (Hou et al., 2017). Core overlapping cortical regions of emotion regulation and music include the anterior cingulate cortex (ACC), the orbitofrontal cortex (OFC), and prefrontal cortex (PFC). Subcortical regions include the amygdala, hippocampus, and nucleus accumbens (NAcc), which are part of the ventral striatum (Hou et al., 2017).

Moore (2013) systematically reviewed the overlap of neural structures implicated in music and emotion regulation for typically developing humans providing "preliminary guidelines for how to use music to facilitate emotion regulation" (p. 199). Neural structures for review included the amygdala, ACC, OFC, and lateral PFC (Moore, 2013). Findings demonstrated that certain musical characteristics and experiences can result in producing desired neural activation patterns implicated in emotion regulation. Desired activation patterns include the increased activation of cognitive control and monitoring areas (PFC, OFC, and ACC) and the decreased activation of the amygdala (Moore, 2013). More research is needed for the clinical application of music for emotion regulation.

In light of the overlap between music processing and brain structures involved in emotion modulating neural structures, music therapy treatment is increasingly considered by the scientific community to have an important role in rehabilitation (Hillecke, Nickel, & Bolay, 2005; Koelsch, 2009; Stegemoller, 2014). In fact, emotion modulation is considered one of five key components in developing a scientific perspective on music therapy (Hillecke et al., 2005; Koelsch, 2009). Music therapists use these theories as guides when planning and identifying the therapeutic function of the music elements they elect to use in treatment. One common application of music's ability to modulation emotion used by music therapists in neurorehabilitation settings is the strategic pairing of music-based experiences with non-music activities to increase motivation for rehabilitation (Stegemoller, 2014; Thaut & Hoemberg, 2014). In other words, the processing of and interaction with music can immediately impact processes involved in emotion, and subsequently, cognition and behaviors required for rehabilitation.

Music Therapy and Emotion Regulation Post-Stroke

Evidence of music therapy and emotion regulation. The impact of music therapy on emotion regulation is an emerging area of investigation. The literature highlights the effects that music listening and music making may have on brain structures linked to emotion regulation and their potential impacts on neuroplasticity (Raglio et al., 2015; Schlaug, 2015; Sihvonen et al., 2017). Given the overlapping neural networks, engagement with music suggests the potential for health benefits, notably for disorders related to emotion dysfunction like depression (Koelsch, 2009, 2012). Similarly, scholars advocate for the role of music in neurologic rehabilitation (Schlaug,

2015; Stegemoller, 2014). Stegemoller (2014) described the unique abilities of a music therapist to impact the dopaminergic reward system during rehabilitation. Stegemoller (2014) theorized that the enjoyment derived from music engagement facilitated by a music therapist can aid in neural synchrony. Schlaug (2015) elaborated on this theory by positing that the multisensory and auditory-motor coupling experience of music making aids in the learning and relearning required for successful rehabilitation.

The connection between music processing and the mesolimbic pathway involved in activation of reward, arousal, and emotion networks is of great importance to PSD and rehabilitation (Raglio, 2015; Sihvonen et al., 2017). Though limited, research into this network and others has begun to include subjects with acquired neurological conditions, and studies including persons with stroke are a leading area of investigation (Sihvonen et al., 2017). Neural pathways unaffected by a stroke can be accessed through music interactions and damaged regions can be strengthened through those same interactions (Sihvonen et al., 2017). For example, Sarkamo et al. (2014) found increases in grey matter volume in limbic structures including the ventral striatum (associated with pleasure and reward respectively) and the cingulate gyrus (associated with emotion processing) for patients who experienced a middle cerebral artery stroke following two months of music listening.

Music therapy interventions for emotion regulation in hospitalized adult populations are yet to be developed; however, there is support for the use of music therapy in neurologic populations to improve mood and reduce depression. Research suggests that music therapy can improve depressive symptoms, anxiety levels, and global functioning (Aalbers et al., 2017). Research also suggests that music therapy for

mood and emotion outcomes following acquired brain injury shows promising results; however, the evidence is insufficient to draw conclusions as to efficacy (Magee et al., 2017). Examples of challenges include the use of different instruments used to measure mood and depression and incomplete results and intervention reporting (Magee et al., 2017). Though evidence has proven difficult to pool, several reviews of music therapy intervention on mood constructs following acquired brain injury support continued investigation and development of more robust research designs to deconstruct the interventions (Ard & Wheeler, 2016; Raglio et al., 2015; Rushing et al., 2015; Sihvonen et al., 2017).

Treatment of mood modulation post stroke. Moore (2013) reviewed the research on music and overlapping neural structures implicated in emotion regulation for healthy participants. Specific music elements found to activate undesired neural patterns (amygdala activation) include increased complexity of music, musical dissonance, and unexpected musical events. Listening to preferred and familiar music, singing, and improvisation were found to activate desired neural patterns (amygdala deactivation) implicated in emotion regulation (Moore, 2013). Findings suggest that the use of preferred, familiar music and active participation such as singing or music making may impact parallel neural processes driving emotion regulation positively.

Many music therapy studies investigating mood constructs following stroke have been conducted following discharge from the hospital. Patient preferred live music (PPLM) (a patient selected song or type of song played live by a music therapist) is one common intervention that has been shown to elevate mood during acute hospitalization and aligns with recommended music elements for emotion regulation (Silverman et al.,

2016). However, PPLM has been investigated primarily in transplant and oncology units (Silverman et al., 2016). Though not immediately following stroke, two clinical trials of music-based interventions have shown promise in improving mood outcomes beginning approximately two weeks post-stroke (Jun et al., 2012; Sarkamo et al., 2008).

Interventions included daily listening to recorded preferred music (Sarkamo et al., 2008) and a music movement program (Jun et al., 2012). These two trials are described below.

Sarkamo et al. (2008) examined the effects of daily preferred music listening during the first two months following stroke compared to audio book listening and a control group. Results demonstrated a decrease in depression and confusion, as well as increased grey matter correlated with a reduction of negative mood after two months of listening (other cognitive benefits were also found). Qualitative findings from the same cohort indicated that stroke survivors report using music as an emotion modulating and regulating strategy (Forsblom, Laitinen, Sarkamo, & Tervaniemi, 2009). For example, “when I put the music on, I don’t have to think about this stroke or other sad things all the time,” or “with the help of music I can do the dishes and other work in my household. Without music, I would have just sat down feeling miserable” (Forsblom et al., 2009, p. 427). Beginning within two weeks post stroke onset, Jun et al. (2012) found that participating in a music movement group for one hour, three times per week, for eight weeks produced significant improvements in mood in addition to physical gains. The movement and music group included stretching to music, moving to music, playing instruments, and expressing feelings (Jun et al., 2012). Similar trials in acute and post-acute longer term ABI care have shown moderate to large effect sizes resulting from a variety of interventions and a combination of interventions (Rushing et al., 2015).

In addition to treatment information derived from quantitative trials, Forsblom and Ala-Ruona (2012) investigated the professional competencies of music therapists working in post-stroke rehabilitation. Researchers conducted interviews with six music therapists who were part of two different intervention projects in Finland. Three “critical factors” were identified as essential competencies and working skills of music therapists in acute stroke care. Factors included a neurologic and music therapy knowledge base of stroke care, clinician-patient interactions, and accurate observation of patient physiological and psychological functioning across treatment. These factors will be explored in a later section but highlight the complexity of music therapy treatment implementation.

Conclusions

The addition of music therapy to neurorehabilitation is increasing as evidenced by advances in the neuroscientific understanding of music processing, inclusion in stroke-specific guidelines, and identification of music therapy as an option to reduce psychological distress following stroke therapy (Lincoln et al., 2012; Sarkamo et al., 2013; Winstein et al., 2016). A common area targeted by music therapists in neurorehabilitation is mood. Baker and Tamplin (2006) argue that much of music therapy involves working with participants on an emotional level and particularly with those participants who demonstrate low motivation and poor engagement in rehabilitation. Though the body of evidence related to the efficacy of music therapy is evolving, clear evidence for improving mood following stroke is lacking. More specifically, there is no evidence on how best to address mood during acute hospitalization following stroke. Additionally, the heterogeneity of study designs and

outcome measures and the limited details of intervention reporting restrict generalizability (Ard & Wheeler, 2016; Magee et al., 2017). A challenge to responding to these gaps is the highly individualized approach to music therapy intervention within neuropsychological rehabilitation (Lincoln et al., 2012).

Guidelines for stroke neurorehabilitation, neural underpinnings of music and emotion, and results of clinical trials suggest the main considerations for music therapy during acute post-stroke care targeting mood should include:

- Implementation during early stroke care (Eriksen et al., 2016; Jun et al., 2012; Sarkamo et al., 2008; Winstein et al., 2016).
- The use of familiar and preferred music (Moore, 2013; Sarkamo et al., 2008; Silverman et al., 2016).
- Facilitation of music-based interventions by a trained music therapist (Dileo, 2006; Magee et al., 2017; Moore, 2013; Silverman et al., 2016).
- The use of a variety of interventions such as singing and creating music (Magee et al., 2017; Moore, 2013; Raglio et al., 2015; Rushing et al., 2015).

Research Question 2: What is the Effect of Two Active Music Therapy Treatments on Elevating Mood Following a First-Time Acute Ischemic Stroke?

Dosing and Music Therapy

Dose-response for music therapy treatment is consistently suggested as an area of study to determine if stronger treatment effects can be achieved with continued intervention (Fredenburg & Silverman, 2014a; Gold, Solli, Kruger, & Lie, 2009; Magee & Davidson, 2002; Silverman, 2015; Wheeler et al., 2003). Historically, research in

music therapy has focused on providing support for goal areas to target thus, less emphasis has been placed on dosing or the amount of music therapy necessary to bring about change (Wheeler et al., 2003). To aid in address such gaps, Robb, Burns, and Carpenter (2011) developed intervention reporting guidelines for music therapy trials to including delivery schedules. For example, dosing, duration, and frequency of intervention.

Overview. A dose-response, also known as a dosing effect, suggests that more treatment, or a specific minimal amount, elicits more favorable results. Dosing studies in the field of psychology suggest that more than 10 sessions and fewer than 20 sessions are needed for 50% of participants to demonstrate recovery (Hansen, Lambert, & Forman, 2002). Hansen et al. (2002) reported that an average of 12.7 psychotherapy sessions resulted in improvement for 57.6% to 67.2% of patients. Furthermore, across treatments and diagnoses, 13–18 sessions were needed for psychiatric symptom alleviation (Hansen et al., 2002). Similarly, a mean recovery rate for depression was 52.6% with fewer than 12 sessions and 65% for 12–20 sessions. Yet, the average number of sessions reported for randomized clinical control trials was less than five. In other words, while 10–20 sessions of psychotherapy were shown to be most beneficial for 50% of participants, participants received closer to five sessions.

Two reviews have been conducted focusing on dosage within music therapy treatment (Chung & Woods-Giscombe, 2016; Gold et al., 2009). Gold et al. (2009) completed a meta-analysis looking specifically at dose-relationships in music therapy for people with severe mental disorders. The outcome measures of interest included general, negative, and depressive symptoms. Researchers found a small effect size after 3–10

sessions, a medium effect size after 10–24 sessions, and a large effect after 16–51 sessions. Across studies music therapy was offered one to six times per week with a range of six to 78 total sessions offered. Sessions varied from 20 to 105 minutes in length. Chung and Woods-Giscombe (2016) completed a systematic review focused on dosage (in minutes), type (active, receptive, or combination of treatment), and format (group or individual) of music therapy for individuals with schizophrenia. Outcome categories included total score of symptom scales, general symptoms, positive symptoms, negative symptoms, depression, anxiety, cognitive functioning, social functioning, behavior, and quality of life. Results suggested that when participants received 500 minutes, or at least 10 sessions, there was an increase in the proportion of significant improvement to non-significant improvement (across outcome measures). Authors found that the proportion of significant improvements seen were greater for combined (active and receptive) music therapy; however, wide variations in dosage suggested that this finding was not conclusive.

Music therapy and dosing in acute medical care. In acute medical settings in the United States, the brief length of hospital stays following stroke (5.3 days) challenges the suggested minimum of 3–10 sessions per patient identified in previous music therapy and psychotherapy literature (Hall et al., 2012). Music therapists working in hospital settings have addressed shortened stays by using a crisis intervention approach that addresses “the most immediate needs of the patients in the moment” (Gooding, 2014, p. 136). Short stays in combination with a growing emphasis on patient-centered care, means that music therapists address psychosocial needs in as few as one treatment.

Single-session music therapy demonstrating psychosocial improvements in acute medical care are commonly rooted in patient preferred live music (PPLM) (a patient selected song or type of song played live by a music therapist). Outcomes of interest have included mood, and positive and negative affect (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015); anxiety (Madson & Silverman, 2010; Rosenow & Silverman, 2014); stress (Crawford et al., 2013); fatigue (Rosenow & Silverman, 2014); and relaxation (Crawford et al., 2013). In each case, authors of single-session studies have reported the need for dosing considerations in future investigations (Crawford et al., 2013; Fredenburg & Silverman, 2014a; Magee & Davidson, 2002; Wheeler et al., 2003).

Psychosocial benefits of multiple sessions of music therapy in acute medical care have been found. For example, extended intervention has demonstrated continued improvements in total mood disturbance (Cassileth et al., 2003) and a dose-effect on physical fatigue during hospitalization for bone marrow transplant (Fredenburg & Silverman, 2014a). Through music therapy consultation (as opposed to direct patient-therapist treatment), Clark et al. (2006) reported a correlation between reduced treatment-related distress and the number of times preferred recorded music was used during radiation therapy. Authors have also argued that working alliance (rapport between participants and therapists) was seen to increase with a greater number of sessions potentially improving engagement and involvement in treatment (Fredenburg & Silverman, 2014a). Specific to mood and treatment extending beyond one session, Cassileth et al. (2003) found that receiving individualized music therapy during

hospitalization for autologous stem cell transplant could significantly improve total mood disturbance across hospitalization compared to controls. Researchers found that a single-session significantly improved mood and that each additional session continued to improve mood, indicating a dosing effect.

Two acute hospital trials have looked at advancing mood improvement into coping. Hogan and Silverman (2015) added coping-infused dialogue to a single session of PPLM for patients on a solid organ transplant unit and found medium to large effect sizes on positive and negative affect. Ghetti (2011) investigated the effects of a single session with two specific interventions of Active Music Engagement (AME) and AME with Emotional Approach Coping (AME/EAC) as compared to a control group for patients receiving liver and kidney transplants. Findings demonstrated that AME/EAC together significantly increased positive affect and that both AME and the combined AME/EAC significantly decreased negative affect compared to controls. Together, these studies demonstrate the feasibility of music therapy to improve mood during acute hospitalization following one treatment and suggest continued improvement with additional sessions.

Two acute hospital music therapy study examined patient perspective on dosing. O'Callaghan and Hiscock (2007) conducted a qualitative analysis on respondent comments about the helpfulness of music therapy based on if they received one or more music therapy sessions. Respondents were oncology patients who received music therapy consisting of live familiar music during their inpatient hospitalization. No pronounced differences were found in emergent themes between groups. Additionally, no differences were found between groups in the reported quality of music therapy or

the amount of details respondents provided. Authors suggested that music therapy be offered to patients despite discharge timeline as, “they can have a profound experience in one session” (p. 271).

Music therapy and dosing in neurologic rehabilitation to address mood.

Rushing et al. (2015) completed a systematic review for studies using an active approach to music therapy and targeting mood across settings (acute to chronic care). Findings indicated that participants received a total average of 11.33 sessions and received sessions one to three times per week. Duration of treatment ranged from two weeks to eight weeks with one study lasting 20 weeks (Rushing et al., 2015).

A few studies have investigated dosing outcomes of music therapy for mood improvement following acquired brain injury. One group of researchers provided dosing results based on a multi-intervention approach to music therapy for institutionalized participants with traumatic brain injuries (Guetin, Soua, Voiriot, Picot, & Herisson, 2009). Researchers found that mood continued to improve across time with a significant change in mood seen from baseline following 1, 5, 10, 15, and 20 sessions. Overall mood continued to improve suggesting a dosing relationship. Significant reductions in anxiety were seen between sessions 1–10, 1–15, and 1–20. For depression, there was a significant improvement between sessions 1–10 and 1–15, indicating a need for more than five sessions to demonstrate significant improvement in anxiety and depression, though measures were not taken at sessions two, three, and four.

During acute rehabilitation following TBI or stroke, Wheeler et al. (2003) examined the impacts of the number of music therapy sessions received by participants. In this investigation participants received group and/or individual treatment two to three

times per week for the duration of their rehabilitation stay, ranging from four to 10 sessions. Researchers found that more sessions had a positive effect on social participation and that the number of individual sessions compared to group sessions had an impact on motivation. Dosing appeared to have limited impact on mood except for the finding that more group sessions indicated higher family ratings of participant mood. The authors concluded that while the sample was small ($n = 10$), the total number of sessions and the number of group or individual session might impact outcomes, advocating for more sessions. Magee and Davidson (2002) conducted one of the first studies to look at brief music therapy intervention for acquired neurodisabilities for participants who were residents in a residential or rehabilitation facility. Authors found significant improvements for mood, specifically in regard to states of composed-anxious, energetic-tired, and agreeable-hostile mood states following two sessions. Though this study was not designed to evaluate dosing, authors suggested exploring different amounts of music therapy, particularly in regard to the elated-depressed mood state, as that was a domain that did not see significant change following two once-weekly sessions. In conclusion, research supports brief music therapy intervention following acquired brain injury to positively affect the mood and motivation of participants in rehabilitation in the setting of current healthcare systems (Magee & Davidson, 2002; Wheeler et al., 2003).

Conclusions

Dosing literature for psychotherapies suggests a 10 session minimum is needed to drive symptom recovery. Applications of music therapy in mental health have found evidence of a dosing effect across outcomes and interventions that is in line with these

findings. However, in practice participants typically receive fewer than 10 sessions of psychotherapy and music therapy. In the acute medical setting, music therapy investigators have evaluated the effects of single sessions, demonstrating improvements for psychosocial outcomes such as mood. There is evidence of continued improvement with additional treatment. More evidence is needed to clarify the impact of dosing on changes in mood for participants post-stroke during acute hospitalization.

Research Question 3: What Does the Clinical Decision Making (CDM) Process of a Music Therapist Targeting Mood Elevation for Adults Hospitalized Following a First-Time Acute Ischemic Stroke Involve?

Clinical Decision Making (CDM)

Healthcare professions consider clinical decision-making (CDM) a complex skill set defined by multi-dimensional contexts (Higgs, Jones, Loftus, & Christensen, 2008). Higgs and Jones (2000) postulate that CDM involves data input, interpretation and re-interpretation, problem formulation and re-formulation, a progressively deeper understanding of problem spaces, and decision-making for interventions and actions. To navigate CDM, an updated model has been put forth with patient-centered care being the primary lens through which clinical reasoning is viewed (Higgs et al., 2008). In healthcare, clinical reasoning is a “contextualized interactive phenomenon rather than a specific process” (Higgs et al., 2008, p. 5). It is a context-dependent way of thinking that allows for each scenario to guide actions (Higgs et al., 2008). Clinical reasoning therefore encompasses elements of professionalism including autonomy, responsibility, and accountability in the face of uncertainty (Higgs et al., 2008). The three core dimensions of CDM include (Higgs et al., 2008):

- Cognition or reflective inquiry,
- A strong discipline-specific knowledge base, and
- Metacognition, which provides the integrative element between cognition and knowledge.

The following are additional dimensions of CDM that emphasize patient-centered care with consumers as active participants in the treatment process (Higgs et al., 2008):

- Mutual decision-making, or the role of the participant or patient in the decision-making process.
- Contextual interaction, or the interactivity between the decision makers and the situation or environment of the reasoning process.
- Task impact, or the influence of the nature of the clinical problem or task on the reasoning process.

Dimensions of CDM are listed in Table 2.1.

One important element of CDM is the context-dependent nature of its process. This is illustrated in the above dimensions and is also referred to as a multifaceted “problem space” (Higgs et al., 2008, p. 11). Examples of problem spaces include factors unique to participants such as family, culture, and individual healthcare needs. Factors unique to practitioners can include the frames of reference from which practitioners’ function (e.g., professional competencies standards and ethics). Additional problem spaces that impact CDM are the interprofessional team, the workplace, and local and global healthcare systems (Higgs et al., 2008)

The World Health Organization (WHO) developed a model of treatment accounting for problem spaces and the elements of CDM called the International

Classification of Functioning, Disability, and Health (ICF) (World Health Organization, 2013). The ICF serves as scaffolding based on individual and health contexts so that healthcare professionals can plan and make treatment decisions related to processes such as stroke rehabilitation. The ICF contributes to patient-centered care through inclusion of contextual factors. Contextual factors can include support systems, learning styles, the physical environment, adaptive devices, and more. The ICF defines contextual factors by the extent to which they are barriers or facilitators to health, activity, and participation in life. For example, one's support system (e.g., a spouse) may be a barrier or a facilitator depending on that person's attitudes and interactions with the participant. The ICF guidelines argue that a diagnosis alone does not provide the necessary information for comprehensive care and an understanding of health conditions. To these ends, dimensions of the ICF include the patient's health condition, body functions and structures, activity limitations, participation restrictions, and contextual factors for designing and evaluating comprehensive treatment. The Higgs et al. (2008) model of healthcare CDM and the WHO's ICF illustrate how critically appraising the interactions of informational and human elements of circumstances result in healthcare actions (Higgs et al., 2008).

Examples and challenges of CDM. Rehabilitation-based professions like physical therapy offer insights into CDM processes. One study of physical therapists working in acute care used qualitative inquiry to design a theoretical model for decision making (Masley, Havrilko, Mahnensmith, Aubert, & Jette, 2018). The resulting model included a foundation of professional development and ongoing assessment. Core constructs of the model included communication (with patients, their families, and

medical team members) to gain information, collection and analysis of medical information, application of specialized knowledge, and communication to provide information. The entirety of the model was situated within the “complex environment” reflecting the fast-paced acute-care setting (Masley et al., 2018, p. 914). Researchers noted that “the process required continuous, repetitive clinical reasoning and decision making and a willingness to change a plan instantaneously during a single treatment session as well as across the episode of care” (Masley et al., 2018, p. 914).

An illustration of environmental influences on CDM was found in an occupational therapy study at an inpatient rehabilitation for participants following stroke (Skubik-Peplaski, Howell, Hunter, & Harrison, 2015). Researchers investigated occupational therapists’ choice of environment and how the environment impacted their choice of intervention. Therapists had the choice of three environments: a therapy gym, a homelike space, or a combination space (e.g., a therapy gym with a kitchen). Occupational therapy interventions included occupations, activities, and preparatory methods. Findings indicated that clinical reasoning was influenced by reliance on habits, the perception of the gym and the preparatory methods as “safe,” and environmental choices of convenience, i.e., “see it, use it,” with a resulting impact on intervention choice (Skubik-Peplaski et al., 2015). Authors argued that interventions selected based on the above variables limit interactive and conditional clinical reasoning, which in turn leads to and maintains the implementation of practices that have not been proven to lead to patient-centered outcomes. Authors recommend increased awareness of the impact that the environment can have on intervention choice.

One reason clinicians may remain in habitual or personally “safe” patterns of CDM (unchanging approach), is the complex nature of health care interventions and clinical reasoning. Though there are no clear boundaries between simple and complex interventions, complex interventions are recognized as common in healthcare and are defined as interventions encompassing several interactive components (Craig et al., 2008). This speaks to the need for continual ongoing assessment and evaluation allowing the clinician flexibility to change their approach as needed. However, complex interventions are difficult to evaluate (Craig et al., 2008). For example, guidelines recommend that post-stroke care occur in the setting of interprofessional, specialized stroke units. However, pinpointing the components that make stroke units effective has proven challenging (Craig et al., 2008; Winstein et al., 2016).

Accurately identifying the effective components of complex interventions challenges many healthcare fields (e.g., the robust and varied field of psychotherapy). For example, while approaches to psychotherapy are highly studied, it is still relatively unclear as to what exactly the mechanisms are that produce desired results (Kazdin, 2007). To these ends, the Medical Research Council (MRC) has put forth guidelines for designing and evaluating research-based complex interventions (Craig et al., 2008). Craig et al. (2008) defines dimensions that contribute to intervention complexity to include:

- the number of, and interactions between components within the experimental and control interventions.
- the number and difficulty of behaviors required by those delivering or receiving the intervention.

- the number of groups or organizational levels targeted by the intervention.
- the number and variability of outcomes.
- the degree of flexibility or tailoring of the intervention permitted (p. 7).

Expertise in clinical reasoning and CDM. Given the multi-dimensional spaces of the above description, the level of clinical expertise needed to effectively navigate complex interventions is of interest. CDM literature actively explores differences between experts or experienced practitioners and novice practitioners. Loftus and Smith (2008) found that expert practitioners use forward reasoning characterized by “if-then” predictions drawing on pattern recognition to foresee outcomes. In contrast, novice practitioners rely on backward reasoning, or hypothesis testing starting from the goal and working backward; at times reflecting after the action has occurred as opposed to making choices based on data and prediction. Wainwright, Shepard, Harman, and Stephens (2011) found results illustrative of forward and backward reasoning using qualitative methods to investigate differences between novice and experienced physical therapists working in inpatient rehabilitation. Researchers found that informative factors such as academic training, personal experiences, and reflection-*on*-specific actions were the primary influencers in novice CDM. Alternatively, directive factors such as medical record information, observation of patients’ movement behavior and problem solving, and reflection-*in*-action influenced experienced clinician CDM. A key difference between experienced clinicians and novice clinicians was the act of reflecting-*in*-action (making changes while treatment was being provided) by experienced clinicians versus reflection-*on*-action, (reflection of the treatment retroactively) by novice clinicians.

In music therapy literature, Jones and Cevasco (2007) investigated student versus professional music therapists' nonverbal behaviors during older adult group therapy. Looking specifically at proximity and facial expressions during song leading, results indicated that professionals varied their affect significantly more than students and that professionals maintained closer proximity to participants longer than students. Authors suggested that the song facilitator's level of self-awareness and intentional use of nonverbal behaviors may contribute to differences between student and professional music therapists. In other words, professionals' intentional reflection and decisions to act based on clinical (forward) reasoning may have contributed to findings.

In summary, CDM for healthcare professionals is multi-dimensional, patient-centered, and context dependent. The development, implementation, and evaluation of complex interventions are challenging and require progressively deeper understanding and ongoing assessment. A core dimension of CDM is metacognition, which involves the interpretation of profession specific knowledge, information gathered, and unique human elements. To these ends, CDM is a highly cognitive task with differences in clinical reasoning patterns found between novice and expert practitioners and between individual professions.

Clinical Decision Making in Music Therapy

Tomaino (1999) described the need for CDM when reflecting on a challenging case stating that “the music provided a path to communicate, yet I needed to know how and when to introduce different music...” (pp. 120–121). Baker (2007) reported that clinical reasoning in music therapy, which leads to CDM, integrates theory, evidence-based research, and experience. She further posited that “music therapy practitioners are

described as experts when they are able to identify clinical problems, understand the problem from the participants' perspective, select the most effective and engaging intervention, and predict the therapeutic outcome" (pp. 27-28). The American Music Therapy Association Professional Competencies outline several ways a music therapist utilizes CDM skills. Below and in Table 2.1 are a few examples of music therapy professional competencies from the American Music Therapy Association (2013) that are reflective of dimensions of CDM:

- 10.1 Apply basic knowledge of existing music therapy methods, techniques, materials, and equipment with their appropriate applications.
- 11.1 Select and implement effective culturally-based methods for assessing the participant's strengths, needs, musical preferences, level of musical functioning, and development.
- 12.3 Identify the participant's primary treatment needs in music therapy.
- 12.5 Select and adapt music, musical instruments, and equipment consistent with the strengths and needs of the participant.
- 12.7 Create a physical environment (e.g., arrangement of space, furniture, equipment, and instruments) that is conducive to therapy.
- 13.1 Recognize, interpret, and respond appropriately to significant events in music therapy sessions as they occur.
- 13.8 Sequence and pace music experiences within a session according to the participant's needs and situational factors.

Music therapy scholars have provided examples of CDM in a variety of formats, although the terms "clinical decision-making" and "clinical reasoning" are not often

found as keywords. Formats have included models, frameworks, decision trees, critical factors, and processes. Published expert topic papers have included planning and implementing improvisational experiences (Beer, 2011), a framework for processing lyric analysis interventions in mental health (Dvorak, 2016), and an evidence-based decision-making process for early childhood (Kern, 2011). Additionally, qualitative researchers have looked explicitly at the music therapist's clinical processes in order to link theory with practice, sometimes referred to as treatment dismantling (Kazdin, 2007). In other words, researchers seek to translate intervention knowledge of *how to do music therapy* into describing *what happens during music therapy*. Qualitative methods have aided in the study of clinician processes. Results from studies have provided guidelines for the use of electronic music technologies (Magee & Burland, 2008), a decision tree for choosing receptive or active interventions for women in breast cancer groups (Thompson, 2013), a tiered identification of techniques dimensions used in pediatric rehabilitation (Edwards & Kennelly, 2004), increased knowledge of clinical processes for working with adults in pain management (Kwan, 2010), and identification of competencies and critical factors for working in acute stroke care (Forsblom & Ala-Ruona, 2012). Results from this body of literature emphasize the benefits to clinical practice through the study of clinical processes.

Select research. The following section reviews selected music therapy literature in regard to CDM with implications for acute stroke neurorehabilitation based on the emphasis of rehabilitation, mood, medical setting, and active intervention. In this context, active intervention is defined as interventions in which the music therapist elicits and encourages participation from participants.

Forsblom and Ala-Ruona (2012) investigated the competencies and skills of a music therapist working in acute stroke care. The study investigated clinicians' insights into the skills and knowledge needed for clinical reasoning and decision-making. Using qualitative methods, the researchers interviewed music therapists who had experience working in acute stroke rehabilitation and were part of two acute stroke music therapy intervention projects. One project involved passive recorded music listening and the other involved active live music therapy groups. Projects were designed to meet the needs of survivors of middle cerebral artery stroke. Results identified three factors that influenced critical thinking patterns of the music therapists. The first was knowledge of neurology and neuropsychology. This factor included knowledge of the neurological basis of strokes, clinical music therapy training, understanding of music therapy and stroke care approaches, and professional supervision. It is important to note that five of the six clinicians in the study were provided specialized training in these areas as part of the intervention projects. The second factor was interaction with participants. This factor was considered the most important and included interaction during music playing, listening and sharing (verbally), discussion, and reflection. Examples of CDM included the opening discussion during which the music therapists determined the participant's mood and the subsequent pacing of activities. Another example of CMD included the interaction during music playing of not just leaving the participants to play but helping them "play at the very best of their abilities" (p. 6). Idiosyncratic communication styles were also noted as important for interaction. The final factor was accurate physiological and psychological participant observation. This factor involved the challenge of attending to each participant while facilitating sessions. Specific elements of attention

included participant motivation, body language, motor functions, changes in mood, cognitive performance, and coping skills. Authors highlighted the value participants placed on additional knowledge-based training, awareness of interactions, and interest in professional supervision to enhance skills.

Edwards and Kennelly (2004) used modified grounded theory in a rehabilitation setting to identify patterns in the use of techniques by registered music therapists (RMT) working in pediatric rehabilitation. Their aim was to examine and describe rehabilitation techniques used by RMTs. Emergent themes included facilitation of participation, supporting task accomplishment, and contributing to session flow. Within themes, eight categories with properties, and dimensional ranges were presented. For example, the category of choices had properties of options, verbal choices, patient choices, and non-patient choices. Dimensional ranges of choices were few to many and direct to indirect. Authors noted that categories of techniques used across sessions allowed for their individualized application. The properties and dimensional ranges served to demonstrate the depth of skilled work done by the RMT. For example, authors discussed how a seemingly simple act of having a child sing required skilled work that included persistent intervention in categories such as cueing, synchronizing (musically), orientation, feedback, and more thus allowed the child to “respond and participate at his or her best” (p. 123).

Thompson (2013) was interested in the decision making process necessary to determine whether to use receptive or active music interventions for women in breast cancer groups as part of a larger mixed methods study (Thompson, Grocke, & Dileo, 2016). Results took the form of a decision tree. To develop the decision tree, Thompson

(2013) observed opening discourse of the group members. During observation Thompson asked of herself, “what do I notice” and “what do I look for?” Three theme areas emerged related to the posed questions: language themes observed when participants commented on their personal situations, body language observed when participants conversed with each other, and conversation themes during exchanges with at least one other person. Categories and subcategories were refined to identify mood and energy levels within the group. The final decision tree presented six combinations of mood and energy descriptors that were factored into the decision to use an active or receptive music intervention. Broadly, a positive mood and energy level was found to be more conducive to active intervention, with low mood and energy levels suggesting participants may better respond to a receptive intervention. Thompson (2013) found that development and use of a decision tree was beneficial in providing insight, consistency, direction, and reliability in the CDM process. Creation of the decision tree allowed for identification of what cues were judged to be the most important in CDM. Thompson also argued that use of a decision tree allows for standardization of intervention while retaining clinical flexibility in addressing participant needs.

When investigating stress in older adults on an intensive care unit, Shultis (2012) designed a decision tree protocol. The purpose of the decision tree was to be able to respond to individual needs within one music therapy session. The 25-minute sessions included five steps: (a) opening or warm-up, (b) song choice, (c) verbal discussion, (d) mobilizing coping skills, and (e) closure. The researcher observed patient baseline anxiety and pain scores to inform the session opening. Higher scores indicated a more rapid introduction of music and less verbal discussion. Scores also informed the extent

to which the participant was asked to verbally (or otherwise) engage in selecting an opening song. Collected demographic information informed song options. During the mobilizing coping skills step, there were three intervention options: (a) another song, (b) creation of a song parody based on coping, or (c) a music-assisted relaxation exercise guided by the clinician. A primary informer of which of the three techniques would be used was the participant's ability to engage in discussion about the personal meaning of the opening song (ability to discuss was not defined). This decision tree is illustrative of a multi-step process during which observation and components of treatment steps inform each other.

Beer (2011) authored a model for CDM that included detailed steps and considerations for designing and setting up music making improvisational experiences. The author described improvisational experiences as a goal-oriented and shared music-making experience between the participant and therapist. Guidelines for determining goals, structuring effective experiences, and factors imperative to implementation were included. A main tenant of the model was the amount of structure, or lack thereof, the music therapist may provide the participant to ensure safety and success.

Dvorak (2016) provided a framework for planning, implementing, and evaluating group lyric analysis. During lyric analysis, the lyrics of a song are examined and largely considered the most important musical element. However, the author discussed how other facilitated changes in musical elements, such as harmony and tempo, can change a listener's interpretation of the music played. Different questions posed to participants during lyric analysis facilitation will also have different effects. Therefore, musical and non-musical mechanisms must be examined when making

treatment decisions (Dvorak, 2016). To effectively navigate the process of lyric analysis, Dvorak designed a five-level processing framework. Clinicians and students can plan, adjust implementation, and evaluate effectiveness based on movement through the five levels of lyric analysis. Each level increases in depth and complexity. For example, the first level focuses on group processing of the presented music itself (Dvorak, 2016), whereas level five asks participants to transfer new insights developed during lyric analysis to their lives.

Medical and acute care settings. Music therapy-specific literature in acute medical settings that addresses CDM is limited. Lee, Davidson, and McFerran (2016) acknowledged that working with adults in hospitalized settings is often unpredictable with a wide array of interventions used based on patient characteristics. Illustrative of this, Shultis (2012) selected three very different interventions to use with patients to reduce stress in an intensive care unit. Which of the three interventions was to be used was not determined *a priori*. Instead, the intervention identified as the most potentially effective was based on how engaged participants presented in the moment, with verbal interaction being a leading consideration. One way of evaluating patient verbal interaction was during the initial song selection in which patients could participate.

Silverman et al. (2016) reviewed studies employing the use of patient preferred live music (PPLM) in the medical setting. The researchers found that when patients were given the choice between PPLM and other interventions, such as guided music relaxation or a harmonica lesson, almost every patient elected to continue with PPLM. Because PPLM is simply a receptive listening intervention, it lacks active involvement from patients. Therefore, limited expectation of carryover beyond momentary impact on

mood or anxiety cannot be predicted. For example, use of new coping skills or problem solving in or beyond the music therapy session would not be explored or taught through the use of PPLM alone. Silverman suggests PPLM as an ideal intervention for new music therapists due to its inherent limited therapeutic depth. However, PPLM in the medical setting is argued to serve as a mechanism to build a working alliance, and it functions as a gateway to more active interventions such as songwriting, lyric analysis, and improvisation. Knowing that patients do not tend to self-select active interventions, effectively pacing the transition into volitional engagement would be a skilled endeavor involving ongoing observation, assessment, and CDM.

Conclusions

The field of music therapy provides competencies, frameworks, decision trees, and models of practice aligned with processes involved in CDM even though CDM is not a term often used. Authors suggest that models of CDM can assist in planning, implementing, and evaluating treatment (Dvorak, 2016; Kern, 2011; Magee & Burland, 2008; Thompson, 2013). Researchers promote the value of decision-making procedures for teaching intervention implementation for new professionals (Beer, 2011; Dvorak, 2016; Silverman et al., 2016; Thompson, 2013). When taken together, several components of CDM are common across the music therapy literature: the assessment of opening interactions, clinician- participant verbal or other forms of interaction, facilitation by the clinician of safe and successful participation of the participant, and the structure provided by the music therapist through intervention choice and its properties. Ongoing in-depth consideration of effective techniques and observation of patient characteristics, such as mood change, are also used to determine session pacing and are

echoed across the literature. Table 2.1 illustrate how the CDM process of music therapists working in acute stroke care parallels dimensions of CDM in healthcare.

Table 2.1*Clinical Decision Making and Music Therapy Competencies*

Dimensions of a CDM Model	AMTA MT Comps. Examples	MT Comps. for Stroke Care
Higgs et al. (2008)	American Music Therapy Association (2013)	Forsblom and Ala-Ruona (2012)
Discipline-specific knowledge	10.1 Existing music therapy methods, techniques, materials, and equipment with their appropriate applications.	Knowledge concerning the neurological basis of strokes, clinical music therapy training, understanding of approaches, and professional supervision.
Clinical problem or task	12.3 Identify the participant's primary treatment needs in music therapy.	
Metacognition	12.5 Select and adapt music, musical instruments, and equipment consistent with the strengths and needs of the participant. 13.1 Recognize, interpret, and respond appropriately to significant events in music therapy sessions as they occur.	Accurate observation of the physiological and psychological aspects of music therapy including changes in mood, motivation, body language, coping skills, motor function, and cognitive performance.
Cognition or reflective inquiry	13.8 Sequence and pace music experiences within a session according to the participant's needs and situational factors.	
Mutual decision making	11.1 Select and implement effective culturally-based methods for assessing the participant's strengths, needs, musical preferences, level of musical functioning, and development.	Good patient interaction including playing music, listening, discussing, and reflecting.
Contextual interaction	12.7 Create a physical environment (e.g., arrangement of space, furniture, equipment, and instruments that is conducive to therapy).	

*CDM = clinical decision-making; AMTA = American Music Therapy Association; MT = music therapy; Comps. = Competencies.

Figure 2.1. Sound Processing Pathways and Behavioral Implications

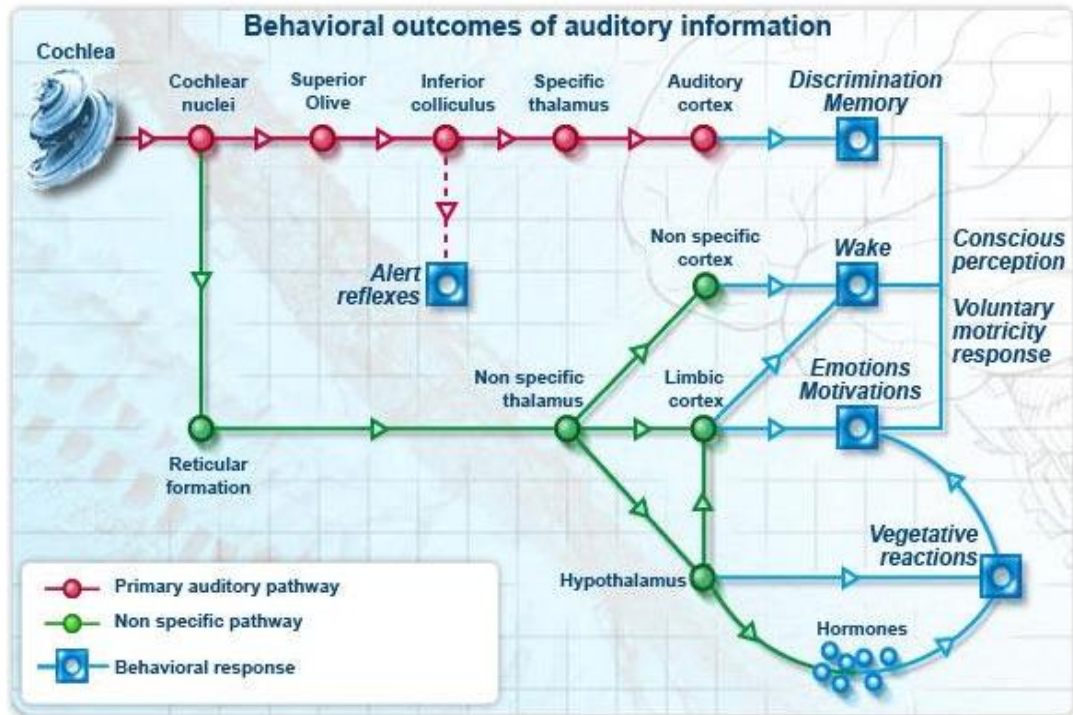


Figure 2.1. This figure is taken from Pujol and Irving (2016) and is used with permission. It illustrates the two primary neural pathways through which sound is processed and the resulting behavioral implications of aural processing.

Figure 2.2. Key Brain Areas Associated with Music Processing

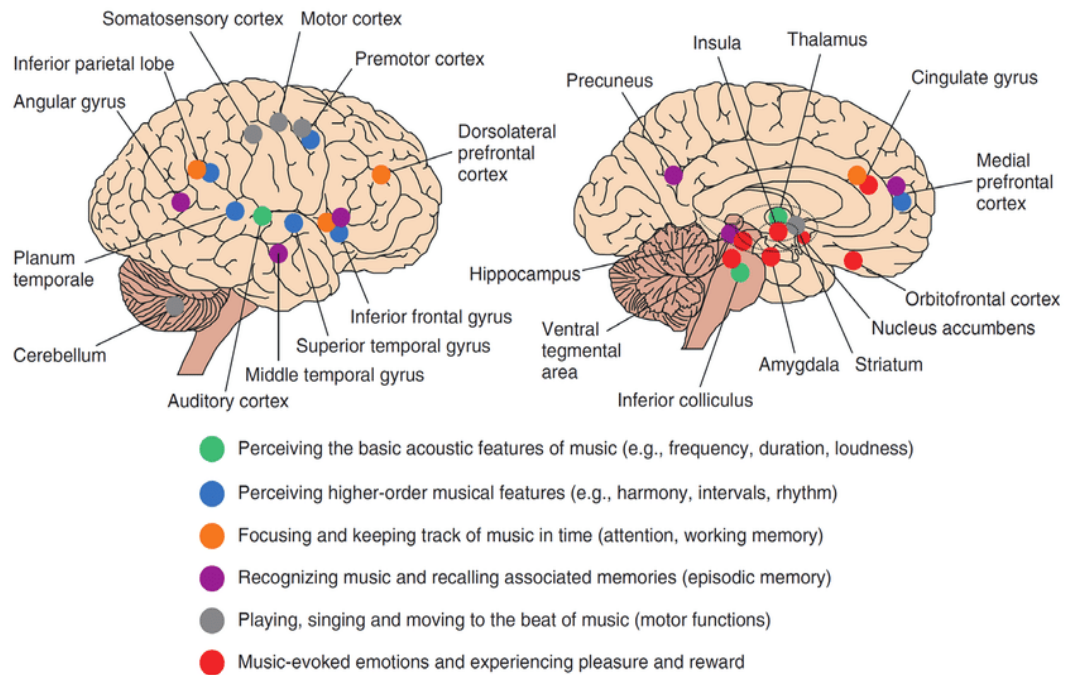


Figure 2.2. This figure is taken from Sarkamo et al. (2013) and is used with permission. Illustrated are the key brain areas associated with music processing. Findings are correlated from neuroimaging studies of healthy subjects. Of interest to this literature review are the red dots, which illustrate music-evoked emotions related to pleasure and reward.

Chapter 3: The Effects of Active Music Therapy Treatment on Mood Following First-Time Acute Ischemic Stroke

Background

Experiencing a stroke can lead to depression, mood disorders, and difficulties with emotion regulation (Hofmann et al., 2012). Post-stroke depression (PSD) is reported to affect 30% of stroke survivors (Hackett et al., 2005; Towfighi et al., 2017) with early PSD and mood disorders being associated with mortality at three, 12, and 24 months post stroke (Kouwenhoven et al., 2011; Townend et al., 2007). Higher levels of depression and depressive symptoms are associated with a less efficient use of rehabilitation services and poor functional outcomes at both admission and discharge (Gillen et al., 2001; Towfighi et al., 2017). Furthermore, depressive symptoms are associated with 80% higher odds of hospital readmission (Ottenbacher et al., 2012).

The acute phase of stroke recovery may be a key factor in influencing the depression trajectory, with early depression predicting poor longitudinal outcomes (Eriksen et al., 2016; Kouwenhoven et al., 2011; Townend et al., 2007). PSD has been recognized in 40.9% of survivors of first-time ischemic stroke within the first seven to 10 days and has been shown to increase the likelihood of disability in the first year (Willey et al., 2010). Early PSD has been shown to be correlated with continued PSD at 12 months (Kouwenhoven et al., 2011; Willey et al., 2010). Though disability may decrease across the first few weeks following stroke, mood disorder prevalence has been shown to increase (Townend et al., 2007). Cooper et al. (2015) found that at two months post-stroke, patients demonstrated significantly more difficulty in overall emotion regulation as compared to healthy controls (Cooper et al., 2015). Emotion regulation in

the acute phase following stroke has also been found predict social functioning at 18 months (Cooper et al., 2015). Therefore, it has been recommended that: (1) PSD be screened routinely (Winstein, et al., 2016); (2) psychosocial support begin in the acute phase (Eriksen et al., 2016); and, (3) treatment options continue to be explored (Winstein, et al., 2016).

Optimal approaches to treatment and prevention of PSD are uncertain (Towfighi et al., 2017). Currently, the main therapeutic approach to PSD is pharmacological (Paolucci, 2008; Powers et al., 2018). However, timing of screening and specific guidelines for pharmacological treatment remains unclear (Paolucci, 2008; Powers et al., 2018). Psychotherapy approaches (as compared to non-pharmacological controls) have demonstrated the ability to prevent PSD and result in fewer reported adverse events (Hackett et al., 2008). Promising psychotherapy interventions have involved talk-based techniques, such as motivational interviewing and problem-solving (Hackett et al., 2008). During talk-based treatments, participants explore the impact of stroke on problem solving skills and emotional adjustment (Hackett et al., 2008). These types of interventions may be particularly effective as problem solving and reappraisal are leading strategies to improve emotion dysregulation (Aldao et al., 2010).

Music therapy interventions for emotion regulation with hospitalized adult populations are yet to be developed; however, there is some evidence for music therapy intervention to reduce symptoms of depression (Maratos et al., 2008). There is also support for its application with neurologic populations as an avenue to prevent distress following stroke (Lincoln et al., 2012). Researchers have identified music therapy as a promising non-pharmacological approach to improve mood, reduce depression, and

increase quality of life following acquired brain injury (ABI) (Magee et al., 2017). The evidence for music therapy intervention with persons with ABI is weakened by the fact that studies have included poor randomization strategies (bias), heterogeneity in measures used and populations of interest, inconsistent reporting of results, and limited theoretical construction of interventions (Ard & Wheeler, 2016; Magee et al., 2017; Raglio et al., 2015; Rushing et al., 2015).

Evidence supporting the use of music therapy for ABI during acute hospitalization following injury is sparse. However, music therapy is often used during acute hospitalization to address psychological distress (Gooding, 2014). Research has shown that a qualified music therapist facilitating music interventions can be more effective than music medicine (music, usually recorded, administered by other medical staff) in medical settings (Dileo, 2006; Standley, 2000). More specifically, several studies have investigated the use of music therapy to target mood-related outcomes during transplant and cancer treatment (Cassileth et al., 2003; Fredenburg & Silverman, 2014b; Ghetti, 2011). Cassileth et al. (2003) found that individualized music therapy during hospitalization for autologous stem cell transplant significantly improved total mood disturbance across hospitalization as compared to controls. Furthermore, they found that a single session of individualized music therapy improved mood immediately. Depression was also improved, although results were not statistically significant. Similarly, Fredenburg and Silverman (2014b) found that a single session of patient-preferred live music significantly improved positive and negative affect scores for patients receiving blood and bone marrow transplants. Ghetti (2011) investigated the impact of a single session of Active Music Engagement (AME) versus AME with

Emotional Approach Coping (AME/EAC) for patients receiving liver and kidney transplants as compared to a control group. Findings demonstrated that AME/EAC together significantly increased positive affect and that both AME and AME/EAC significantly decreased negative affect compared to controls. Together, these studies demonstrate the potential of music therapy to improve mood during acute hospitalization.

Music therapy to address mood constructs after ABI has been investigated largely outside of the acute hospital setting. Findings are encouraging; however, specificity of interventions and low quality of evidence results in difficulty correlating findings for mood constructs (Ard & Wheeler, 2016; Magee et al., 2017). Rushing et al. (2015) conducted a review of studies investigating the impact of active music therapy (AMT) interventions following ABI. In the review, AMT was defined as a group of interventions that elicited and encouraged active participation by the treatment recipients. They reported that a group program of stretching, moving to music, and verbal discussion were AMT interventions demonstrating large effect sizes on mood outcomes for ABI populations (Jun et al., 2012); a group session focused on emotional adjustment using songs with positive emotions and group singing (Thaut et al., 2009); and the use of a variety of receptive and active music therapy interventions within the same group or individual session (Nayak et al., 2000). The authors concluded that a variety of music therapy interventions can improve mood following ABI.

The earliest investigations into music therapy for mood improvement following stroke were initiated at two weeks post stroke (Jun et al., 2012; Sarkamo et al., 2014; Sarkamo et al., 2008). Sarkamo et al. (2008) examined the effects of daily, preferred

music listening during the first two months following stroke. Music listening was compared to audio book listening and a control group. Results indicated a decrease in depression and confusion, as well as increased grey matter, which correlated with a reduction of negative mood after two months of recorded music listening (Sarkamo et al., 2014; Sarkamo et al., 2008). Qualitative findings from the same cohort indicated stroke survivors reported using music as an emotion regulating strategy (Forsblom et al., 2009). For example, “When I put the music on, I don’t have to think about this stroke or other sad things all the time,” or “With the help of music I can do the dishes and other work in my household. Without music, I would have just sat down feeling miserable” (Forsblom et al., 2009, p. 427). Jun et al. (2012) incorporated a more active approach beginning at two weeks post-stroke onset. They reported that participating in a music movement group for one hour, three times per week, for eight weeks, significantly improved mood and physical functioning. The movement and music group included stretching to music, moving to music, playing instruments, and expression of feelings. Taken together, these studies suggest that early music-based intervention following stroke is feasible and shows promise as a nonpharmacological approach to reducing psychological distress.

Overall, stroke-specific reviews support music therapy intervention to address mood impairments following neurologic injury (Ard & Wheeler, 2016; Raglio et al., 2015). Additionally, the need for evidence-based effective intervention to support psychological functioning early in stroke recovery is critical. Therefore, the purpose of this study was to determine if active music therapy following a first-time acute ischemic stroke (AIS) could effectively improve mood in a single session during acute

hospitalization. It was hypothesized that active music therapy treatment during acute hospitalization following a stroke would have a positive impact on mood.

Research Questions

Primary research question:

- What is the effect of one treatment of active music therapy on mood, as measured by The Faces Scale, following a first-time ischemic stroke during acute hospitalization?

Secondary research questions:

- What is the effect of active music therapy on depression, as measured by the PHQ-9, following a first-time ischemic stroke during acute hospitalization?
- What is the effect of active music therapy on cognition, as measured by the Mini MoCA, following a first-time ischemic stroke during acute hospitalization?
- What treatment variables are present when targeting mood elevation on an acute stroke hospital unit including target music therapy goals in addition to mood and length of treatment?
- How do participants describe their experiences with active music therapy?

Methods

Research Design and Setting

A single-arm, repeated measures design was used to evaluate the effects of active music therapy on mood following stroke. This study took place at a large university-affiliated teaching hospital in the southeastern United States. The study was approved by the Institutional Review Board where the work was carried out (Appendix A).

Participants

Participants included English speaking adults (≥ 18 years of age) admitted to the hospital for a first-time acute ischemic stroke between June 2016 and May 2018 ($N = 44$). Participants were recruited within the first two weeks of hospital admission.

Participants were excluded if they had or were found to have a prior stroke or prior neurological or psychiatric disease such as Lewy Body Dementia, severe Alzheimer's, Schizophrenia, Schizoaffective disorder, or other severely debilitating conditions.

Depression was not considered an exclusion criterion.

Measures

Participant characteristics and treatment variables. Patient characteristics included: age; gender; race; stroke side (right or left); vascular distribution (anterior or posterior); National Institute of Health Stroke Scale (NIHSS) score at hospital admission, at study entry, prior to each music therapy treatments, and at hospital discharge; and discharge location. The NIHSS is a 15-item scale measuring stroke severity. Scores range from zero to 42, with higher scores indicating greater stroke severity (Kwah & Diong, 2014). Treatment variables collected included goals targeted during treatment in addition to mood and length of treatment. Pharmacological data were monitored for potentially altering agents such as sedatives administered within 24 hours prior to treatment (Table 4.1). No study participants received any medication within 24 hours of music therapy treatment.

Primary outcome. To measure change in mood, The Faces Scale was used, as seen in Figure 3.1 (McDowell, 2006). The Faces Scale is a self-report, seven-point scale consisting of seven face illustrations. Each face has fixed eyes and a mouth that changes

across the seven points from a smile to a frown. Respondents were told, “Here are faces expressing various feelings.... Which face comes closest to expressing how you feel right now?” For analysis, faces were numbered one through seven. The higher the number, the higher the negative mood state.

Two major factors contributed to the decision to use The Faces Scale: simplicity and ease of administration and the fact that it has been used in previous studies (Guetin et al., 2009; Nayak et al., 2000). Nayak et al. (2000) successfully used The Faces Scale prior to and following treatment sessions to monitor change in mood for participants receiving group music therapy during inpatient rehabilitation following stroke and traumatic brain injury. Guetin et al. (2009) used a different version of a faces scale to evaluate the effects of music therapy on mood in chronic traumatic brain injury treatment.

Secondary outcomes. Depression was evaluated using the Patient Health Questionnaire (PHQ-9). The PHQ-9 (Appendix B) is a nine-item questionnaire based on each of the nine DSM-IV criteria for depression (Kroenke, Spitzer, & Williams, 2001). It is validated as a diagnostic and screening instrument for PSD (Williams et al., 2005). Scores range from zero to 27, with zero indicating no depression. Participants were asked to indicate, “Over the last two weeks, how often you have been bothered by any of the following problems?” for example, “feeling down, depressed, or hopeless.” Responses range between “0” not at all, “1” several days, “2” more than half the days, and “3” nearly every day. Scores of one to four indicate minimal depression; five to nine, mild depression; 10 to 14, moderate depression; 15 to 19, moderately severe depression; and 20 to 27, severe depression. A score of less than 10 is regarded as

clinically significant, as major depression rarely occurs for individuals with a score of less than 10, and the likelihood of major depression increases beyond a score of nine (with scores greater than 14 usually signifying major depression) (Kroenke et al., 2001).

The Mini MoCA (Appendix C) is a short form of the Montreal Cognitive Assessment (MoCA) (Nasreddine et al., 2005). It was used to evaluate cognition at admission and discharge. Mini MoCA scores range from zero to 12, with zero to six indicating possible severe cognitive impairment, seven to nine indicating possible moderate cognitive impairment, and 10 to 12 indicating mild or no cognitive impairment. Respondents are tested on orientation, verbal fluency, and delayed recall. The strengths of using the Mini MoCA as a post-stroke assessment include its brevity, ease of use, correlation with cognitive and functional outcomes, free access, and availability of short versions of the assessment (Chiti & Pantoni, 2014). Limitations of its use for the stroke population include lack of standardized norms, no clear cut-offs to define cognitive impairment, inability to use it with patients experiencing severe aphasia, and gaps in assessment areas such as intellectual functioning (Chiti & Pantoni, 2014).

Procedure

Medical team members identified potential participants who met criteria for study inclusion. Once identified, prospective participants were asked by a known provider from their medical team if they were willing to be approached by study personnel to learn more about the study. Potential participants were visited in their hospital room by study personnel who described the study, administered the UCSD Brief Assessment of Capacity to Consent (UBACC) (Jeste et al., 2007) to determine

decisional capacity, and obtained informed consent. The UBACC was adapted for the purposes of this study (Appendix D). Informed consent was obtained as close to hospital admission as possible with a maximum period of two weeks following admission (Appendix E) When a participant demonstrated impaired capacity for consent, a legally authorized representative (LAR) was sought to sign consent on behalf of the subject. On the occasion of the use of an LAR, the participant was read an assent form, which he or she then signed (Appendix F).

Pretest depression scores (PHQ-9) and cognitive scores (Mini MoCA) were completed as soon as possible following admission to the hospital. Both tests were part of standard patient care at the study site. After providing informed consent and pre-test scores, participants began receiving music therapy treatment as soon as the principle investigator (PI) was available. Availability ranged from immediately to within approximately 24 hours. The Faces Scale (McDowell, 2006) was administered prior to and following each music therapy treatment by the patient's nurse or care technician. Nurses and care technicians were given instructions on proper scale administration by the PI. Pharmacological data were monitored for potentially altering agents, such as sedatives administered within 24 hours prior to treatment (see Table 3.1). Participants received at least one music therapy treatment session facilitated by the PI (a board-certified music therapist). Prior to discharge, PHQ-9 and Mini MoCA scores were collected along with participant comments on their experience with music therapy. For comment collection, participants were asked, "You have received music therapy during your hospitalization; please comment on your experience with music therapy." Complete study procedures can be seen in Figure 3.2.

Intervention

The music therapy treatment consisted of active music therapy (AMT) administered by the PI, a board-certified music therapist (MT-BC) with approximately 10 years of experience in medical settings. AMT was defined as music making interventions that elicited and encouraged active engagement from participants involving creating music, playing instruments, singing, improvising, and/or moving to music (Sihvonen et al., 2017; Vink, Bruinsma, & Scholten, 2004). During AMT participants were supported and encouraged by the PI to create, participate in, and/or move to music. Materials used consisted of, but were not limited to, a six-string acoustic steel string guitar, hand-held percussion instruments such as tambourines, paddle drums, and egg shakers, and electronic instruments accessed through GarageBand on an iPad.

All interventions used patient preferred live music (PPLM) when possible. PPLM is defined as “a receptive music therapy experience involving music selected and preferred by the patient that is performed live by a qualified music therapist” (Silverman et al., 2016, p. 2). It has been noted that hospitalized patients may initially prefer receptive music therapy interventions such as PPLM (Crawford et al., 2013; Silverman et al., 2016). Therefore, to build rapport and develop a therapeutic alliance, treatments for participants started with PPLM followed by opportunities for more active participation (Bruscia, Dileo, Shultis, & Dennery, 2009; Silverman et al., 2016; Standley, 2000). Age-appropriate music was selected by the PI if music preference was not provided by the participant or if participant music preference was not familiar to the PI. Treatment duration for all treatments was approximately 25 minutes. Twenty to 30 minutes has been reported in single-session medical music therapy literature with promising results for targeting mood constructs (Bergh & Silverman, 2018; Cassileth et

al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Hogan & Silverman, 2015).

A typical treatment involved a pre-treatment review of participant electronic medical records, greetings and introductions, sharing of information about treatment, ongoing assessment of the participant's musical interests and stroke experience, PPLM and assessment of the participant responses to music and secondary goal areas as needed (communication and movement), interventions for mood elevation and secondary goals if appropriate, a treatment closure period of PPLM or other intervention, and goodbye. See Appendix G for complete AMT treatment guidelines.

Analysis

Based on a literature review of music therapy and literature using The Faces Scale, the estimated sample size to achieve 80% power (two-sided hypothesis; $p \leq 0.05$) was 29. The sample size calculation was based on the following assumptions:

1. The pre-post treatment The Faces Scale score changes are independent between patients. Pre-post treatment measures on the same subject are positively correlated, with an estimated correlation equal to 0.3.
2. An average change in pre- and post- The Faces Scale scores is at least 1 point. Each patient's change in The Faces Scale score has a normal distribution with a standard deviation of approximately 1.89.

Standard deviation was derived from previous literature of a randomized clinical trial of music therapy for individuals with acute traumatic brain injury and stroke (Nayak et al., 2000). This hypothesized change corresponded to an effect size of 0.53.

Paired *t*-tests were used to determine the statistical significance for changes in The Faces Scale, PHQ-9, Mini MoCA, and NIHSS scores from before AMT and immediately following AMT. All analyses were performed using SAS 9.4. Descriptive statistics were used to analyze music therapy goals in addition to mood addressed, duration of treatment, and quantity of treatments. Content analysis was conducted to analyze participants reported experience with AMT following procedures by Lal, Jarus, and Suto (2012). A total of 32 participant comments were collected and analyzed. The PI and another board-certified music therapist conducted a random analysis of 25% of comments ($n = 8$), resulting in agreed upon categories followed by independent analysis of the remaining 75% of comments ($n = 18$). Comments were broken into categories. For example, one participant's comment of, "I liked it. I got to play the tambourine" was considered two categories: "the experience as positive" and "a positive experience with active engagement." Each category could only be tallied once per participant comment. Frequencies were tabulated for each category, and reliability was calculated using the formula [agreements \div total observations]. Interrater reliability was 82%, which met the minimum acceptability threshold for reliability (Madsen & Madsen, 2016). After reliability was calculated, discussion to evaluate and reach a consensus on any discrepancies was completed for result reporting.

Results

Participant Characteristics and Treatment Variables

Of the 86 potential participants screened for consent, 44 participants received AMT treatment at least once during their hospitalization. Reasons for exclusion or dropout prior to consenting or receiving AMT included discharge prior to consent or

treatment or patient declining to participate. History of stroke, absence of a stroke, cognitive impairment, currently receiving music therapy, or hospital stay longer than two weeks prior to enrollment were additional exclusion criteria. See Figure 3.3 for a study flow chart.

Participant mean age was 68.14 years ($n = 43$, $SD = 12.09$, range 35–88). Of the participants, 52.3% were female ($n = 23$) and 47.7% were male ($n = 21$). All participants were white. See Table 3.2 for a breakdown of participant stroke location. Participants were most often discharged to an acute rehabilitation facility ($n = 30$, 68.2%), followed by discharge home ($n = 11$, 25.0%), and lastly, discharge to a sub-acute facility ($n = 1$, 2.3%).

Participants presented with mild to moderate NIHSS scores across the course of the study. Significant improvements in stroke severity were seen from admission to discharge ($M = -2.98$, $SD = 5.62$, $p = .012$) No significant change was seen from treatment one to discharge ($M = -0.78$, $SD = 2.67$, $p = .069$). See Table 3.3 for complete NIHSS scores. Pharmacological data was monitored for potentially altering agents (e.g., sedatives) administered within 24 hours prior to treatment and no study participants received any monitored medication within 24 hours of music therapy treatment (Table 3.1).

Primary Outcome

The purpose of this study was to determine the effect of one treatment of active music therapy on mood as measured by The Faces Scale. After checking for normality, a paired t -test found a significant immediate treatment effect indicating an improvement in

mood following one AMT treatment ($M = -0.84$, $SD = 1.63$, $p = 0.002$). See Table 3.4 for results.

Secondary Outcomes

In addition to mood, changes in depression and cognition were evaluated from hospital admission to discharge. After checking for normality, paired t -tests were conducted and indicated no significant change in depression ($p = 0.453$) or cognition ($p = 0.197$) from admission to discharge. See Table 3.5 for results.

Additional treatment variables collected included targeted music therapy goals in addition to mood and length of treatment. Fine and gross motor skills were the most targeted goals outside of mood, followed by speech stimulation (See Table 3.6). The mean time from hospital admission to treatment was 3.59 days ($SD = 2.58$). Participants across this study had a mean length of hospitalization of 7.07 days ($SD = 5.02$). The mean length of one treatment was 31 minutes ($SD = 6.78$).

Finally, participants were asked to comment on their experience with music therapy. Comments were divided into categories as previously described. Eight categories emerged from the results. Most comments included some form of the category of the “experience as positive.” The second most frequently occurring category was “characteristics of/reference to the music therapist” and the third, “other.” No comments were negative, and only one comment indicated that no change in mood had occurred. Categories and examples of participant comments in response to music therapy treatment can be found in Table 3.7. A list of all comments can be found in Appendix H.

Discussion

This is the first study to specifically target mood improvement following stroke in an acute hospital setting with a single treatment. Results indicated that one AMT treatment significantly improved mood for hospitalized adults following a first-time acute ischemic stroke. Furthermore, participants reported the experience of receiving AMT treatment as positive. A unique aspect of this finding was the brevity of treatment coupled with application to acute stroke care. To date, single-sessions of music therapy have shown effectiveness in addressing mood constructs as part of neuro-rehabilitation, but only in chronic settings (Magee & Davidson, 2002; Thaut et al., 2009; Thompson, Grocke, & Dileo, 2016). Within six months post stroke, improvements have been seen for depression (Kim et al., 2011) and mood states (Jun et al., 2012) with multiple treatments of music therapy. Early intervention has also shown promise following an extended course of recorded music listening and consultation with a music therapist, resulting in significant improvements in depression and confusion (Sarkamo et al., 2008). To these ends, improvements in psychological states following acquired brain injury have been documented.

No significant changes were seen in cognition (Mini MoCA) or depression (PHQ-9) following one session of AMT. During acute medical care, Mini MoCA scores are often used as guides for subsequent management (Quinn, Elliott, & Langhorne, 2018) as opposed to accurately observing changes in cognition across several days. Similarly, the PHQ-9 measures depression, with questions related to symptoms over the previous two weeks. Patients in the stroke unit at the study site remain hospitalized for an average of only five days; however, medical personnel used the PHQ-9 to identify

patients who may be at particular risk for post-stroke depression. Mean admission and discharge PHQ-9 scores of 5.61 and 6.27 respectively presented on the low end of mild to moderate levels (5–14) of depression. Site guidelines for depression treatment in the mild to moderate range call for the provider to use clinical judgment on how to proceed, possible administration of a subsequent scale, and a two-week follow up with a primary care physician. Therefore, secondary outcomes as measured in this study should be interpreted cautiously with respect to the presence or absence of change in depression or cognition given a single treatment of AMT during acute hospitalization.

The lack of meaningful change in cognition or depression was not surprising considering the AMT treatments specifically targeted mood elevation. Furthermore, in-hospital acute ischemic stroke care emphasizes hemodynamic stabilization such as blood pressure and oxygen delivery and evaluation of depression and functional skills such as activities of daily living and communication (Powers et al., 2018). Findings are intended to be incorporated into discharge planning and the care transition to the discharge location (Powers et al., 2018). In line with this approach to health care, the AMT treatment designed for this study specifically targeted state mood elevation housed within an assessment-focused treatment process (see Appendix G). During AMT, findings were immediately incorporated into the treatment to elevate state mood and, when appropriate, aid in the transition to rehabilitation through verbal processing.

Comments from participants encourage further investigation into the effects of AMT to carry over through transition to rehabilitation. For example:

“I thought it [music therapy] helped mood and feeling of well-being, also a better outlook on future events.”

and

“[Music therapy was] very uplifting and gives you a feeling of self-confidence you need to get back into the main stream of life again.”

Though no change was seen in depression or cognition following a single treatment of AMT, longitudinal studies would be important to monitor the long-term effects of AMT. Sarkamo et al. (2008) reported that two months of music listening significantly improved depression, confusion, verbal memory, and focused attention. Following 16 weeks of active music therapy interventions, Pool (2013) found significant improvements in sustained attention and immediate memory recall. Thompson et al. (2016) found significant improvements in mood following one session but did not find improvements in depression until after 10 sessions. Taken together, the studies suggest that multiple music therapy sessions may significantly influence depression and cognition following acquired brain injury; however, application during acute hospitalization have yet to be demonstrated and may require multiple exposures.

The PHQ-9 and MiniMoCA were part of standard care screenings at the study site for depression and cognition. The PHQ-9 was used to assess depression with items prompting participants to report on symptoms over the past two weeks. The average length of hospitalization for study participants was seven days, thus not allowing for enough time to detect depression changes resulting from the stroke. Additionally, the use of the full MoCA may allow for a more complete understanding of changes in cognition. Historically in music therapy literature, the Mini Mental Status Exam has been used to assess cognition. Therefore, further consideration of potential measures for cognition and depression in this population is warranted.

Findings indicated that in addition to mood, music therapy treatment most often targeted fine and gross motor skills, followed by communication goals during acute hospitalization (see Table 3.6). A recent Cochrane review identified music therapy as an effective treatment for persons with acquired brain injuries in the areas of motor skills, specifically upper extremity functioning and gait training, and communication including naming and speech repetition (Magee et al., 2017). Additionally, many researchers targeting mood as a primary outcome following stroke, have also addressed other outcomes with the same treatment (Clark, Baker, & Taylor, 2012; Jun et al., 2012; Nayak et al., 2000; Pool, 2013). Thus, it appears possible to have multiple goals within a music therapy treatment and still effectively elevate mood.

AMT treatment variables of dosing were observed, but not evaluated during this investigation. Results could be used as a starting point for music therapy care guidelines during acute hospitalization following stroke for mood elevation. One treatment of AMT averaged 31 minutes ($SD = 6.78$). Nineteen of 44 participants (43%) received two treatments prior to being discharged and one received three. On average, participants received 1.48 treatments. Since more than one treatment was not always possible during hospitalization, it is encouraging that one 31-minute treatment had a significant impact on mood. This finding is in line with work reporting the effects of single-session music therapy intervention in the acute care hospital for patients receiving care for cancer and organ transplant (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015). Dosing is important to consider in future studies to determine if the quantity of treatment sessions during acute care would produce different results.

Investigating participants' perceptions of treatment is valued in music therapy research (Fredenburg & Silverman, 2014a; Pool, 2013). In the present study, participants were asked to comment on their experience with music therapy. The largest category that emerged from responses was that music therapy was a positive experience. This is consistent with similar research that elicited participant perceptions of music therapy following stroke (Forsblom et al., 2009; Kim et al., 2011). A novel finding in the present study was that the second largest category reported related to characteristics of and references to the music therapist. In reviews, music therapy, which includes the relationship between the music therapist and the participant(s) (Dileo, 2006), is consistently found to be more effective in medical and acquired brain injury populations when compared to music medicine which does not involve a therapeutic relationship with a music therapist (Dileo, 2006; Magee et al., 2017; Standley, 2000; Yinger & Gooding, 2015). The participant-therapist relationship is "likely to have an additive effect on the outcome" in neurologic rehabilitation (Sihvonen et al., 2017, p. 657). Future studies should consider replication with multiple clinicians to determine the impact on outcomes.

Patient (and caregiver) levels of engagement and motivation are increasingly viewed as being associated with good rehabilitation outcomes and linked to individualized goal setting (Langhorne et al., 2011). Additional findings from comment analysis may be linked to engagement and motivation such as self-identified changes in mood, positive perceptions of active engagement, the impact of participant music preference, and identification of personal insights and depth of the experience. Fredenburg and Silverman (2014b) suggested that different types of active music

therapy intervention could increase patient engagement and possibly result in stronger treatment effects after finding that receptive patient-preferred live music could significantly influence affect for hospitalized patients receiving a bone marrow transplant. In other words, receptive PPLM combined with, or as a catalyst to active intervention, could have elevated effects on affect, motivation, and engagement of patients. Several comments from participants indicated a level of surprise in personal engagement and mood shift. For example:

“It was good. She did a good job! She made me play the tambourine with my left hand, she wouldn't let me use my right. It was good. Had George Strait!”

and

“Very nice; knew all of the songs; I think it made me more cheerful; enjoyed her visit/music; I was smiling like an idiot.”

Personal insight and increased levels of motivation and engagement during a critical window of rehabilitation during which depression can predict long-term outcomes is compelling when seeking options to prevent the development of post-stroke depression (PSD). Relatedly, emotion regulation is an active process that involves effort-based action (Gross, 2015). Thus, it is important to consider the possibility that if participants experience positive, active engagement both psychologically (e.g., mood shift) and physically (e.g., singing, playing instruments, moving to music), AMT may prevent or mitigate the onset of PSD. Though the long-term impact of AMT on the development of PSD was not studied in the present investigation, future inquiry may benefit from follow up evaluation. In order to have long-term effects, it may also be necessary to adjusting treatment to address emotion regulation in a more robust fashion

as opposed to the focus on externally driven (by the music therapist), state (current) mood elevation in the present study. For example, in acute medical care, Fredenburg and Silverman (2014a) used PPLM with cognitive behavioral techniques to help patients learn to cope with fatigue, and Ghetti (2011) incorporated Active Music Engaged and Emotional Approach Coping to improve well-being, demonstrating the feasibility of such approaches.

Limitations and Recommendations

Mood was selected as the construct of choice to evaluate if a meaningful change could be measured in one treatment at the acute hospitalization stage of stroke recovery. Emotion modulation, such as changes in state mood following one 31-minute treatment, however, does not imply that music therapy treatment impacts the development or continuation of depression, which requires a longer period to observe (i.e., at least two weeks). Because of the brevity of hospitalization, depression could not be accurately measured. Therefore, results from this study do not suggest carryover effects beyond the immediate change in mood.

The music therapist administering treatment was blinded to all outcome measures. Study personnel were trained in Mini MoCA and PHQ-9 administration, staff was instructed on The Faces Scale administration, and medical team members were assumed to have training on Mini MoCA, PHQ-9, and NIHSS administration. However, because multiple medical team members administered measures, it is possible that reliability across measure administration was lacking and could include bias. Future studies may consider having dedicated measure administrators and prior evaluation of interrater reliability. An additional barrier in measure administration not accounted for

was the possibility of visual impairment following stroke, which could influence participants' ability to complete the primary measure accurately. A visual screen is recommended as part of the enrollment process for future studies.

AMT treatment guidelines are provided; however, limitations exist in relation to precise replication (Appendix G). Lee, Davidson, and McFerran (2016) acknowledge that working with adults in hospitalized settings is often unpredictable with a wide array of interventions used based on patient characteristics. Similarly, Cassileth et al. (2003) described individualized music therapy in the acute medical setting based on discussion of music preferences and clinical problems with patients to determine appropriate content for music therapy treatments. As a result, provided guidelines do not account for details, such as when, how, and why specific techniques or music may be implemented across the treatment. Though this type of specification has been called for (Ard & Wheeler, 2016; Robb et al., 2011), it is incompatible with the dynamic acute hospital setting and others, which require moment-to-moment treatment adjustment. To address this limitation and increase fidelity of treatment in dynamic settings, future research should investigate the clinical decision-making process in order to answer the when, how, and why questions of music therapy treatment implementation.

A strength of the present study was the homogeneity of the sample. Study participants were white adults averaging 68 years of age who had experienced a first-time acute ischemic stroke resulting in mild to moderate stroke severity. However, this presents a limitation in the ability to generalize findings to other age ranges, cultural backgrounds, race, and stroke severities. Additionally, there was no control group and the same music therapist, who was also the study PI, administered all treatment. Future

studies may consider the addition of a control group and replication of treatment administered by different music therapists.

Conclusion

A single AMT treatment lasting an average of 31 minutes significantly improved mood during acute hospitalization for adults following a first-time acute ischemic stroke. In addition to quantitative findings, AMT, involving the elicitation of active participation, was viewed as a positive experience for stroke survivors. Furthermore, participant comments highlighted therapist characteristics and use of patient-preferred live music as memorable parts of the treatment experience. Future studies may consider the impact of multiple AMT treatments. While some treatment variables were identified, such as treatment duration and additional goals addressed, future investigation into when, why, and how clinical decisions are made could provide a more detailed framework for acute stroke care music therapy. In conclusion, findings here support the use of brief active music therapy to provide early psychological support to stroke survivors and the continued investigation into the role of music therapy in early stroke recovery.

Table 3.1*Medications Monitored*

Medication	Trade Name	Use
Diphenhydramine	Benadryl	Antihistamine
Hydroxyzine	Vistaril	Anxiety/antihistamine
Lorazepam	Ativan	Seizures/anxiety
Diazepam	Valium	Sedative
Haloperidol	Haldol	Antipsychotic
Risperidone	Risperdal	Antipsychotic
Standard intensive care sedatives		
Propofol		General anesthetic
Fentanyl		Narcotic - Pain
Midazolam		Sedative
Rocuronium	Zemuron	Paralytic

Table 3.2*Stroke Location*

	<i>n</i>	%
Left	16	36.4
Right	24	54.6
Left & Right	2	4.5
Unknown	2	4.5
Anterior	7	15.9
Posterior	14	31.8
Unknown	23	52.3

Table 3.3*National Institute of Health Stroke Scale (NIHSS) Scores*

NIHSS	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Med	Max	Range	<i>p</i>
Hospital admission	44	6.75	6.53	0	5	25	25	
Study entry	43	5.05	4.29	0	4	21	21	
Treatment 1 (Tx 1)	42	4.71	4.06	0	4	20	20	
Hospital discharge (DC)	43	3.81	3.66	0	3	13	13	
Change DC - admission	43	-2.98	5.62	-20	-2	6	26	0.012
Change DC – Tx I	41	-0.78	2.67	-8	0	6	14	0.069

Note. Higher scores indicate higher stroke severity. Scores range from 0-42.

Table 3.4*Change in The Faces Scale*

	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Med	Max	Range	<i>p</i>
Pre	43	3.26	1.79	1	3	7	6	
Post	44	2.41	1.82	1	2	7	6	
Change	43	-0.84	1.63	-6	-1	5	11	0.002

Note. A decrease in scores represents a decrease in negative mood.

Table 3.5*Depression and Cognition Scores*

Measure	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Med	Max	Range	<i>p</i>
Mini MoCA admission	32	8.06	3.11	0	9	12	12	
Mini MoCA discharge	29	9.24	2.73	4	10	12	8	
Mini MoCA change	25	0.68	2.56	-7	1	5	12	0.197
PHQ-9 admission	38	5.61	4.7	0	5	18	18	
PHQ-9 discharge	33	6.27	5.12	0	5	18	18	
PHQ-9 change	33	0.58	4.35	-9	0	12	21	0.453

Note. Lower Mini MoCA scores indicate greater impairment. Higher PHQ-9 scores indicate greater impairment. MoCA = Montreal Cognitive Assessment; PHQ-9 = Patient Health Questionnaire.

Table 3.6*Goals Addressed in Addition to Mood*

Goal	<i>n</i> Treatment 1
Fine/Gross Motor	9
Speech Stimulation	3
Coping	2
Self-Expression	2
Family Support	2
Pain	-
Relaxation	1
Neglect	1
Coordination	1
Normalization	1
Anxiety	1
Spiritual Support	1

Table 3.7*Participant Comments on Music Therapy Treatment*

Category	<i>n</i> *	Examples
Experience as positive	23	“I really enjoyed it. It was really nice.” “I think it’s a great thing... I loved it.” “I didn’t think I would enjoy it, but I did.”
Characteristics of/reference to the therapist	11	“She was very nice....” “She does a great job.” “She can sing.”
Other	8	“The nurse came in and asked if we were having a party.” “...it didn’t do anything for me. I can’t even watch TV or get into a ball game right now.”
Self-identified change in mood/state	6	“...uplifting for mood....” “I thought it helped mood and feeling of well-being....” “I think it made me more cheerful... I was smiling like an idiot.”
Impact of participant music preference	6	“She actually played what I wanted....” “...played the music I liked.” “Played my favorite music....”
Active engagement	6	“I even played along....” “I got to play the tambourine.” “Got to talk....”
Personal insight/depth of the experience	5	“...gives you a feeling of self-confidence you need to get back into the mainstream of life again.” “...took my mind off of [?].”
Comments on music	3	“I enjoyed the beat.” “I enjoyed the instrumental more than the vocal.”
Full comment examples		“I thought it helped mood and feeling of well-being, also a better outlook on future events.” “Enjoyed it; entire thing was great; she actually played what I wanted, made me feel important; liked country music.” “Boosted my spirits. I even played along. Took my mind off of [?].”

**n* = comments per category

Figure 3.1. The Faces Scale

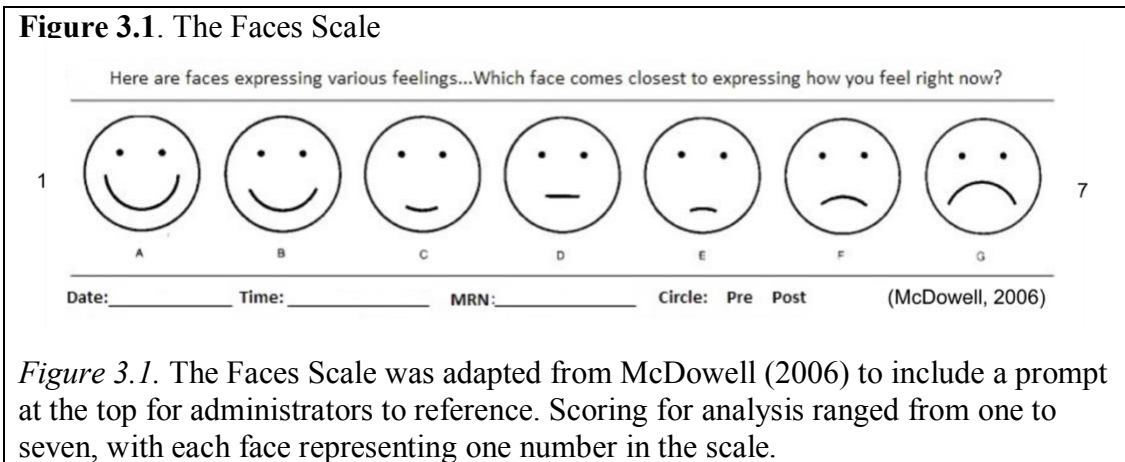
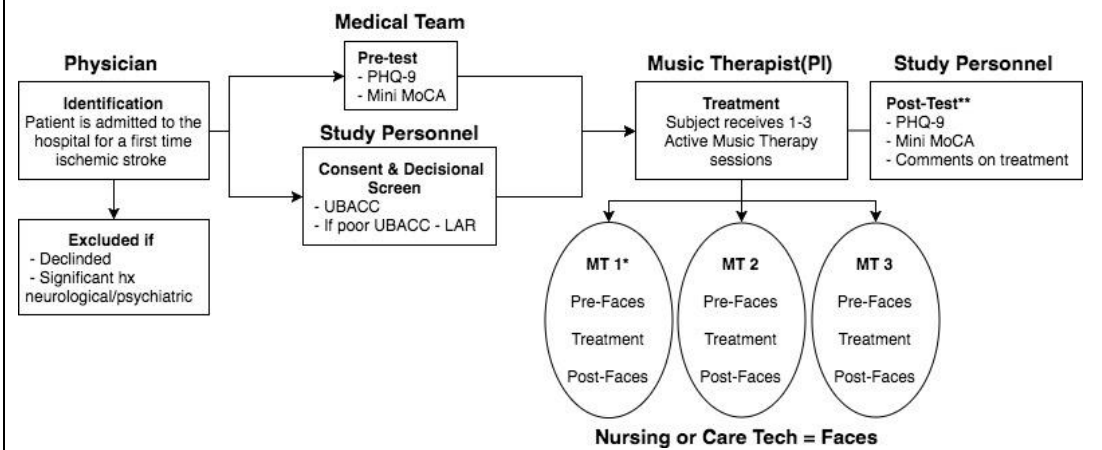


Figure 3.1. The Faces Scale was adapted from McDowell (2006) to include a prompt at the top for administrators to reference. Scoring for analysis ranged from one to seven, with each face representing one number in the scale.

Figure 3.2. Study Procedure



*Figure 3.2. Flow chart of study procedures. *Change in The Faces Scale across one music therapy treatment was the primary endpoint. **Post-tests were administered within 24 hours following the third treatment or as close to discharge as possible if a subject had received at least one treatment but fewer than three treatments and was being discharged.*

Figure 3.3. Study Flow Chart

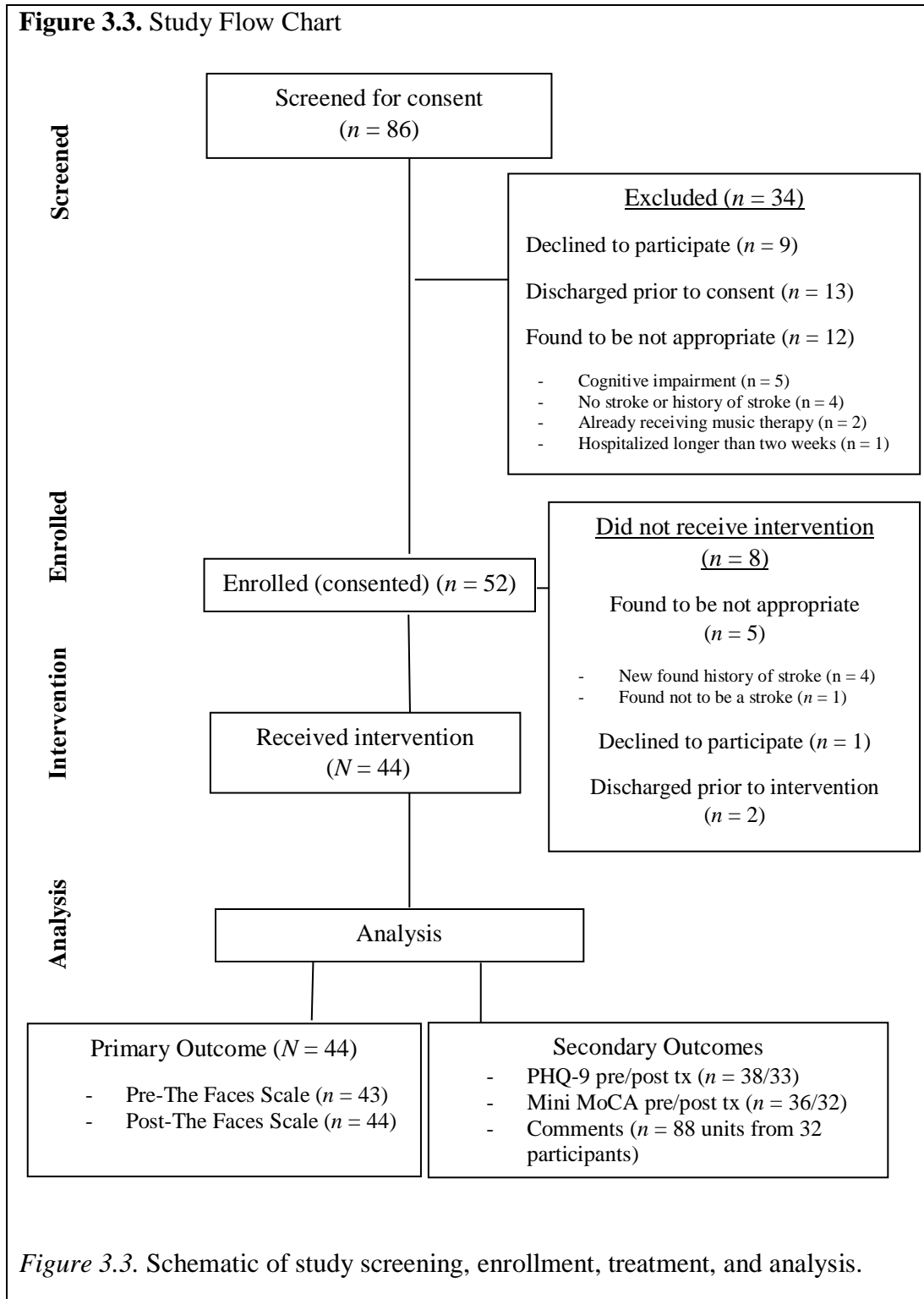


Figure 3.3. Schematic of study screening, enrollment, treatment, and analysis.

Chapter 4: The Effects of Active Music Therapy Intervention on Mood Following First-Time Acute Ischemic Stroke: Is More Better?

Background

Trials involving music therapy treatments with adults in acute medical settings often investigate the impact of single-session treatments (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015; Madson & Silverman, 2010; Rosenow & Silverman, 2014). These studies are largely rooted in patient preferred live music intervention and are conducted with adult patients in bone marrow and solid organ transplant units. Trials have found improvements in mood, including positive and negative affect (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015), anxiety (Madson & Silverman, 2010; Rosenow & Silverman, 2014), stress (Crawford et al., 2013), fatigue (Rosenow & Silverman, 2014), and relaxation (Crawford et al., 2013). One study revealing immediate improvements in affect also showed continued improvement in total mood disturbance with continued intervention (Cassileth et al., 2003). Encouraging results have led investigators to recommend dosing as a target area of future research to determine if stronger treatment effects can be achieved with continued intervention (Fredenburg & Silverman, 2014a; Magee & Davidson, 2002; Wheeler et al., 2003).

A few researchers have begun exploring dosing within neurologic rehabilitation. Wheeler et al. (2003) evaluated the impact of dosing for participants who received music therapy to increase mood and social participation during chronic phases of traumatic brain injury and stroke recovery. Researchers found that increased numbers of

treatments were associated with social participation and family ratings of participant mood, leading researchers to advocate for longer periods of music therapy (Wheeler et al., 2003). Looking at brief intervention, Magee and Davidson (2002) found that two sessions of music therapy during acute neurorehabilitation for a variety of diagnoses significantly improved POMS subscales of composed-anxious, energetic-tired, and agreeable-hostile, but not depressed-elated. The authors argued that while the interventions (song choice or improvisation) demonstrated improvement in motivation in rehabilitation, differences in dosing may need to be explored to target depression (Magee & Davidson, 2002).

In long-term chronic care, Thaut et al. (2009) found a significant improvement in emotional adjustment, depression, and anxiety following one group session of music therapy. Another study provided dosing results across 20 sessions, collecting data at every fifth treatment (Guetin et al., 2009). This study was based on a multi-intervention approach (receptive and active) of music therapy for institutionalized participants with traumatic brain injuries. Researchers found that mood was significantly improved immediately after one session and continued to improve across time with a significant change in mood, seen from baseline following each fifth session. Overall mood continued to improve, suggesting a dose relationship.

One recent investigation looked at brief active music therapy (AMT) for patients admitted to the hospital following a first-time ischemic stroke. A significant improvement in mood was found following one treatment (Rushing, Lee, Yan, & Dressler, 2018). Due to the encouraging results from brief acute medical care music therapy and the supporting literature in long-term neurologic rehabilitation indicating

some dosing effects, further investigation into dosing in acute medical settings following acquired brain injury was warranted. The purpose of this study was to determine the effect of two AMT treatments on elevating mood following a first-time acute ischemic stroke. It was hypothesized that two treatments would have a positive impact on mood.

Research Question

What is the effect of two active music therapy treatments on mood for adults following a first-time acute ischemic stroke during acute hospitalization? Specifically, would the change in The Faces Scale from prior to any AMT to following receipt of the last AMT treatment differ between those that received one versus two treatments?

Methods

Research Design and Setting

A single-arm, repeated measures design was used to evaluate the effects of active music therapy on mood following stroke. Two groups were stratified based on the number of treatments received during hospitalization. Groups were not predetermined or randomized. Group 1 consisted of participants who received one AMT treatment ($n = 25$) and Group 2 consisted of participants who received two AMT treatments ($n = 19$) during their hospitalization. This study took place at a large university affiliated teaching hospital in the southeastern United States. The study was approved by the Institutional Review Board where the research took place (Appendix A).

Participants

Participants included English speaking adults (≥ 18 years of age) admitted to the hospital for a first-time acute ischemic stroke. Participants were recruited within the first two weeks of hospital admission. Participants were excluded if they had, or were found

to have, a prior stroke or prior neurological or psychiatric disease such as Lewy Body Dementia, severe Alzheimer's, Schizophrenia, Schizoaffective disorder, or other severely debilitating condition. Depression was not considered an exclusion criterion.

Measures

Participant characteristics and treatment variables. Participant characteristics collected included: age; gender; race; stroke side (right or left); vascular distribution (anterior or posterior); National Institute of Health Stroke Scale (NIHSS) score at hospital admission, at study entry, prior to each music therapy treatments, and at hospital discharge; and discharge location. The NIHSS is a 15-item scale measuring stroke severity. Scores range from zero to 42, with higher scores indicating greater stroke severity (Kwah & Diong, 2014). Treatment variables collected included: duration of treatment, quantity of treatments, and length of hospitalization. Pharmacological data were monitored for potentially altering agents such as sedatives administered within 24 hours prior to treatment (Table 4.1). No study participants received any medication within 24 hours of music therapy treatment.

Primary outcome. To measure change in mood, The Faces Scale was used (see Figure 3.1) (McDowell, 2006). The Faces Scale is a self-report, seven-point scale consisting of seven face illustrations. Each face has fixed eyes and a mouth that changes across the seven points from a smile to a frown. Respondents were told, "Here are faces expressing various feelings.... Which face comes closest to expressing how you feel right now?" For analysis, faces were numbered one through seven. The higher the number, the higher the negative mood state.

Two major factors contributed to the decision to use The Faces Scale: simplicity and ease of administration coupled with the fact that it has been used in previous studies (Nayak et al., 2000; Thompson et al., 2016). Nayak et al. (2000) successfully used The Faces Scale prior to and following treatment sessions to monitor change in mood for participants receiving group music therapy during inpatient rehabilitation following stroke and traumatic brain injury. Guetin et al. (2009) used a different version of a faces to evaluate the effects of music therapy on mood in chronic traumatic brain injury treatment.

Additional measures. Depression was evaluated using the Patient Health Questionnaire (PHQ-9). The PHQ-9 (Appendix B) is a nine-item questionnaire based on the DSM-IV criteria for depression (Kroenke et al., 2001). It is validated as a diagnostic and screening instrument for post-stroke depression (Williams et al., 2005). Scores range from zero to 27, with zero indicating no depression. Participants were asked to indicate, “Over the last two weeks, how often you have been bothered by any of the following problems?” For example, “Feeling down, depressed, or hopeless.” Responses range between zero (not at all), one (several days), two (more than half the days), and three (nearly every day). Scores of one to four indicate minimal depression; five to nine, mild depression; 10 to 14, moderate depression; 15 to 19, moderately severe depression; and 20 to 27, severe depression. A score of less than 10 is regarded as clinically significant, as major depression rarely occurs for individuals with a score of less than 10, and the likelihood of major depression increases beyond a score of nine (with scores greater than 14 usually signifying major depression) (Kroenke et al., 2001).

The Mini MoCA (Appendix C) is a short form of the Montreal Cognitive Assessment (MoCA) (Nasreddine et al., 2005). It was used to evaluate cognition at admission and discharge. Mini MoCA scores range from zero to 12, with zero to six indicating possible severe cognitive impairment, seven to nine indicating possible moderate cognitive impairment, and 10 to 12 indicating mild or no cognitive impairment. Respondents are tested on orientation, verbal fluency, and delayed recall. The strengths of using the MoCA as a post-stroke assessment include its feasibility, brevity, ease of use, correlation with cognitive and functional outcomes, free access, and availability of short versions of the assessment (Chiti & Pantoni, 2014). Limitations of its use for the stroke population include lack of standardized norms, no clear cut-offs to define cognitive impairment, inability to use it with patients experiencing severe aphasia, and gaps in assessment areas such as intellectual functioning (Chiti & Pantoni, 2014).

Procedure

Medical team members identified potential participants who met criteria for study inclusion. Once identified, prospective participants were asked by a known provider from their medical team if they were willing to be approached by study personnel to learn more about the study. Potential participants were visited in their hospital room by study personnel who described the study, administered the UCSD Brief Assessment of Capacity to Consent (UBACC) (Jeste et al., 2007) to determine decisional capacity, and obtained informed consent. The UBACC was adapted for the purposes of this study (Appendix D). Informed consent was obtained as close to hospital admission as possible with a maximum period of two weeks following admission

(Appendix E). When a participant demonstrated impaired capacity for consent, a legally authorized representative (LAR) was asked to sign consent on behalf of the subject. On the occasion of the use of a LAR, the participant was read an assent form, which he or she then signed (Appendix F).

Pretest depression scores (PHQ-9) and cognitive scores (Mini MoCA) were completed as soon as possible following admission to the hospital. Both tests were part of standard patient care at the study site. Pre-test measures served as baseline data. After providing informed consent and pre-test scores, participants began receiving music therapy treatment as soon as the principle investigator (PI) was available. Availability ranged from immediately to within approximately 24 hours. The Faces Scale scores prior to the first AMT treatment served as baseline data (pre-test). After providing informed consent and pre-test scores, participants begin receiving music therapy treatment as soon the principal investigator (PI) was available; which ranged from immediately to within approximately 24 hours. The Faces Scale (McDowell, 2006) was administered prior to and following each music therapy treatment by the patient's nurse or care technician. Nurses and care technicians were given instructions on proper scale administration by the PI. Participants received two music therapy treatment sessions facilitated by the PI (a board-certified music therapist). The Faces Scale scores collected following the last AMT treatment received served as primary outcome posttests. Participants were not randomized as to dose. Participants who were available received two treatments. In other words, participants who received two treatments most likely had a longer hospital stay, thus allowing time for the PI to return for a second treatment.

Intervention

The music therapy treatment consisted of active music therapy (AMT) administered by the PI, a board-certified music therapist (MT-BC) with approximately 10 years of experience in medical settings. AMT was defined as music making interventions that elicited and encouraged active engagement from participants involving creating music, playing instruments, singing, improvising, and/or moving to music (Sihvonen et al., 2017; Vink et al., 2004). During AMT participants were supported and encouraged by the PI to create, participate in, and/or move to music. Materials used consisted of but were not limited to a six-string acoustic steel string guitar, hand-held percussion instruments such as tambourines, paddle drums, egg shakers, and electronic instruments accessed through GarageBand on an iPad.

All interventions used patient preferred live music (PPLM) when possible. PPLM is defined as “a receptive music therapy experience involving music selected and preferred by the patient that is performed live by a qualified music therapist” (Silverman et al., 2016, p. 2). It has been noted that hospitalized patients may initially prefer receptive music therapy interventions such as PPLM (Crawford et al., 2013; Silverman et al., 2016). Therefore, to build rapport and develop a therapeutic alliance, treatments for participants started with PPLM followed by opportunities for more active participation (Bruscia et al., 2009; Silverman et al., 2016; Standley, 2000). Age-appropriate music was selected by the PI if music preference was not provided by the participant or if participant music preference was not familiar to the PI. Treatment duration for all treatments was approximately 25 minutes. Twenty to 30 minutes has been reported in brief medical music therapy literature with promising results for

targeting mood constructs (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Hogan & Silverman, 2015).

A typical treatment involved a pre-treatment review of participant electronic medical records, greetings and introductions, sharing of information about treatment, ongoing assessment of the participant's musical interests and stroke experience, PPLM and assessment of the participant responses to music and secondary goal areas as needed (communication and movement), interventions for mood elevation and secondary goals if appropriate, a treatment closure period of PPLM or other intervention, and goodbye. See Appendix G for complete AMT treatment guidelines.

Analysis

Sample size analysis indicated that 24 participants receiving one dose of AMT and 16 participants receiving two doses of AMT were needed to detect a one-point change in the mean The Faces Scale score with 80% power at a two-sided 0.10 significance level. It was assumed that those who received one treatment would have a one-point change and that those who received two would have a 2.5-point change. A one-point change was identified as meaningful assuming a standard deviation of 1.89 based on a previous music therapy study that used The Faces Scale (Nayak et al., 2000). This corresponds to a large effect size of 0.79 between dosing groups.

Baseline demographic and stroke characteristics were compared between those that received one treatment versus those that received two treatments using Fisher's exact tests and two-sample *t*-tests for categorical and continuous variables, respectively. The Faces Scale change scores were calculated as the last post-treatment The Faces Scale score (happening immediately after the first treatment for those that only received

one treatment (Group 1) and immediately after the second treatment for those receiving two treatments (Group 2) subtracted from the very first baseline pre-treatment The Faces Scale (before any treatment occurred). A repeated measures ANOVA was constructed to model the number of AMT treatments received (one versus two), time point of The Faces Scale administration, and the interaction between time point and the number of treatments received. ANOVA models were also used to explore differences in measures (PHQ-9, Mini MoCA, and NIHSS, length of hospitalization, and duration of AMT session) between Group 1 and Group 2. Baseline demographics of stroke vascular distribution, location, and NIHSS scores at admission were included as possible covariates in these models to adjust for differences seen between groups, as these participant cohorts were not randomized to the number of sessions received. Backwards selection and Akaike information criterion (AIC) were used to identify best model fit. All analyses were conducted using SAS 9.4.

Results

A total of 44 participants received AMT treatment. Group 1 included participants who received one treatment of AMT ($n = 25$). Group 2 included participants who received two treatments of AMT ($n = 19$). Alpha of .10 was selected due to design and sample size considerations.

For participant characteristics, significant differences were found between groups for stroke location (stroke side $p = 0.064$; vascular distribution $p = 0.061$). Participants in Group 1 had more strokes occur on the right side and with more anterior vascular distribution as compared to those in Group 2. See Table 4.2 for stroke location breakdown. Significant differences between groups were also found for NIHSS scores at

admission, as participants in Group 2 had significantly higher scores ($M = 9.68$, $SD = 7.80$) upon admission as compared to Group 1 ($M = 4.52$, $SD = 4.33$, $p = 0.015$). There were no significant differences between groups for gender ($p = 0.205$), age ($p = 0.589$), or race (all participants were white). There were no significant differences between groups at admission for depression (PHQ-9) or cognition (Mini MoCA). See Table 4.2 for complete demographic and baseline information.

A repeated measures ANOVA was constructed to assess differences in The Faces Scale scores. The best model incorporated time of The Faces Scale administration ($p = 0.023$), group ($p = 0.581$), and the interaction between time and group ($p = 0.05$), and it was adjusted for vascular distribution ($p = 0.035$), stroke side ($p = 0.002$), and NIHSS score at admission ($p = 0.001$). There were many differences in The Faces Scale scores simply due to stroke characteristics. Holding all other variables constant, a one-point increase in NIHSS at admission resulted in a 0.06 increase in average The Faces Scale score (i.e., higher stroke severity resulted in worse average mood).

Similarly, when looking specifically at vascular distribution, those with anterior strokes had on average The Faces Scale scores of 0.926 higher than those with posterior strokes ($p = 0.044$), and those with anterior strokes had no significant difference in The Faces Scale scores compared to those with unknown vascular distributions ($p = 0.524$). Those with posterior vascular distributions on average had The Faces Scale scores of 0.64 lower than those with unknown vascular distributions ($p = 0.026$). In other words, participants with posterior strokes tended to have better mood as compared to those with anterior or unknown vascular distributions. For stroke side, those with bilateral strokes had The Faces Scale scores on average 1.02 higher than those with left side only ($p =$

0.08). Additionally, those with strokes affecting only the left side had average The Faces Scale scores 1.03 lower than those affecting only the right side ($p < 0.001$). In other words, those with left side only strokes tended to have better mood as compared to those with right side only or bilateral strokes.

Model estimates for time by group are displayed in Table 4.3. Adjusting for stroke side, vascular distribution, and NIHSS at admission, there was no significant difference in mood between groups at pre-AMT treatment one ($p = 0.280$) and post-treatment one ($p = 0.109$). There was a significant improvement between pre- and post-treatment one in Group 1 ($p = 0.037$), but no significant improvement in mood between pre- and post-treatment one for Group 2 ($p = 0.524$). However, there was a significant improvement in mood pre- and post-treatment two for Group 2 ($p = 0.017$). See Figure 4.4 for an illustration of The Faces Scale scores by time point.

To assess for differences in dosing regimens using the above described ANOVA model, the researchers compared changes between the final The Faces Scale score after the last treatment received and the very first The Faces Scale score before any treatment (i.e., the difference between those who received only one treatment versus those who received two treatments). Adjusting for stroke side, vascular distribution, and NIHSS at admission, the final change for Group 1 (calculated as post-treatment one minus pre-treatment one) was on average -1.024 ($SE = 0.488$), and the final change for Group 2 (calculated as post-treatment two minus pre-treatment one) was on average -0.459 ($SE = 0.306$). Change was not statistically different between groups ($p = 0.328$). Mean change in The Faces Scale scores by group is illustrated in Figure 4.5.

Repeated measured ANOVA models explored differences between Group 1 and Group 2 for cognition (Mini MoCA) and depression (PHQ-9), while considering stroke side, vascular distribution, time of measure administration (hospital admission or discharge), and NIHSS at admission. In regard to cognition, the final model only included group and vascular distribution. Time of Mini MoCA administration (hospital admission or discharge), NIHSS at admission, and stroke side were not associated with changes in Mini MoCA scores. Those who had only one treatment had an average Mini MoCA score of 9.46 ($SE = 0.30$) as compared to an average score of 7.34 ($SE = 0.37$) for those receiving two treatments ($p < 0.001$). Therefore, adjusting for vascular distribution, those who received two treatments had worse cognition as compared to those who received only one treatment. Additionally, there were differences between vascular distributions (all p-values < 0.05). The average Mini MoCA score for posterior strokes was 6.94 ($SE = 0.40$), anterior strokes was 8.46 ($SE = 0.55$), and unknown distributions was 9.81 ($SE = 0.30$). On average participants with posterior strokes presented with lower cognitive scores.

In regard to depression, time of PHQ-9 administration (hospital admission or discharge), group, and vascular distribution did not have a significant impact and were removed from the final model. However, NIHSS at admission and stroke side were associated with depression. On average, for every one unit increase in NIHSS score at admission, PHQ 9 scores increased by 0.23 ($p = 0.012$). In other words, higher stroke severity resulted in worse depression. Regarding stroke side, those with bilateral strokes had an average PHQ-9 equal to 13.772 ($SE = 2.16$), left had an average equal to 5.25 ($SE = 0.87$), right had an average of 5.63 ($SE = 0.66$), and unknown side had an average of

3.54 ($SE = 2.99$). Those with bilateral stroke distributions had significantly worse depression than those with left only ($p < 0.001$), right only ($p < 0.001$), and unknown ($p = 0.007$), and all other comparisons were not significantly different.

For NIHSS scores at discharge, there were no significant associations with group, vascular distribution, or stroke side. When adjusted for admission NIHSS scores, no significant differences were found for change in NIHSS between groups prior to treatment one ($p = 0.234$) or at discharge ($p = 0.409$).

Collectively, Group 1 had generally less cognitive impairment and lower stroke severity. Due to the small sample size and lack of randomization, these findings are to be interpreted with extreme caution. Of note is that mean levels of all measures for both groups generally fell on the lower side of severity ranges.

Adjusting for NIHSS score at admission, duration (in minutes) of treatment one was found to be significantly longer for Group 1 ($M = 32.73$, $SD = 8.83$, $p = 0.025$) compared to Group 2 ($M = 27.77$, $SD = 10.25$; Table 4.4). The mean duration of treatment two for Group 2 was 27.77 minutes ($SD = 10.22$). Length of hospital stay (LOS) ranged from one to 23 days. Adjusting for NIHSS score at admission, Group 2 had a significantly longer LOS (in days) ($M = 8.40$, $SD = 6.23$) compared to Group 1 ($M = 6.06$, $SD = 5.37$, $p = 0.077$). For every one unit increase of NIHSS score at admission, LOS increased by 0.402 days ($p < 0.001$). In regard to treatment frequency, there were no significant differences between groups for time from admission to treatment one ($p = 0.796$); however, for every one unit increase of NIHSS score at admission, time to treatment one increased by 0.162 days ($p = 0.012$). Mean time from hospital admission to treatment one was 3.68 for Group 1 and 3.47 for Group 2. Time from treatment one to

treatment two was a mean of 2.26 days. See Table 4.5 and Figure 4.6 for more information on length of hospitalization and frequency of treatment, respectively.

Discussion

The purpose of this study was to investigate the effectiveness of two treatments of active music therapy (AMT) as compared to one on change in mood for adults hospitalized following a first-time acute ischemic stroke. This study sought to build on previous research demonstrating the effectiveness of one AMT treatment following a first-time acute ischemic stroke (Rushing et al., 2018). Participants enrolled in this study received one or two AMT treatments based on participant and PI availability during hospitalization. Therefore, to evaluate outcomes, participants were stratified into two groups: those who received one AMT treatment and those who received two; Group 1 and Group 2, respectively.

Baseline group differences were found for stroke side (left and right) and stroke vascular distribution (anterior and posterior). Additionally, a significant difference was found between groups for stroke severity at hospital admission, with Group 2 presenting with higher stroke severity. Length of hospitalization was also significantly longer for Group 2. Differences in participant and stroke characteristics are likely due to the lack of randomization. Because the amount of AMT was not controlled for, it is not surprising that those with more severe strokes and longer hospitalizations received more AMT. This approach to participant treatment is in line with the new emphasis on pragmatic trials. Pragmatic trials allow for more flexibility during recruitment with variables controlled for during analysis or through multi-site control groups (Salive, 2017).

ANOVA models were constructed to account for baseline differences and to look at changes in mood across time from prior to any AMT to following the last AMT (post treatment one or two depending on group). Results indicate that there was no significant difference in mood change across time due to dosing (receipt of two treatment as compared to one). A significant improvement in mood was seen for Group 1 during treatment one and for Group 2 during treatment two. Findings from this study do not point to a dosage difference, however differences in the two groups may have impacted the results.

Baseline differences in stroke location (side and vascular distribution) were found and adjusted for across analysis. Lesion location has not been found to be consistently associated with PSD (Kim, 2016; Kutlubaev & Hackett, 2014). In the present study, it was seen that those with posterior strokes tended to have better mood (The Faces Scale scores) as compared to participants with anterior or unknown stroke vascular distributions. Those with posterior strokes also tended to present with worse cognitive scores, though cognition has also not been consistently associated with PSD (Kutlubaev & Hackett, 2014)). Participants with left side strokes tended to present with better mood compared to those with right side and bilateral strokes, and those with bilateral strokes had significantly higher depression scores. This finding contradicts the literature, which indicates that those with left side lesions have 26% greater odds of PSD in the acute phase. However, previous studies define acute as one to six months post stroke, which is beyond the time frame of the presented study (Douven et al., 2017). While stroke location may be of interest, there is inconsistent evidence as to its impact

on mood and PSD. Regardless of impact across the cohort, cognitive impairment, depression, and stroke severity were mild to moderate.

Stroke severity (and physical disability) in the acute phase has been identified as a predictor of post-stroke depression (PSD) and post-stroke mood disorders (Kim, 2016; Kutlubaev & Hackett, 2014). Similarly, the present study found that increased stroke severity at hospital admission was associated with a worse average mood and increased mean depression scores. Therefore, stroke severity was controlled for in analysis and is recommended as an important variable.

To date, this study (the entire dissertation cohort) is the first to evaluate brief music therapy treatment by a Board Certified Music Therapist within days following stroke onset. Several authors have enrolled participants within two weeks of stroke onset, providing a much longer regiment of treatment (Jun, Roh, & Kim, 2012; Sarkamo et al., 2008). In this study, participants received one or two AMT treatment starting approximately 3.5 days following hospital admission. The effectiveness of brief music therapy in acute hospital settings has previously been found with research conducted on oncology and organ transplant units. Researchers have found mood improvement following single music therapy sessions leading authors to encourage investigation into the effects of multiple sessions (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015). One study, which evaluated outcomes across multiple sessions, found that extended intervention in the acute medical setting demonstrated continued improvements in total mood disturbance (Cassileth et al., 2003).

Three brief music therapy treatment studies found immediate effectiveness in mood-based outcomes following ABI outside of the acute medical setting (Guetin et al., 2009; Magee & Davidson, 2002; Thaut et al., 2009). Thaut et al. (2009) found that one session of music therapy significantly improved emotional adjustment, depression, and anxiety. Magee and Davidson (2002) found that two sessions of music therapy significantly improved feelings of composed-anxious, energetic-tired, and agreeable-hostile, but not depressed-elated. Guetin et al. (2009) found that mood was significantly improved during the first session and from baseline to following every fifth session (20 sessions in total; data was collected in five-session intervals). However, depression was not seen to significantly improve until after the tenth session.

No significant difference between dosing groups was found for change in mood in the current study. It may be that a one-treatment variance was not large enough to see a difference. Music therapy studies for mood elevation following ABI commonly include several sessions and are often delivered into or beyond acute recovery. For example, Guetin et al. (2009) provided up to 20 sessions of music therapy for participants eight years post ABI showing immediate and continued mood elevation across time. More closely related to the present study timeline and population, two music therapy studies demonstrated improvement in mood following music therapy initiated within two weeks of stroke onset (Jun et al., 2012; Sarkamo et al., 2008). However, both studies consisted of two months of intervention with one treatment that also targeted physical goals and the other that used independent passive music listening (Jun et al., 2012; Sarkamo et al., 2008).

A meta-analysis of music therapy interventions for serious mental disorders found significant dose-effect relationships with small effect sizes being achieved after three to 10 sessions, and large effects after 16 to 51 sessions (Gold, Solli, Kruger, & Lie, 2009). Similarly, 500 minutes of music therapy, or at least 10 sessions, were needed to see an increase in the proportion of significant improvement to non-significant improvement for participants with schizophrenia (Chung & Woods-Giscombe, 2016). Dosing literature for psychotherapy treatment has found that more than 10 but fewer than 20 sessions are needed for 50% of participants to improve (Hansen, Lambert, & Forman, 2002). Of note is that patients actually only receive an average of fewer than five psychotherapy sessions (Hansen, Lambert, & Forman, 2002). Thus, a minimum of 3–10 sessions may be needed to demonstrate dosing difference for music therapy treatment targeting mood outcomes.

Group 1 and Group 2 were seen to improve at different rates (see Figure 4.4). Group 1 significantly improved mood during the first treatment. While pre- and post-treatment mood scores were not different between groups, Group 2 did not demonstrate a significant improvement until treatment two. It is interesting to note that mean mood scores for Group 2 continued to decline across time until post treatment two (see Figure 4.4). While there was no indication that two treatments are better than one, it is important to consider how group variables may interact with the effectiveness of a dosing regimen. One explanation for Group 2 not demonstrating improvement until the second treatment could be that different stroke severities may require different dosing. Group 2 had significantly higher NIHSS scores at hospital admission therefore it may be that increased stroke severity requires a greater dose of music therapy to demonstrate

positive improvement as was seen for Group 2 improving after two, but not one treatment. Research investigating music therapy treatment based on stroke severity is yet to be conducted.

One trial found continued improvement in total mood disturbance during acute hospitalization with continued music therapy doses during autologous stem cell transplant however, dosing was not specifically evaluated (Cassileth et al., 2003). Rather, frequency and duration of music therapy was determined based on participant need and not reported (Cassileth et al., 2003). When looking specifically at the impact of music therapy dosing following ABI, Wheeler et al. (2003), did not find an impact on self-reported mood. Associations with dosing were found based on the number and type of music therapy (group or one-on-one) on social participation and family ratings of participant mood.

Ard and Wheeler (2016) reviewed dosing, frequency, and duration of music therapy interventions following stroke concluding the need for increased reporting. Though frequency and duration were not evaluated for the present study, they are reported. It was found that on average, participants received their first AMT treatment three to four days from hospital admission. The second treatment was a mean of two days after the first. Acute care music therapy targeting mood elevation has been reported to be planned for 20–30 minutes (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b). Similarly, the duration of the first AMT treatment for this study was a mean of 33 and 28 minutes for Group 1 and Group 2, respectively. Group 2's first treatment was significantly shorter than Group 1's. One possible reason for the significant difference could be anticipation of a second

session and thus, a shorter first treatment for Group 2. Another reason for treatment length differences could be related to stroke severity resulting in either shorter treatments for Group 2 due to a possible lower tolerance threshold or a longer session for Group 1 due to a higher tolerance threshold and thus better response. Treatment two was a mean of 27 minutes. Duration of hospitalization was also collected. At the time of the study, five days was the average length of stay for participants admitted to the study site. Six to eight days was the average length of hospitalization for study participants. Fidelity of treatment frequency, dose, and duration are important to consider for future studies.

Limitations and Recommendations

The primary limitation of the presented study is the lack of randomization. Due to baseline differences between dosing groups, many adjustments were made based on stroke characteristics of location and severity. Additionally, differences were found between groups for cognition, and depression was associated with higher stroke severity. While stroke location and cognition have not been consistently reported to predict the development of PSD, stroke severity has been and is recommended as an important study variable. Pre-stroke mood disorders have been reported to be associated with PSD (Caeiro, Ferro, Santos, & Figueir, 2006); however, information on pre-stroke mood disorders was not collected here.

Also not evaluated here but potentially of interest as a predictor of benefit and long-term impairment is social participation. One music therapy study conducted with participants receiving inpatient rehabilitation following ABI found that a participant was significantly more likely to benefit from music therapy the more impaired the

participants social behavior was at the onset of therapy (Nayak et al., 2000). Social participation has also been associated with music therapy dosing following ABI and difficulties with emotion regulation (Cooper et al., 2015; Wheeler et al., 2003). These factors could be useful in designing longitudinal studies and targeting those more likely to benefit from music therapy.

To date, no investigation of music therapy dosing for neurologic populations in acute medical settings has been done. Taken together with acute care music therapy, music therapy following ABI, and dosing literature within music therapy and psychotherapy, more than a one treatment dose difference may be required to demonstrate a dosing effect. Specifically, a minimum of three, five, or 10 doses should be considered. Future investigations may consider a larger sample size to accommodate multiple dosing groups or pragmatic trial design allowing for multi-site group comparisons and inclusion flexibility.

Last, while one and two treatments demonstrated effectiveness in mood improvement, there remains the question of carry over across time and if one or two treatments is enough to impact PSD. Data was collected across hospitalization, but not beyond it. This study can thus serve as pilot data for further investigation into the acute initiation of music therapy and psychosocial management following stroke.

Conclusion

Findings from the present study build on evidence supporting music therapy for mood elevation in acute medical care and following ABI. Results from this study show that one and two treatments of active music therapy are effective in improving mood for stroke survivors who are receiving care immediately following stroke in the acute

medical setting. However, findings did not indicate that two treatments were better than one. Results revealed additional questions that need to be addressed, such as the impact of stroke severity and pre-stroke mood disorders as covariates, the impact of AMT on social participation and the long-term impact on depression and emotion regulation. Future investigation would benefit from larger scale randomization or pragmatic study design allowing for group stratification options. In conclusion, findings support the viability of continued development of music therapy treatment to target positive mood modulation for stroke survivors beginning in the earliest stages of recovery.

Table 4.1*Medications Monitored*

Medication	Trade Name	Use
Diphenhydramine	Benadryl	Antihistamine
Hydroxyzine	Vistaril	Anxiety/antihistamine
Lorazepam	Ativan	Seizures/anxiety
Diazepam	Valium	Sedative
Haloperidol	Haldol	Antipsychotic
Risperidone	Risperdal	Antipsychotic
Standard intensive care sedatives		
Propofol		General anesthetic
Fentanyl		Narcotic - Pain
Midazolam		Sedative
<u>Rocuronium</u>	<u>Zemuron</u>	<u>Paralytic</u>

Table 4.2*Participant Characteristics*

	Group 1		Group 2		<i>p</i>
	<i>n</i>	%	<i>n</i>	%	
Stroke Side					0.064
Left	9	36.0	7	36.8	
Right	14	56.0	10	52.6	
Left & Right	1	4.0	1	5.3	
Unknown	1	4.0	1	5.3	
Vascular Distribution					0.061
Anterior	5	20.0	2	10.5	
Posterior	8	32.0	6	31.6	
Unknown	12	48.0	11	57.9	
Gender					0.205
Male	11	44.0	10	52.6	
Female	14	56.0	9	47.4	
Age	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	
Age	26	66.31 (11.62)	18	65.50 (20.70)	0.589
Range	35–84		41–88		
NIHSS Score - Admission	25	4.52 (4.33)	19	9.68 (7.80)	0.015
Range	0–8		2–23		
Mini MoCA - Admission	18	8.67 (2.93)	14	7.29 (3.27)	0.218
Range	1–12		0–12		
PHQ-9 - Admission	23	4.83(4.09)	15	6.80 (5.44)	0.210
Range	0–18		0–6		

Table 4.3*Change in The Faces Scale by Time and Group*

		Group 1		Group 2		<i>p</i> value between groups at each time
		<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	
Tx 1	Pre	3.33	0.41	2.31	0.44	0.280
	Post	2.86	0.30	3.15	0.44	0.109
	<i>p</i> value for pre vs. post by group	0.037		0.5239		
Tx 2	Pre	-	-	3.31	0.41	-
	Post	-	-	2.26	0.21	-
	<i>p</i> value for pre vs. post	-		0.017		

Note. A decrease in scores represents a decrease in negative mood. Tx = treatment. The model is a repeated measures ANOVA adjusted for NIHSS score at admission, stroke side, and vascular distribution.

Table 4.4*Treatment Duration in Minutes*

Goal	<i>M</i>	<i>SD</i>	<i>p</i>
Treatment 1 Group 1	32.73	8.83	
Treatment 1 Group 2	27.77	10.25	0.025
Treatment 2 Group 2	27.11	10.22	

These model estimates were adjusted for baseline NIHSS admission scores.

Table 4.5*Length of Stay and Frequency of Treatment in Days*

Goal	<i>M</i>	<i>SD</i>	<i>p</i>
Admit to DC Group 1	6.06	5.37	0.077
Admit to DC Group 2	8.40	6.23	
Admit to tx 1 Group 1	3.68	3.35	0.796
Admit to tx 1 Group 2	3.47	3.89	
Admit to tx 2 Group 2	6.21	4.04	
Tx 1 to tx 2 Group 2	2.26	1.63	

DC = discharge; tx = treatment. Model estimates were adjusted for NIHSS score at admission.

Figure 4.1. The Faces Scale

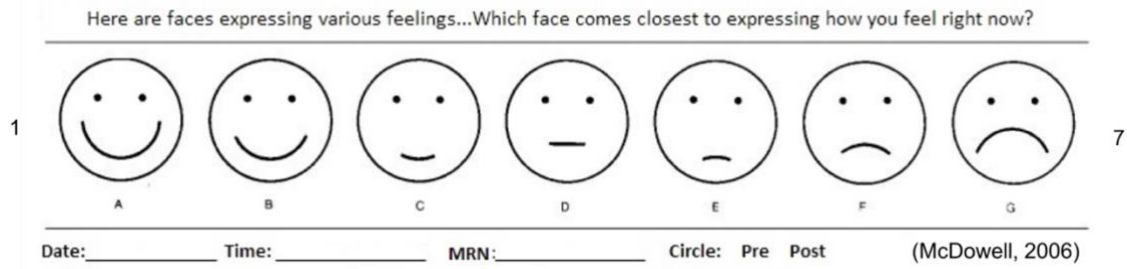


Figure 4.1. The Faces Scale was adapted from McDowell (2006) to include a prompt at the top for administrators to reference. Scoring for analysis ranged from one to seven, with each The Faces Scale representing one number in the scale.

Figure 4.2. Study Procedure

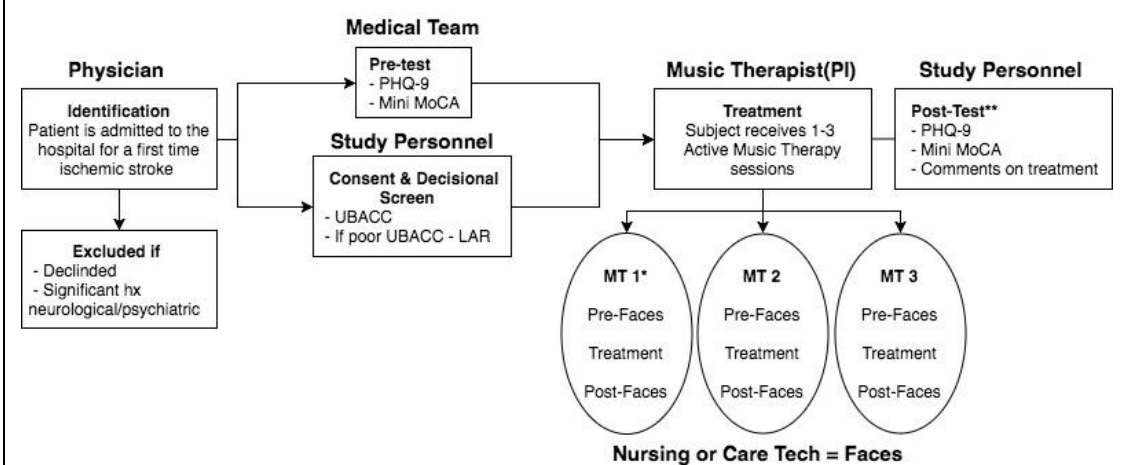


Figure 4.2. Flow chart of study procedures. *Change in The Faces Scale across one music therapy treatment was the primary endpoint. **Post-tests were administered within 24 hours following the third treatment or as close to discharge as possible if a subject had received at least one treatment and fewer than three treatments and was being discharged.

Figure 4.3. Study Flow Chart

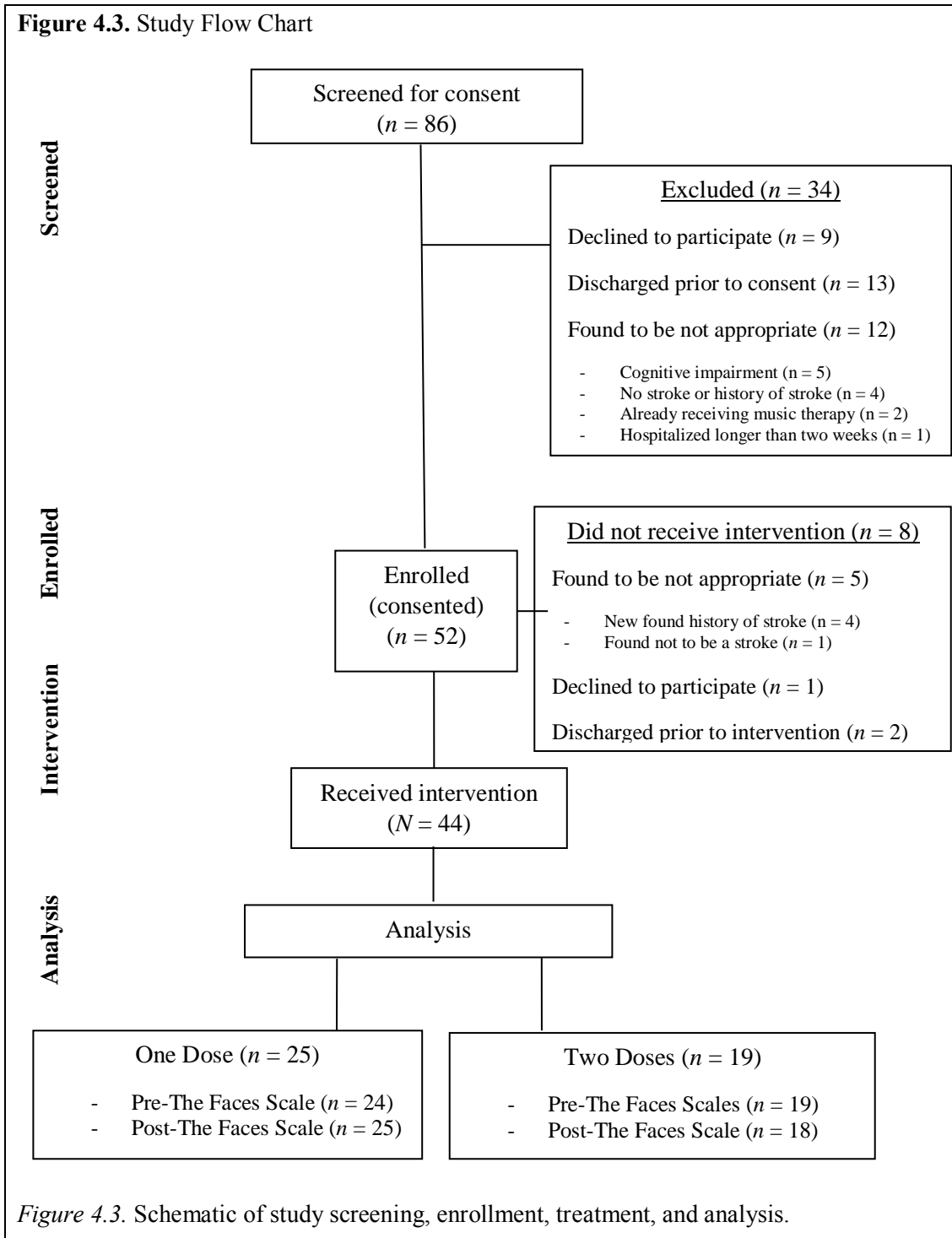


Figure 4.3. Schematic of study screening, enrollment, treatment, and analysis.

Figure 4.4. Means by Time Point on The Faces Scale

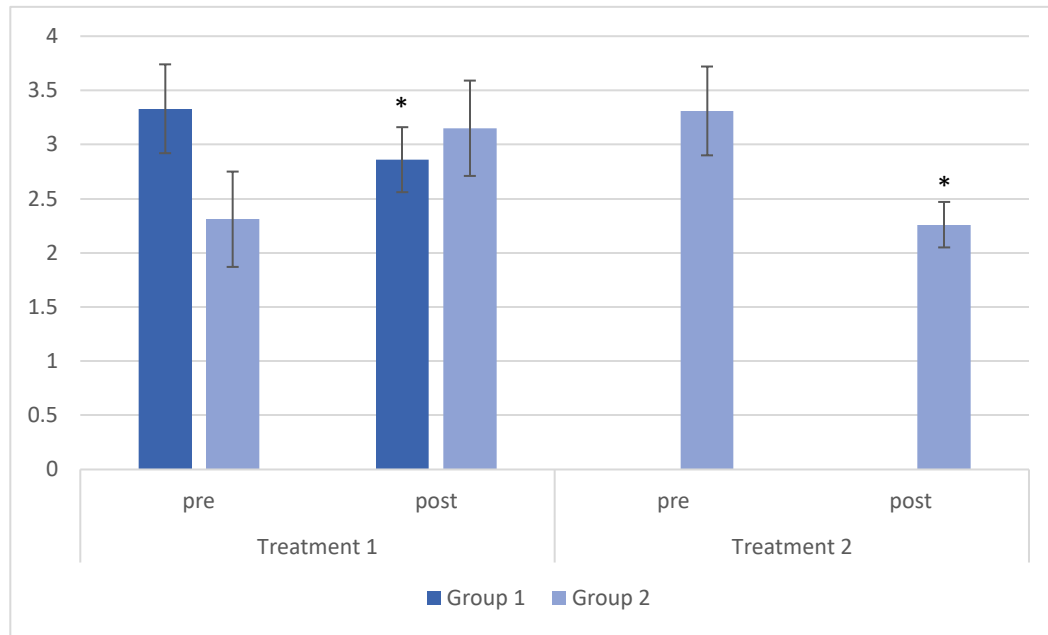


Figure 4.4. Bar graph of The Faces Scale scores at each of the four data collection time points. *Indicates a significant change in mood pre- to post-identified treatment. A decrease in mean scores represents a decrease in negative mood. Scores are adjusted for NIHSS at admission, stroke side, and vascular distribution.

Figure 4.5. Mean Change in The Faces Scale Across Treatment

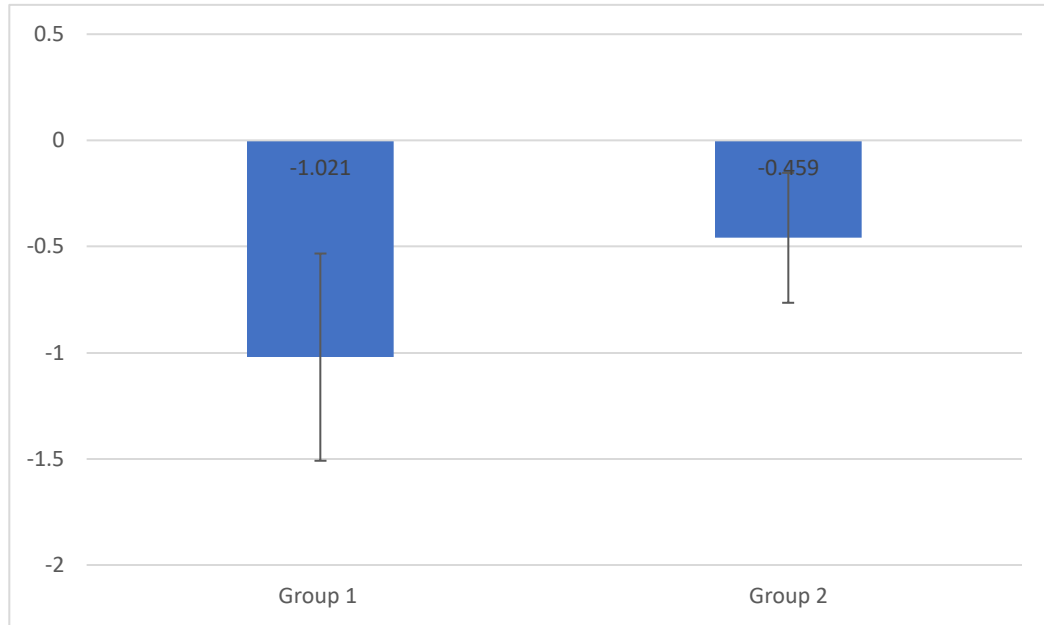


Figure 4.5. Bar graph of change in The Faces Scale scores across treatment. There was no significant difference between groups. Negative change represents decreased negative mood. Scores are adjusted for NIHSS at admission, stroke side, and vascular distribution.

Figure 4.6. Length of Stay and Frequency of Treatment in Days

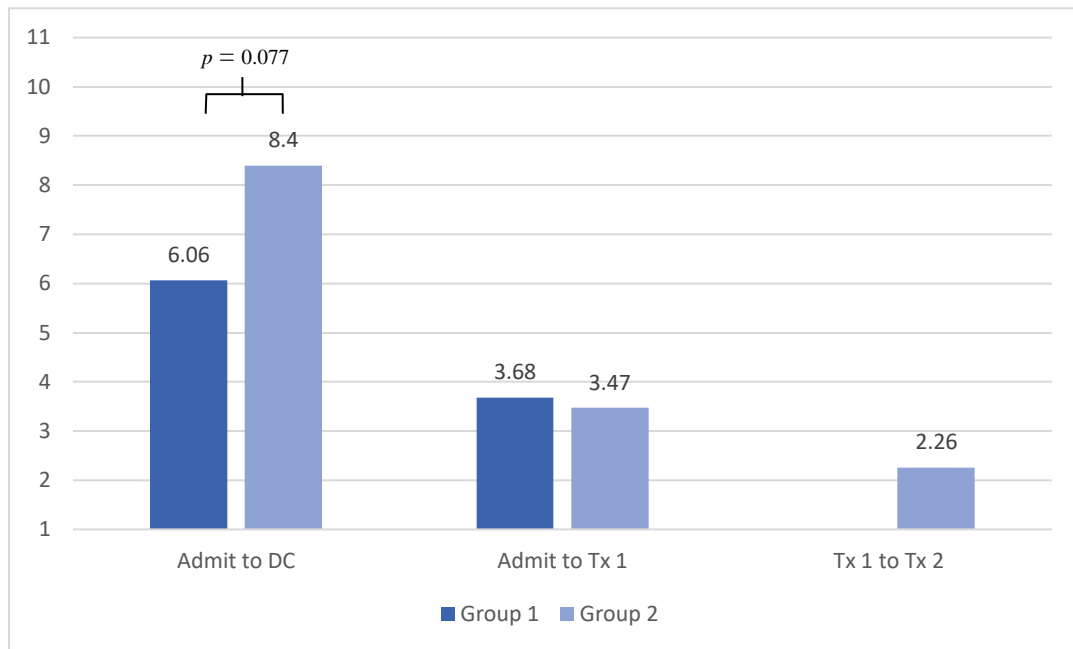


Figure 4.6. Bar graph of length of stay in the hospital and frequency of treatment. DC = discharge; Tx = treatment. Scores are adjusted for NIHSS at admission.

Chapter 5: A Self-Study of Clinical Decision Making in Music Therapy to Improve Mood Following Acute Stroke

Post-stroke depression (PSD) has been identified in 40.9% of stroke survivors within the first 7–10 days following a stroke (Willey et al., 2010). Additionally, depressed mood in the first week following stroke has shown to increase the likelihood of disability throughout the first year (Willey et al., 2010). In response to the prevalence of depression following stroke, the AHA/ASA encourage the advancement of research on the effectiveness of interventions to determine optimal strategies to treat and prevent PSD (Towfighi et al., 2017). Researchers have demonstrated that a variety of music-based interventions show promising results for improving mood and related outcomes following stroke (Ard & Wheeler, 2016; Magee et al., 2017; Raglio et al., 2015; Rushing et al., 2015). However, the methodological rigor for these studies has been described as moderate to poor with intervention reporting that lacks clarity and thus fidelity. The result is a limited evidence base for music therapy as a necessary intervention for improving mood following stroke.

One barrier to well-defined intervention is the fact that various interventions and combinations of approaches are often used within the same treatment (Ard & Wheeler, 2016; Raglio et al., 2015; Rushing et al., 2015). For example, one study described music therapy procedures as preparatory activities, main activities, and finishing activities (Jun et al., 2012). While the authors go into detail describing “activities” (e.g., moving to music or singing), they do not provide enough detail to permit replication. This is not uncommon since interventions in healthcare are recognized as complex, difficult to evaluate, and encompassing several interactive components (Craig et al., 2008).

To understand and communicate the complexity of intervention, researchers have investigated music therapists' clinical decision making (CDM) processes (Edwards & Kennelly, 2004; Kwan, 2010; Magee & Burland, 2008). For example, Edwards and Kennelly (2004) examined techniques used by music therapists working in pediatric rehabilitation. The authors identified categories of techniques used, properties of those techniques, and dimensional ranges of the properties. Categories of techniques included cueing, synchronizing (musically), choices, orientation, preparation, feedback, incorporation, and humor all aimed at allowing the children to "respond and participate at his or her best" (p. 123). Edwards and Kennelly (2004) then outlined how various music interventions related to different techniques. For example, having a child sing could, even before singing, encompass the category of choices, which then has properties of options: verbal choice, patient choice, or non-patient choice. Furthermore, dimensions of choice properties could range from a few to many and from direct to indirect.

Authors have also provided expert insight into approaching CDM for specific music therapy interventions. Dvorak (2016) offered a conceptual framework for planning, implementing, and evaluating group lyric analysis. Beer (2011) developed a model for CDM that included detailed steps and considerations for designing and setting up music improvisational experiences. Additionally, Kern (2011) authored a five-step evidence-based practice decision-making process for early childhood music therapy. Beer (2011) and Dvorak (2016) suggested that such models function to structure treatment planning, implementation, and evaluation.

The CDM process for intervention selection has also been deliberated. Shultis (2012) created a decision tree to determine which of three interventions to choose — song choice, song writing/parody, or music-relaxation—to reduce stress for adults in an intensive care unit. A primary driver for determining which to use was the participant’s ability to engage in discussion about the personal meaning of the opening song. A participant’s ability to discuss was not defined, but baseline anxiety and pain scores were used to inform the session opening, with higher scores leading towards a more rapid introduction of music and less verbal discussion. Additionally, information on the patient’s background was assessed to inform music selections made by the therapist, such as the participant’s musical history and preferences. Thompson (2013) also used a decision tree to determine whether to use receptive or active music interventions for women in breast cancer support groups. The term “active” meant that participation was elicited and encouraged from participants through activities such as group songwriting, as opposed to passive music listening activities (Thompson, 2013). To develop the decision tree, Thompson deconstructed her own clinical reasoning by asking herself: “what do I notice and what do I look for?” (p. 52). The author discovered that areas of interest were participants’ verbal and body language and conversational themes. Broadly, positive mood and high energy levels were found to be more conducive to active intervention, while low mood and low energy levels were more conducive to receptive intervention.

Clinician knowledge and competency is an important consideration in structuring and selecting interventions. Forsblom and Ala-Ruona (2012) investigated the skills and knowledge of music therapists working in acute stroke care. Music therapists were

interviewed to examine their subjective experiences of post-stroke care and specialized education. The investigation resulted in thematic identification of music therapy critical factors to clinical reasoning and decision-making when working in post-stroke care. Three factors that influenced critical thinking patterns of the music therapists were identified. The first was knowledge of neurology and neuropsychology, including knowledge of the neurological basis of strokes, clinical music therapy training, understanding music therapy and stroke care approaches, and professional supervision. The second factor was interaction with participants, which was argued to be the most important. This factor included interaction during music playing, listening and sharing (verbally), discussing, and reflecting. Examples of CDM included the opening discussion whereby music therapists first assessed the participant's mood and subsequently decided on the pacing of activities. Another example included interaction during music playing so participants were not left to play alone but supported by therapists so that they could "play at the very best of their abilities" (p. 6). The final factor identified was accurate ongoing physiological and psychological participant observation. Participant motivation, body language, motor functions, changes in mood, cognitive performance, and coping skills were elements identified as necessary to observe. In addition to the three factors, the authors concluded by highlighting the value music therapists placed on additional knowledge-based training, awareness of interactions with participants, and interest in professional supervision to enhance their skills. These findings of ongoing knowledge consideration and evaluation of interactive components illustrate the complex nature of CDM for music therapists working in post-stroke care.

In healthcare, CDM is a complex, multi-dimensional, context-dependent process (Higgs et al., 2008). Scholars posit that CDM is not a protocol, but an interactive process. Clinical reasoning in healthcare, which leads to CDM, is considered a “contextualized interactive phenomenon rather than a specific process” (Higgs et al., 2008, p. 5). Clinical reasoning guides clinician actions and encompasses elements of professionalism including autonomy, responsibility, and accountability in the face of uncertainty (Higgs et al., 2008). Specific dimensions of CDM include: (a) cognition or reflective inquiry, (b) discipline-specific knowledge, (c) metacognition, (d) mutual decision-making, (e) contextual consideration, and (f) consideration of task impacts (Higgs et al., 2008). In line with CDM in healthcare, expertise in music therapy CDM involves identifying clinical problems, understanding the problem from the participant’s perspective, selecting the most effective and engaging intervention(s), and the ability to reasonably predict the therapeutic outcome (Baker, 2007).

Music therapy interventions to improve mood for adults with depression and in neurorehabilitation have yielded promising results. However, variations in interventions, a lack of intervention specificity, and a lack of clearly defined approaches has resulted in moderate to low levels of evidence. To these ends, a strategic research priority within the field of music is the investigation into CDM processes to, “further develop, integrate, describe, and link theory and theoretical models in music therapy research with well-articulated and defined music therapy interventions” (American Music Therapy Association, 2015a, p. 11).

A recent study evaluating the effectiveness of music therapy to improve mood during acute hospitalization following stroke demonstrated promising results with one

active music therapy treatment (Rushing et al., 2018). Though effective, the intervention(s) followed previous literature and were not clearly delineated beyond broad treatment guidelines. Lack of insight into the CDM process during facilitation of complex interventions results in the inability to replicate outcomes, teach effectiveness, and identify active ingredients that correlate with positive outcomes. Qualitative research approaches have aided in identifying elements of music therapy treatment (Edwards & Kennelly, 2004; Magee & Burland, 2008) and the experiences of music therapists working with specific populations (Forsblom & Ala-Ruona, 2012; Kwan, 2010). The study proposed here used a qualitative approach to investigate the CDM process during active music therapy intervention for mood elevation following stroke.

Purpose Statement

The purpose of this study was to describe the clinical decision-making process of a music therapist targeting mood elevation for hospitalized adult patients following a first-time acute ischemic stroke. The work reported here is part of a larger study on the effects of music therapy on mood following a first-time ischemic stroke. The Institutional Review Board (IRB) where the work was carried out approved modifications to include the collection of audio recordings of treatments to investigate CDM. Eight treatments were recorded. Each recording consisted of a unique patient's treatment session whom the MT-BC worked. Mood elevation was previously determined to be successful through facilitation of active music therapy (AMT) (described below) resulting in a significant improvement in mood detailed in chapters 3 and 4 (Rushing et al., 2018).

Research Questions

1. What are the components of the clinical decision making (CDM) process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute ischemic stroke?
2. What determines the clinician's course of action (i.e., what influences progression through the stages of the treatment process)?

Research Design

Qualitative methodology allowed for an in-depth exploration of interactive and complex variables that are difficult to measure, such as those present in clinical decision making. Silverman (2015) stated, “qualitative studies are essential for understanding unique experiences in treatment and for better conceptualizing mechanisms of therapeutic change in the music therapy process” (p. 236). Qualitative research allows for the understanding, interpretation, and description of emergent themes using thick and rich language. Furthermore, a qualitative approach allows for inquiry into one's own perspectives and thought processes that cannot be accessed through a quantitative framework, making it an appropriate approach for this research (Creswell, 2013; Glesne, 2006).

Methodology

The Three Phase Process Model of Collaborative Self-Study was selected as a guiding methodological approach (Louie, Drevdahl, Purdy, & Stackman, 2003). Self-study provides the opportunity to capture practical knowledge of the teacher (Louie et al., 2003) or, in this case, the music therapist. Self-study is used primarily in education for knowledge discovery that results in a product transferable to teaching knowledge

(Louie et al., 2003). Likewise, it can be used to identify and develop the tools for decision-making that transfer to music therapy clinical work. Collaborative self-study refers to interaction with colleagues through the research process as opposed to studying one's self in isolation (Louie et al., 2003). Specific benefits of collaborative self-study include: (a) social support, (b) a higher level of discourse and critique, (c) increased transferability of knowledge, (d) and enhanced validation including guarding against solipsism (Garbett & Ovens, 2016; Louie et al., 2003).

The collaborative self-study process involves an assessment phase, implementation phase, and dissemination phase. The assessment phase focuses on the researcher's readiness to engage in self-study. In the current study, the assessment phase included evaluation of the primary investigator's roles as researcher, participant, and clinician (see the "Researcher Statement" for details).

Assessment also included evaluating the environment for the availability of collaborators and the quality of collaborative relationships. One collaborator was a faculty member and researcher who served in the role of critical reviewer throughout the study. Since this collaborator was not a music therapist, she was also able to provide an external audit of the data (Creswell, 2013). A second collaborator was an established researcher, faculty member, and board-certified music therapist. Discussion of study time requirements, roles, and expectations of timeline were assessed and agreed upon with this collaborator. Last, a faculty advisor with expertise in qualitative methods was identified to serve as a consultant. Each collaborator was able to approach the study through both a supportive and a critical lens (Louie et al., 2003). Finally, assessment of the academic climate and relevance of this topic to the field of music therapy were

determined to be highly relevant, particularly in the area of explicit intervention reporting (Robb et al., 2011).

The implementation phase involves validating the selected research methods for data collection and analyses. Four sources of data were collected: (1) electronic medical records (EMR), (2) audio recordings of music therapy treatments, (3) the researcher's journal, and (4) patient and caregiver/visitor comments. Each source was used to corroborate data interpretation, identify patterns, and explore researcher personal reactions, allowing for rich and thick description of findings and increased trustworthiness (Glesne, 2006). Analysis was informed by Creswell's (2013) spiral approach to data analysis. Additionally, event flow charts and *NVivo* (2018) software were used (Baxter & Jack, 2008; "*NVivo*," 2018).

Dissemination included peer review of findings, sharing discernable findings, and providing theoretical underpinnings to the scholarly community (Louie et al., 2003). Because this study was conducted as part of the researcher's doctoral dissertation, no manuscript is under review; however, manuscript preparation and publication is an intended goal. In the meantime, collaborators from the first phase served as peer reviewers (Louie et al., 2003). Additionally, the resulting conceptual framework and findings will aid in knowledge teaching in both academic and clinical arenas.

The decision tree taxonomy generated by Thompson (2013) was used as a conceptual framework and guided data analysis. Specifically, Thompson's personal inquiry into "what do I notice" and "what do I look for" was used (2013, p. 52). Thompson's overarching themes of participant mood and energy generated by observation of verbal language and verbal interactions in conversation guided reflection

and analysis. An approach to CDM for healthcare professionals as outlined by Higgs and Jones (2000) was also used as a lens for analysis. Dimensions of CDM included: reflective inquiry, profession-specific knowledge, metacognition, mutual decision-making between participant and clinician, contextual interaction, and task impact (Higgs & Jones, 2000).

Analyses of treatment was also guided by Beer's (2011) spectrum approach to CDM and Robb et al.'s (2011) intervention reporting guidelines. Beer's (2011) model of implementing improvisational experiences in music therapy was centered on the amount of structure provided by the music therapist to ensure successful participation. Robb et al. (2011) provided guidelines to increase intervention transparency. For example, the authors provided guidelines for reporting intervention content such as what music was used, who selected the music used, and what intervention strategies were investigated.

Participants and Procedure

The principal investigator (PI) was the sole participant as this was a self-study of clinical decision making. The PI is a board-certified music therapist (MT-BC) with approximately 10 years of clinical experience. For the purpose of this study and chapter, the PI will be referred to as the MT-BC. Data was collected on the MT-BC's work with eight adult (≥ 18 years) patients hospitalized following a first-time acute ischemic stroke. Patients were identified within two weeks of stroke onset and met IRB inclusion and exclusion criteria from study one and two (see chapters 3 and 4). Data collection took place on the neurology unit of a large-university affiliated teaching hospital in the southeastern United States. All eight patients received one music therapy treatment from the MT-BC. Analysis was completed on the MT-BC's CDM process with the eight

patients. For this study, the entirety of the music therapy treatment process took place during an initial music therapy treatment lasting approximately 25 minutes. Each treatment was conducted with a different patient. Patients were between the ages of 58 and 81. Electronic medical records (EMR) indicated that all were white. All eight patients could verbally communicate with minimal to no barriers and had minor National Institute of Health Stroke Scale (NIHSS) severity scores on hospital admission (range 0–6). All eight patients were participants in study one and two (chapters 3 and 4). See procedures from chapters 3 and 4 for detailed information on patient recruitment and procedures for study one and two. For the purposes of this study the MT-BC is the study participant.

During this study, the MT-BC administered active music therapy (AMT). AMT was defined as music making interventions that elicited and encouraged active engagement from participants involving creating music, playing instruments, singing, improvising, and/or moving to music (Sihvonen et al., 2017; Vink et al., 2004). During AMT, participants were supported and encouraged by the MT-BC to create, participate in, and/or move to music. Materials used consisted of, but were not limited to, a six-string acoustic steel string guitar, hand-held percussion instruments such as tambourines, paddle drums, and egg shakers, and electronic instruments accessed through GarageBand on an iPad.

All interventions used patient preferred live music (PPLM) when possible. PPLM is defined as “a receptive music therapy experience involving music selected and preferred by the patient that is performed live by a qualified music therapist” (Silverman et al., 2016, p. 2). It has been noted that hospitalized patients may initially prefer

receptive music therapy interventions such as PPLM (Crawford et al., 2013; Silverman et al., 2016). Therefore, to build rapport and develop a therapeutic alliance, treatments for participants started with PPLM followed by opportunities for more active participation (Bruscia et al., 2009; Silverman et al., 2016; Standley, 2000). Age-appropriate music was selected by the MT-BC if music preference was not provided by the participant or if participant music preference was not familiar to the MT-BC. Treatment duration for all sessions was approximately 25 minutes. Twenty to 30 minutes has been reported in single-session medical music therapy literature with promising results for targeting mood constructs (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Hogan & Silverman, 2015).

A typical treatment involved:

- a pre-treatment review of patient EMRs,
- greetings and introductions,
- sharing of information about treatment,
- ongoing assessment of the patient's musical interests and stroke experience,
- PPLM,
- assessment of the patient's responses to music and secondary goal areas as needed (communication and movement),
- facilitation of interventions and techniques for mood elevation and secondary goals if appropriate,
- a treatment closure period of PPLM or other intervention, and
- goodbye.

See Appendix G for complete AMT treatment guidelines

Data Collection

There were four sources of data collected for this study: (a) data from patient electronic medical records (EMR), (b) audio recordings of music therapy treatments, (c) the MT-BC's research journal, and (d) patient and caregiver/visitor comments.

Information collected from patient EMRs provided a historical view of each patient's medical contexts and social supports, or lack thereof. EMRs also contained information on patient interactions and responses to other healthcare professionals. Prior to providing music therapy to patients, the MT-BC reviewed each patient's EMR for his or her current hospitalization, from admission to the hospital until they received music therapy. Information from EMRs that was considered to potentially play a role in the CDM process was pooled for each patient and consolidated into a document for further analysis. Narratives from other therapists, medical providers, pastoral care providers, or others were included in addition to specific medical information such as diagnosis and medical status. Additionally, the MT-BC's EMR notes on each patient's music therapy treatment was collected in full.

Audio recordings of each treatment session were collected primarily using a Sony IC recorder model #ICD-UX70. A Sony IC recorder model #ICD-PX820 was used as a backup. Recording devices were turned on prior to the MT-BC entering the patient's room and turned off upon exit. Recording devices were placed centrally and as close as possible to the MT-BC, patient, and any other caregivers or visitors actively involved in the treatment. Once it was confirmed that primary recordings were intact, backup recordings were deleted. Audio recordings were transcribed by the MT-BC and a

research assistant as soon as possible following the treatment. Transcriptions of audio included verbal and verbal indicators such as sighs, pauses, or other non-word-based vocalizations (Glesne, 2006).

A researcher journal was kept by the MT-BC throughout the study. Journal entries were completed prior to treatments, following treatments, and in response to reading the transcriptions of the treatment sessions. A researcher journal was used to monitor bias and aid in maintaining study validity (Glesne, 2006). Through the use of a researcher journal, investigators are able to maintain awareness of when their subjective opinions, both foreseen and unforeseen, may be emerging and impacting questions and analysis (Glesne, 2006). The researcher journal was used as a data source and therefore analyzed by the MT-BC and faculty analysis collaborator. Findings were further examined by the faculty external auditor.

Patient comments about their music therapy experiences were collected prior to discharge from the hospital by undergraduate research assistants. Patients were told, “you received music therapy during your hospitalization; please comment on your experience.” Documentation of patient and caregiver/visitor comments were then recorded in transcripts in addition to any comments transcribed from the treatment session. Patient comments served as statements for coding and theme analysis (Creswell, 2013).

Data analysis

Data sources were organized by individual music therapy treatments. A total of eight treatment sessions were available for analysis. Creswell’s (2013) data analysis spiral approach was used; this involved: (a) reading the data multiple times; (b)

reflecting on the data through discussion and writing; (c) classifying, describing, and interpreting data; (d) developing categories in the form of codes and larger themes; and (e) creating a visual representation of resulting constructs (Creswell, 2013). The MT-BC was responsible for data analysis and data management and organization, allowing for easy transfer of de-identified information to the faculty analysis collaborator.

Subsequent and ongoing steps of analysis were conducted in consultation by both the MT-BC and two faculty collaborators. *A priori* codes were originally used to guide analysis. Codes included patient mood and energy levels as categorized by Thompson (2013), dimensions of clinical reasoning as described by Higgs and Jones (2000), and intervention guidelines outlined by Robb et al. (2011). Due to the high need for contextual information to analyze CDM, event flow charts were created and drove results, with coded information used as confirmation for the event flow charts (Baxter & Jack, 2008). Event flow charts were created with de-identified information using the Google Drive platform draw.io (Adler & Benson). NVivo (2018) software was used to code data sources and to develop themes and categories.

Trustworthiness

Validity and reliability for this study were supported in a number of ways as recommended by Creswell (2013) and Glesne (2006). To ensure validity, research bias was monitored through reflexivity in consultation with faculty advisors, ongoing self-evaluation, and use of a researcher journal. “Reflexivity involves critical reflection on how researcher, research participants, setting, and phenomenon of interest interact and influence each other” particularly the monitoring and questioning of the impact of one’s own subjectivities on the research process (Glesne, 2006, p. 6). Techniques used to

ensure reliability included a rich and thick description of results allowing for consistency across literature, triangulation (comparison) of findings across multiple data sources, and the collection of quality audio recordings with transcriptions of audio recordings including verbal and non-verbal material (Creswell, 2013; Glesne, 2006). Additionally, reliability was increased through the use of previously discussed literature to inform analysis, the most salient of which was Thompson (2013).

Researcher Statement

The decision to investigate clinical decision making in music therapy for acute stroke care was driven by two lines of research. The first is how music therapy impacts mood and depression following stroke during acute hospitalization. Mood elevation is a highly-valued target goal for patients receiving music therapy. If mood elevation is not the primary goal, it is still often a secondary outcome addressed. My work in rehabilitation with patients following a stroke led me to conclude that the functional outcomes from music therapy were accompanied by mood elevation. Studies have suggested that many patients experience depression within a week following a stroke (Willey et al., 2010). Authors support the use of music therapy to improve psychological distress following stroke (Lincoln et al., 2012). My own clinical experience coupled with a review of the research evidence led me to wonder if a measurable, positive change in mood and depression could be achieved for patients still in the hospital following stroke. A clinical trial was implemented and encouraging results were found. However, the idiosyncratic nature of acute clinical care and the variety of music-based interventions that target mood elevation and depression led to the question: How are the provided interventions being defined?

Music therapy interventions provided by a credentialed clinician are influenced in large part by the clinician's approach to treatment. My academic training was heavily influenced by cognitive behavioral therapy (CBT). Subsequently, as much of my employment was at medical centers focused on patient-centered care approaches and rehabilitation, I adopted elements of humanistic and neurological approaches into my music therapy practice. At present, I would define my approach to music therapy with patients who have had a stroke as biopsychosocial with CBT and neurologic influences.

The biopsychosocial model was first introduced by George Engel in the late seventies when the broader concept of health and illness emerged to include the 'person' in the biomedical model of healthcare (Sarafino, 1998). Biological factors include a person's genetic and inherited makeup as well as physiological functioning; psychological factors are behaviors and mental processes involved in cognition, emotion, and motivation. Social factors include family, community, and the influence of societal culture and values on healthcare delivery (Sarafino, 1998). The biopsychosocial model is applied to acute illness since acute illness impacts physical (biological), psychological, and social functioning (Davis, Gfeller, & Thaut, 2008; Sarafino, 1998).

Brain damage caused by a stroke can result in a range of motor, sensory, cognitive, and communication impairments. The biopsychosocial model, sometimes referred to as a holistic or whole person approach, allows for a team of healthcare professionals to address the interactive functioning of each area to promote health and combat illness (Sarafino, 1998). The International Classification of Functioning (ICF) is an example of a biopsychosocial model of healthcare (World Health Organization, 2001).

The second area of interest related to clinical decision making in music therapy has been my investigation into music therapy internship supervision and designing a model for supervisors to use to assist interns in obtaining entry-level professional competencies. CDM is essential to demonstrating professional competencies. The development of teaching tools is possible through self-study research. At the time of this writing, I have been an internship supervisor for seven and a half years and an internship director for five of those years. Because I teach interns (and practicum students), it seems fitting that my approach to clinical decision making be open to investigation; particularly as it is important to understand one's own decisions in order to effectively teach others.

My role as researcher, clinician, and participant places me in a unique position. It was essential that I assess my "readiness for engagement in self-study" as I began this endeavor (Louie et al., 2003, p. 12). I am the researcher who designed this study with a purpose in mind. I am also the clinician who seeks to best serve my patients with no research purpose driving decisions. I am the object of my own study, which opens me up to vulnerability, bias, and confrontation of skills. Louie et al. (2003) referred to similar ideas as "confronting contradictions and taking risks" (p. 13). This trio of roles requires close monitoring and allows for an insider view of practice-based evidence. I monitored my biases through reflexive data collection, a researcher journal, and multiple faculty collaborators. Data collection and analysis procedures allowed me to ask questions of myself and debrief with study personnel. I looked for distorted, as well as virtuous, content. Most importantly, I reflected on the research questions at hand, allowing preconceived notions to be worked out in my researcher journal. Ultimately, I believe

this unique combination of roles has allowed for an in-depth examination into CDM in music therapy.

Results

Research Question 1

The first research questions was: What are the components of the clinical decision making (CDM) process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute ischemic stroke? Two factors emerged in response to this question:

1. Progression through a four-stage treatment process: rapport, ongoing assessment, implementation, and termination, and
2. The use of a variety of music-based and therapy-based techniques.

Four-stage treatment process. Analysis of data revealed that CDM was driven by therapist-patient interactions, and interactions were influenced by progression through four stages of the music therapy treatment process. Stages of the treatment process included: (a) rapport building, (b) ongoing assessment, (c) implementation of a music-based and therapy-based intervention (s), and (d) session termination. Figure 5.1 and 5.2 illustrate the progression of stages across a session. While progress through the four stages occurred in each session, variations were seen between sessions. Most notably, that stages could occur sequentially, with overlap, or one could return to a previous stage. Patient cases will be used to examine progression through the stages. All patient names have been changed. EMR review was completed prior to visiting each participant.

CASE 1 - Pam

Highlights from EMR review for Pam included:

- sixty-six-year-old year old white female
- lives with husband,
- acute infarct of the left middle cerebellar peduncle extending into the left pons and small portion of left midbrain,
- mild dysarthria,
- some right-side weakness and possible double vision, and
- has been waiting for placement at an acute rehabilitation facility for two days.

Once in the room, the MT-BC began rapport building during which “get to know you” questions were asked about the patient’s day, musical preferences, and hobbies/interests. Rapport was built through matching/mirroring the patient’s disposition. Pam presented as happy, laughing, sharing life facts, storytelling, and exhibiting dynamic interactions in conversation with her husband. Throughout the conversation, questions from the MT-BC became more probing and included assessment of support systems (family), the stroke experience (hospitalization/medical), and perception of the future (rehabilitation). During this initial conversation the MT-BC gained a great deal of information about Pam and the couple’s life together. For example, it was learned that they had been married for 45 years, Pam drove a book mobile taking books around her county, and that some of the children she interacted with had come to visit her in the hospital.

Pam was provided with song choices and assisted in selecting the first song. Implementation of patient preferred live music (PPLM) began and the MT-BC continued to assess and monitor Pam's responses to the live music. Pam had minimal musical responses such as singing or movement to music. When Pam did sing, it was very quiet or just the mouthing of lyrics, indicating a possible hesitation to participate in more music engagement-based interventions. However, between songs Pam and her husband continued to share stories from their lives. At one point, Pam requested a personally meaningful love song. After playing the requested song, which elicited tears from Pam, the couple discussed how they met, fell in love, and have supported each other including how they have supported one another following her stroke. It was clear from this interaction that implementing "reminiscing" with "validation" was the intervention most likely to continue elevating mood. This decision was based on observable changes in the couple's affect and salience of the experience most linked to sharing stories.

The final stage of the treatment session was termination. Because of the role stories had played in the session and seemingly in Pam's life (book mobile), the MT-BC offered final song choices reflective of themes from the conversation. The following transcription shows the use of a salient song based on reminiscing during the implementation stage of Pam's session.

MT-BC: Hm, well I've thought of three good songs based on what-all of your amazing stories here, or I'm open to other suggestions as well

Pam: *Mhm*

MT-BC: I thought of [inaudible words], I thought about “Luckenbach Texas” and the song about the diamond ring

All: *Laughs*

...Pam and spouse further discuss story of spouse buying Pam’s wedding ring in Vietnam...

MT-BC: Just in case, well another song I thought would be fun was a George Strait “Check Yes or No” were they talk about passing the note in school

Husband: Yeah, I love that

MT-BC: And then the other one I thought about was “On the Road Again.”

Pam: That’s not my-, I always said if I download it on my phone for ringtone, it would be either “Driving My Life Away” or “On the Road Again”

All: *Laughs*

Husband: It takes about three weeks to go all over Harlan County, to one end of it. So, every three weeks she drives to a different road over a different county. She’ll go to one place then, then the next day she’ll have to go to another place, and the next day she takes three weeks to do the whole county

MT-BC: Full rotation. Alright, so that sounds like a good one then, what do you think? Feel free to tap your toes if you want to *Plays song “On the Road Again” 26:51–28:14*

CASE 2 - Virgil

Figure 5.2 illustrates the progression through the therapy stages for Virgil. For Virgil and his girlfriend, rapport was built quickly with a “how are you doing?” and the use of known information (Virgil was reported to like bluegrass music). Greetings were quickly followed by Virgil exclaiming “let ‘er rip,” suggesting that the MT-BC begin playing music. Virgil and his girlfriend displayed a high level of participation throughout the session both in conversation and musically, requiring minimal cueing/prompting to engage with the MT-BC. Similar assessment questions from Pam’s session were used across participants; however, in the case of Virgil, the time spent on them was brief and asked quickly between songs. A larger portion of Virgil’s session was spent increasing the salience of the music experience by implementing music-based techniques that matched and validated the high levels of arousal, affect, and engagement demonstrated by Virgil and his girlfriend. High levels were evident by the enthusiastic disposition of both and their ongoing requests for specific music styles and specific songs.

In the above example, having Virgil engage with music was able to match and validate his mood and energy levels. Virgil was hard of hearing and did not particularly respond to questions therefore his session was more focused on implementation of music-based techniques as opposed to conversational and therapy-based techniques like Pam’s. Though all spoke loudly throughout, Virgil often made statements of personal interest unrelated to others’ comments. Similarly, he was more enthusiastic about sharing his own thoughts with the MT-

BC, such as discussing the music on the church television station he like to watch, as opposed to responding to questions. Thus, implementation of music-based techniques was found to be the most effective for elevating Virgil's mood.

Singing was first attempted as a form of music making following the chart review, which indicated that Virgil had mild dysarthria and was declining speech therapy. While Virgil did engage by singing, playing a tambourine was more highly correlated with his mood elevation as evidenced by his affect and overt engagement in music making (playing the tambourine).

In Virgil's session, rapport was built quickly and limited assessment was needed to determine how to elevate his mood due to his rapid responses or lack thereof. Therefore, it was interesting to consider when to progress to different stages. There were no specific cues from Virgil that one stage was complete. Virgil would have likely engaged with the MT-BC as long as the music therapist was willing. For example, he repeatedly asked the MT-BC to stay and watch the church TV show with him so she could see the musicians. To these ends, the decision to move from the implementation stage to the termination stage was made while Virgil was still highly engaged and based on length of the session.

Termination of Virgil's session included the intention to decrease the high level of arousal that has been achieved through group music making by transitioning to PPLM without prompts or cues for participation. When leaving the room, his nurse expressed gratitude for the music therapy visit. She shared that Virgil had been on 24-hour bed rest following receipt of tissue plasminogen

activator (tPA). She expressed that he had been restless and implied that the interaction was much needed.

Use of a variety of music-based (MB) and therapy-based (TB) techniques. In addition to progression through treatment stages, a variety of music-based (MB) and therapy-based (TB) techniques were used. The ratio of MB to TB techniques ranged from high MB content, to high TB content, or a balanced representation of both. As describe above, Pam’s session was largely devoted to use of TB techniques. TB techniques were used to build rapport during the first portion of the session including open-ended questions, furthering questions, “getting to know you” questions, and reflective listening. Probing then led to assessment of the stroke experience and increased knowledge of the unique attributes of the couple’s lives. Conversely, music-based techniques began less than 30 seconds into Virgil’s session. His session contained six songs in 29 minutes, with limited emphasis placed on TB techniques between songs. This may have been due to challenges with verbal communication (dysarthria and being heard of hearing) and or Virgil’s high energy level and the facilitation of his being able to interact with the music making validating and supporting his arousal and interest in engaging.

A variety of MB and TB techniques were used with specific techniques aligned with certain stages of the treatment process. For example, matching/mirroring patient disposition with both the music and the music therapist’s own disposition was often used for rapport building. In contrast, music making and reminiscing were more commonly found in the implementation stage. Table 5.1 includes common MB and TB techniques used in sessions aligned with corresponding stages of the treatment process in which

they were often used. It was determined that the specific technique was not as critical to CDM, nor to the progression through stages, as was the alignment with or influence of the technique on the patient's levels of arousal, affect, salience, and engagement.

Research Question 2

The second research questions was: What determines the clinician's course of action (i.e. what influences progression through the stages of the treatment process)?

Monitoring and influencing of patient levels of arousal, affect, salience, and engagement. A critical finding of the current study was that CDM was driven primarily by patient levels of arousal, affect, salience, and engagement (AASE). The following descriptions of AASE are according to the American Psychological Association (2019). Arousal can involve the activation of physical and cortical systems involved in autonomic, emotion, and appraisal processes. One's level of arousal relates to how alert someone is to a stimuli. Of note is the fact that arousal levels can facilitate or debilitate performance. Affect is an umbrella term used to describe a range of feelings or emotions. Mood is considered an affective state. A stimulus is salient when it is easily detected or identified. The salience hypothesis posits that stimuli that are motivationally significant are perceived more readily. For example, if a stimuli (music) is meaningful or relevant to someone they may be more motivated to interact with it because it is perceived more readily. Lastly, engagement is defined as volitional participation in which patients decide to interact with the music therapist and engage in treatment during music therapy. See Table 5.2 for complete AASE definitions.

Originally, analysis was guided by coding of mood and energy levels as outlined by Thompson (2013). For instance, did the patient present as positive

energized/cheerful, positive/negative, quiet/ambivalent, tired, or other? Most patients presented as relatively positive to varying degrees. Consequently, it became necessary to consider in more detail (beyond mood and energy levels) what exactly was being observed and how those elements drove CDM. It was identified that patient AASE levels influenced decisions regarding how to progress through treatment stages and which MB and or TB techniques to use. The following case illustrates how AASE impacted CDM. Additionally, the reader can see session-based examples of the AASE concepts in the Table 5.2.

CASE 3 – Barbara

Barbara presented with a quiet/ambivalent disposition. Chart review indicated possible fatigue from a recent physical therapy treatment. Using the technique of matching/mirroring, the MT-BC's vocal tone and rate of speech reflected Barbara's quiet disposition. Since she was not talking, the MT-BC only asked questions to assess music preference music in order to begin music quickly. To determine the most salient music to start the session, genres of music were named, then artists (based on the cues Barbara gave indicative of preference), and finally song options. Barbara gave minimal, soft-spoken replies in response to the options presented. However, as soon as the music therapist mentioned a song title that was salient, changes in her vocal tone occurred. Barbara's vocal tone indicated increased positive affect combined with a shift from very little to greater verbal interaction. In light of these changes, the MT-BC shifted from closed to open-ended questions while tuning the guitar in preparation for PPLM. Musical elements of the first song also matched/mirrored Barbara's levels of arousal, vocal affect, and engagement including a sweet tone and *legato* dynamics. As Barbara

began to sing along, the volume of the guitar accompaniment was increased, the tone of the music was brightened by shifting from finger picking the guitar to strumming, and the music therapist's singing volume decreased to allow space for Barbara to sing. By the end of the first song Barbara was fully singing along.

EMR review indicated that Barbara had moderate depression scores and had been started on medication for "likely" post-stroke depression. Additionally, it was reported that Barbara would ask to "go home" during discussion with other medical team members when the topic of going to a rehabilitation facility was introduced. EMR indicated that physical therapists had stressed the importance of rehabilitation to Barbara, especially due to the fact that no reliable caregiver was at home to assist her. During at least one physical therapy session, Barbara had become emotional when discussing rehabilitation. However, by the end of this music therapy session she was singing her own original songs independently and sharing self-identified reasons that going to a rehabilitation facility might be useful. Barbara spoke of a song she had written stating that when life was knocking her down, she would not let it. She talked about how rehabilitation could be helpful, such as in improving her weak arm. The session continued on with a similar strategy of matching and influencing Barbara's AASE levels to maximize on therapeutic outcomes. When Barbara was asked about her music therapy experience, she stated, "had a good time, feel lifted, not sure if she [MT-BC] would do it again." Table 5.2 describes how CDM was aligned with changes, or lack thereof, in AASE during the rapport building of Barbara's session.

Observation of patient levels of AASE was used to select techniques based on task demands. Task demands are the characteristics of a task in relation to what an

individual must do to complete it (American Psychological Association, 2019). To influence the direction of AASE (such as increasing engagement), the MT-BC would either match current levels of AASE with technique task demands or require a little more from the patients. Virgil's session is illustrative of a patient demonstrating high levels in all AASE domains from the beginning of the session. The following transcript reflects his initial levels of arousal and positive affect observed through joking, salience through confirmed preferred music genre, engagement with reciprocation and initiation of conversation, mouthing words to the first song, and exclaiming the song title prior to the conclusion of the song. Virgil's AASE levels were matched by the MT-BC in musical and verbal interaction.

MT-BC: Hey Virgil, how ya doin?

Virgil: Hu?

MT-BC: How are ya

Virgil: I'm doing alright and you

MT-BC: I'm Jessy, I'm doing just fine

Virgil: you good

MT-BC: I heard you like bluegrass

Virgil: I do

MT-BC: Well I'm gonna play you some songs

Virgil: Ok, Let er rip

Laughing

Girlfriend to MT-BC: want me to get you a chair?

MT-BC: no I'm good

Girlfriend: you sure?

music starts

“Bluemoon of KY” played in the key of C

Musical elements: bright, loud, enthusiastic, sounds cheerful, played one verse and chorus.

Virgil mouthed a few words mostly at the beginning of the song

As last chord fades:

Virgil: Bluemoon of KY (mumbled)!

MT-BC: you got it *laughing*

Virgil: Wasn't it

MT-BC: You got it, that's exactly what it was, I saw you...

Virgil: I know it was

MT-BC: ...mouthing the words along a little bit, you feel free to sing if you want to

Virgil: I can't sing (*visitors laugh*) I can't speak about half the time (*visitors laugh*)

When considering task demands, singing was not the best choice for maximizing engagement for Virgil, as his speech was impaired as a result of his stroke.

Consequently, singing increased task demand. Additionally, this patient had a documented hearing loss, so following along with song lyrics was also demanding.

Because elevating mood was the primary goal (as opposed to speech rehabilitation), facilitation of singing was judged to be an ineffective technique for driving changes

AASE due to the task demands of singing. In light of these challenges, engagement was

achieved through introduction of music making with a tambourine as seen in the transcription below:

MT-BC: *laughs walks over to get tambourine.* Let's see, this is a good one
[song] to do some percussion with, *shakes tambourine,* give that a go for me.
Hands tambourine to patient.

Girlfriend to Virgil: you keep time

Virgil: *mumbles*

Girlfriend to Virgil: you're to keep time with it

Virgil: I don't know how

MT-BC: *starts playing*

Virgil: *mumbles likely about not knowing what to do; immediately starts shaking
the tambourine*

MT-BC: That's perfect!

Girlfriend to Virgil: you're doing good

Virgil: I don't know how *mumbles*

All: *start singing "I Saw the Light"*

Virgil continues with tambourine, girlfriend continues singing throughout

One verse, one chorus

Music moderate volume allowing space for voices, bright, quick paced

MT-BC: awesome

Rest of the song is played

Virgil: hey!

MT-BC: heey, *laughs*

Virgil: thank ya *keeps shaking tambourine*

A less overt example of changes in AASE and matching task demand was seen in James' session. James had a baseline of dementia, initially responded to questions with minimal words, and never demonstrated any changes in AASE in response to opportunities to interact with the music. James did not initiate rhythmic movement, mouth words to songs, sing, or otherwise interact musically either independently or with prompting from the MT-BC or his spouse. For James, facilitation of reminiscing based on song themes changed in a positive direction. James initially gave minimal responses to questions during the session but began sharing stories from his life in full sentences during reminiscing. These changes continued to increase AASE levels as evident by increased initiation of storytelling, elaboration during storytelling, and a decrease in latency between question and response when discussing life stories. Across the session there continued to be no changes in AASE in relation to interacting musically, indicating that the task demands required to physically and cognitively engage in active music making (such as with Virgil or singing with Barbara) was a good choice for James. This was further confirmed by his response when music making was attempted. Because James' wife continued to verbally encourage James to physically engage as much as possible, James was handed a tambourine during an upbeat song with a strong rhythmic structure. James immediately became disoriented, shaking the tambourine towards the ground and gesturing to call his dog, who was not in the room. The task demand of what to do, or how to play an instrument, which may have been an unfamiliar task to him, was too high. Playing an instrument was not a salient experience. In fact, James attempted to turn it into something he was more familiar with.

Reminiscing, derived from PPLM with themes from James' life such as truck driving, did match James' AASE levels and continued to be confirmed as effective in elevating mood across the session. This approach was also confirmed as a good treatment choice as it was later reflected in James' comments about his experience with music therapy. He stated "alright; played my favorite music; fun; got to talk; mostly listened." The "got to talk" part was particularly interesting for James given the progression of dementia which contributed to difficulties with reciprocal verbal communication.

Additional Considerations

Ongoing evaluation and clinician knowledge. There is general agreement in the literature that CDM is a complex task that relies on core foundations of professional knowledge and ongoing evaluation (Baker, 2007; Higgs et al., 2008). Evaluation includes cognition (reflexive inquiry) and metacognition, which bridges the gap between knowledge and cognition (Higgs et al., 2008). Cognition encompasses the processing of information through the lens of the clinician's knowledge set. Metacognition involves reflective self-awareness and monitoring of one's own reasoning, thus preventing errors such as in habilitation of pattern recognition (Higgs et al., 2008). Furthermore, CDM encompasses a progressively deeper reflective understanding of, and tolerance for, ambiguity (Higgs & Jones, 2000; Higgs et al., 2008). In *Defining Music Therapy*, Bruscia (1998) discusses the process of clinical music therapy, arguing that it involves reliable and valid observation with continuous evaluation of its effects. Similarly, critical factors of working as a music therapist in acute stroke care have been identified to include knowledge, interaction with participants, and accurate observation of the

physiological and psychological effects of music therapy (Forsblom & Ala-Ruona, 2012). Therefore, knowledge and evaluation are foundations of the conceptual framework.

Gathering information. Gathering information was valuable in technique selection and influencing AASE levels. For example, knowing that James was a truck driver aided in song choice which facilitated reminiscing and influenced AASE in a positive direction. Information gathered prior to the start of sessions was used to build rapport and to guide assessment. Information gathered during the session included: “get to know you” information, such as personal history with music, family and support systems, and perception of the stroke experience and the future. Examples of using information to build rapport and assess included statements/questions from the MT-BC such as “I hear you like bluegrass” and “you were at a hospital before you came to this hospital, is that right?”

In summary, analysis revealed that the CDM process was shaped first by a foundation of the MT-BC’s knowledge base and ongoing evaluation of treatment. Each session began with building rapport and continued by progressing through the treatment process of assessment, technique implementation, and finally treatment termination. During the treatment process, MB and TB techniques were selected and evaluated for effectiveness informed by patient AASE levels. In some treatments, there was a clear progression from one stage to the next and at times, decisions targeted developing two or more stages simultaneously or returning to a previous stage. A critical finding was the monitoring and influencing of patient levels of AASE which led to treatment decisions. Observing AASE allowed for matching task demands with techniques. In other words,

when considering what MB and or TB technique to use, it was important to observe if the patient was arousing enough, was responding with positive or negative affect, was finding meaning in the experience, and/or was engaging enough to voluntarily participate in the technique. For instance, based on current levels of AASE, was the patient more likely to respond to an open-ended question or a closed-ended question? Similarly, based on what the patient is are doing right now, will he or she select, hold, and play an instrument given the opportunity? Is another technique with fewer or less difficult task demands more appropriate based on AASE? Is there any information that could be gathered that might aid CDM? To illustrate the reported factors contributing to the CDM making process of a music therapist targeting mood elevation for adults hospitalized following stroke, a conceptual framework was developed and can be seen in Figure 5.3.

Discussion

The purpose of this study was to describe the CDM process of a music therapist targeting mood elevation for hospitalized patients following acute stroke. Results indicated that components of CDM involved the progression through a four-stage treatment process, the use of a variety of music-based (MB) and therapy-based (TB) techniques, and the monitoring and influencing of patient levels of arousal, affect, salience, and engagement (AASE). Additionally, a foundation of the clinician's knowledge, ongoing evaluation, and gathering of information contributed to treatment decisions. Through the CDM process, MB and TB techniques matched and influenced patient levels of AASE to facilitate positive changes in mood. An aim of self-study is knowledge discovery with the goal of being able to provide a tool for the greater

teaching community (Louie et al., 2003). Therefore, a CDM framework was developed based on these results and can be seen in Figure 5.3. The framework dismantles treatment and identifies the mechanisms of change when targeting mood elevation. A discussion of each component follows.

Four-Stage Treatment Process

Progression through stages of the treatment process were found to be one of two major components of CDM for targeting mood elevation during acute hospitalization following stroke. Stages of the treatment process are well represented in music therapy literature and in the standards of music therapy practice published by the American Music Therapy Association (2015b). Stages have also been outlined in the *Neurologic Music Therapy Handbook* (Thaut & Hoemberg, 2014), *The New Music Therapist Handbook* (Hanser, 2018), and *Defining Music Therapy* (Bruscia, 1998). A comparison of stages can be seen in Table 5.3. The presented conceptual framework includes four stages: rapport, ongoing assessment, implementation, and termination. Results indicated that stages could occur in temporal order, with overlap, or with a return to a previous stage. Because the present study was part of a larger quantitative study looking at the effects of a single-session of music therapy, all of the necessary stages were completed within a single treatment. It is important to point out that the framework presented does not include stages that took place outside of direct participant contact; for example, referral and documentation. Information gathering and evaluation occurred across the session, resulting in the ongoing development of a deeper understanding of contextual, individual, and musical elements contributing to the CDM process and thus progression through the stages of the treatment process.

Rapport was the first stage of the treatment process once in direct contact with patients and is a core tenet of the definition of music therapy and the development of the therapeutic relationship. Rapport, also known as the working alliance, can be defined as the therapeutic relationship between the therapist and patient. It is described as the degree of engagement with resulting impacts on therapeutic outcomes (Silverman, 2015). Hanser (2018) cites observation of the patient's degree of participation as the first component in rapport building.

Neurorehabilitation scholars argue that engagement is paramount to intervention selection and can drive neuroplastic changes and functional outcomes (Danzl, Etter, Andreatta, & Kitzman, 2012). Strategies to improve engagement begin with devotion to the development of rapport (Danzl et al., 2012). Subsequently, engagement was found here to be a key contributor to CDM.

The second stage during direct patient contact was found to be ongoing assessment. Bruscia (1998) defines assessment as:

that part of the therapy process when the therapist engages and observes the client in various music experiences in order to better understand him/her as a person and to identify whatever problems, needs, concerns, and resources the client is bringing to therapy (p. 27).

This definition aligns well with the present study's findings that the application of various MB and TB techniques with ongoing observation of AASE determines which technique would facilitate the most desirable changes for mood elevation. Levels of AASE and technique selection were found to be tied to task demands. That is, what does the task require of patients and are they, or would they likely, display levels of AASE

that correlated with those demands? Answering these questions and identifying the correct intervention/technique requires assessment of patients' strengths and weaknesses, pinpointing what they can and cannot do, and determining their responsiveness to music (Hanser, 2018).

Implementation involved similar techniques to assessment (see Table 5.1) with more focused facilitation of one or more techniques identified during the assessment stage most likely to produce the desired changes in mood (i.e., singing, music making, or reminiscing). During implementation, several interventions were used. One intervention of note that was used was mood vectoring. Mood vectoring, also referred to as the iso-principle, has long been referenced in music therapy (Heiderscheit & Madson, 2015). This technique involves first observing and selecting music that matches the affect/mood of a participant with the mood/quality of the music. Next, the quality of the music is progressively changed to alter mood (Shatin, 1970). Mood vectoring can be done live with changes made to the music in real-time, adapting to and guiding the patient. Another common application of mood vectoring is playlist development. Once developed, the playlist can be practiced with the music therapist and used outside of therapy for mood management (Heiderscheit & Madson, 2015). Playlist development for mood management may be an option for patients to implement at home following stroke as recorded music listening has been found to significantly decrease depression during the first two months following stroke (Sarkamo et al., 2008).

Termination was identified as the final stage of the treatment process while in direct contact with patients. In acute medical settings, there is no guarantee that a patient will receive a subsequent session. Patients can be suddenly discharged from the hospital,

become critically ill, transfer to a different medical facility, or have any number of procedural activities that prevent music therapy services from being delivered. Thus, termination is important to bring closure to the shared experience and to summarize one's accomplishments in therapy (American Music Therapy Association, 2015b; Hanser, 2018). Termination occurs when goals have been reached or progress is no longer being made (American Music Therapy Association, 2015b; Hanser, 2018). Table 5.1 illustrates techniques found here used for session termination.

Use of a Variety of Music-Based and Therapy-Based Techniques

The use of a variety of music-based (MB) and (TB) techniques was a second main component of CDM. This is not surprising, as music therapy research in neurorehabilitation is replete with examples of various interventions and combinations of approaches, often within the same treatment, for targeting improved mood (Ard & Wheeler, 2016; Raglio et al., 2015; Rushing et al., 2015). However, although findings have been positive, the variety of interventions used has contributed to poor quality of evidence and difficulty in generalizing intervention effectiveness (Magee et al., 2017). Neurologic Music Therapy (NMT) is one of the leading approaches to music therapy in neurorehabilitation. Due to limited studies, a less developed area of the NMT approach is how to target psychosocial needs. Music in Psychosocial Training and Counseling (MPC) is the leading defined technique in NMT for mood control and a number of other psychosocial outcomes (Thaut & Hoemberg, 2014). MPC can encompass a range of strategies, from guided music listening to musical improvisation or composition (Thaut & Hoemberg, 2014).

In music therapy, the majority of interventions are either musical or verbal (Amir, 1999). Nolan (2005) discusses the importance of the synergetic relationship of verbal processing and musical experiences. To conceptualize the balance of music and therapy, Silverman (2015) created a continuum model of music and therapy. The continuum model proposes that music and therapy are both independent and interdependent. Silverman argues that in music therapy there is always both music and therapy, although the balance of each may shift within one session or even within one therapist-participant interaction. At points in treatment there may be more music and less therapy, or more therapy and less music, or an even amount of the two. One example of how the ratio of music and therapy may differ is illustrated by how quickly music is introduced at the beginning of music therapy sessions. Shultis (2012) discussed how she determined when to introduce music working with adults on an intensive care unit. She found that when patient baseline scores of anxiety or pain were high, a more rapid introduction of music was used as opposed to starting with verbal discussion. Silverman (2015) similarly discussed in his continuum model that participant levels of functioning contribute to the ratio of music to therapy throughout or in beginning stages of treatment. In the present study, particularly low or high levels of AASE influenced a more rapid introduction of music. Moderate levels required more information gathering and assessment to determine which specific technique(s) to use.

A common MB technique used in this study was patient preferred live music (PPLM). PPLM was used across treatment stages and is recommended for use in adult medical settings (Silverman et al., 2016). It has been noted that hospitalized patients may initially prefer and be more open to receptive music therapy interventions such as

PPLM (Crawford et al., 2013; Silverman et al., 2016). Therefore, to build rapport, sessions for patients who were hesitant to interact started with PPLM followed by opportunities and bids for more active participation (Bruscia et al., 2009; Silverman et al., 2016; Standley, 2000). To these ends, PPLM can be a gateway to active intervention and thus increased engagement, which is a principle driver of neurorehabilitation (Danzl et al., 2012; Silverman et al., 2016; Standley, 2000). See Table 5.1 for more MB techniques.

A wide range of TB techniques were used during treatment and a list can be found in Table 5.1. Each strategy is correlated with the treatment stages with which they were most frequently used. Due to the use of audio-only recordings for data collection, techniques identified were based in verbal interactions and verbal processing with patients. Verbal processing in music therapy is defined as the “talking that facilitates the therapeutic process during, and in response to, music making or music listening” (Nolan, 2005, p. 18). Nolan offers several ways verbal processing is used in music therapy similar to findings presented here. One purpose is information gathering. Participant responses to probes provide information aiding in ongoing assessment and treatment evaluation (Nolan, 2005). In the presented study, information gathering was found to contribute to the CDM process included “getting to know you” information, inquiries into support systems, the stroke experience, and the future.

Another aspect of TB techniques, specific to verbal interaction, is the quality of verbalizations. Nolan (2005) highlighted the use of the therapist’s voice in verbal processing discussing that alterations in vocal qualities could include volume, tone, tempo, and words used. As illustrated in some of the case examples, elements of the

music therapists' voice are consciously altered based on the intention of the verbalization and elements of the participant-therapist relationship. For example, participant age, disposition, depth of the relationship, and stage of the treatment process could factor into the therapist intentional vocal quality (Nolan, 2005). One study found that the vocal quality of musicians, specifically vocalists, is such that in song and speech there is less "noise" (Stegemöller, Skoe, Nicol, Warrier, & Kraus, 2008). Noise is related to the amount of frequency variability. In light of this finding, Stegemoller (2014) posits that the ability of a music therapist to deliver a "clear" message fosters neuroplasticity processes. Alterations in vocal quality were used effectively in this study as the music therapist matched/mirrored a patient's levels of AASE.

Similar to the previous discussion of MB techniques, verbal matching or mirroring was often used to build rapport which involved the adjustment of vocal quality to reflect patient disposition. Vocal quality was also used by the MT-BC to influence or model a shift in disposition. For example, an inquisitive vocal quality and question words were used during the implementation stage treatment, but shifted to summative and definitive statements during the termination stage. Nolan (2005) termed this an "enhanced transition" (p. 23). Across the treatment process, verbal interventions were used before, during, and after music in the present study and previous literature (Amir, 1999).

Monitoring and Influencing of Patient Levels of Arousal, Affect, Salience, and Engagement

Perhaps the most essential finding in the current study was the identification of underlying factors contributing to CDM and mood elevation. Arousal, affect, salience,

and engagement (AASE) were used to identify effective techniques and to serve as the gauge of treatment effectiveness (see Table 5.2 for AASE definitions.) Technique choice was important in the current CDM process but only to the extent to which it influenced or aligned with the patient's levels of AASE. To check for technique effectiveness, task demands were considered. If technique task demands were too low or too high in relation to a patient's AASE levels, adjustments were made to accommodate the patient's AASE levels.

One way to think about how monitoring and influencing AASE levels may impact therapeutic effectiveness is through the principle of optimal stimulation or arousal. This theory suggests that people tend to learn best when a stimulus occurs at their preferred level of stimulation or excitement (American Psychological Association, 2019). Furthermore, maintaining this preferred level of arousal is motivating (American Psychological Association, 2019). In this study, the presentation of stimuli was based on the music therapist's CDM process. When CDM involves the monitoring and influencing of AASE levels, optimal arousal/stimulation can be fostered. Optimal stimulation can thus facilitate mood elevation and provide scaffolding for the motivation and learning required in neurorehabilitation.

Arousal through reward and enjoyment of music is well documented in neuroscience. Associated neurophysiological changes originate from activation of all major limbic and paralimbic brain structures responsible for the initiation, maintenance, and termination of emotions during musical experiences (Koelsch, 2009). Additionally, music stimulates brain structures involved in dopamine release, a neurotransmitter associated with reward, motivation, learning, and the long-term potentiation required for

neuroplasticity (Stegemoller, 2014). Physiological responses are observed in relation to pleasurable music. The intensity of response is correlated with changes demonstrated in heart rate, electromyogram, respiration, and blood flow in brain regions of reward/motivation, emotion, and arousal (Blood & Zatorre, 2001).

Arousal responses to music are sometimes observed through changes in affect. Affect is an overarching term related to stress responses, emotions, and moods (American Psychological Association, 2019; Gross, 2015). The effect of music therapy on positive and negative affect has been investigated in the medical setting with positive outcomes (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015).

Salience and engagement are principles of neuroplasticity within neurorehabilitation linked to motivation and attention resulting in neural changes (Danzl et al., 2012; Kleim & Jones, 2008). For example, if a motivational stimulus (e.g., music or the music therapist) is salient, the stimulus will be attended to and could be used to foster engagement. Engagement was facilitated in this way across this study—patients voluntarily sang and played instruments, a family made music on various instruments together, patients shared stories and goals, and patients and visitors discussed the stroke experience. When the music therapy experience was salient in some way, there were increases in AASE. That is, the stimuli were significant enough to motivate shifts in AASE. In this study, common examples of salience included the use of personally meaningful songs, familiar music, thematic music to facilitate reminiscing, and the experience of making music with people. Further investigation into the monitoring of AASE levels during treatment could aid in the development and exploration of the

findings here. This is echoed in a review by Sihvonen et al. (2017) in which the authors called for the consideration of the therapeutic relationship and the impact of patient-selected music on activation of reward, arousal, affect regulation, learning, and experience-driven plasticity.

No one component (the stages of treatment, use of MB and TB techniques or monitoring and influencing AASE) discussed stood alone. Rather, components functioned collectively as part of the CDM process of the MT-BC. Results included positive changes in mood illustrated by patient comments such as, “it [the music therapy experience] made me feel important.”

Limitations

While there were strengths in the multiple roles of the MT-BC and measures were taken to support trustworthiness, the most obvious limitation of this study was the triple role of the MT-BC as researcher, clinician, and participant. Furthermore, in this study of CDM, only one person’s process was examined through the lens of the MT-BC’s professional knowledge of music therapy approaches and applications. Future efforts to include other clinicians, clinicians of varying experience levels, and testing of the developed conceptual framework with multiple clinicians would aid in addressing this limitation.

The finding that AASE drives much of CDM is foundational as a step towards evaluation of treatment mechanisms. A limitation here is the lack of objective measure of any domain. Similarly, there were no defined boundaries to stages of the treatment process. Finally, a significant number of techniques were used in treatment. Identifying a refined list, or identification of the most effective techniques and intervention based on

AASE observation would be useful to increase understanding of how to implement and teach effective treatment. A final limitation was the use of audio-only in recording of the treatment. Video analysis could contribute valuable behavioral observations, aid in identification of AASE, help refine techniques, and thus dissect the music therapy CDM process.

An additional limitation to these results is the underrepresentation of family-centered care. It is obvious in reviewing the cases and considering the professional background of the MT-BC's approach to treatment that a family-centered care approach was used. In fact, family members and visitors were at times more involved in treatment than patients and invited to engage by the MT-BC. One example of this was the identification of peer-modeling as a technique used. Peer-modeling occurred when the MT-BC would facilitate engagement from those present other than the patient in order for them to serve as models for the patient. While findings here focused on direct observations and impacts of treatment to the patient, all present and interested were obviously part of, and influential to, the music therapy experience and thus CDM. This is in line with stroke rehabilitation recommendations identifying caregivers as members of the treatment team and also in need of psychosocial support (Miller et al., 2010; Winstein, et al., 2016). Further investigation into the role of non-patient participants in music therapy is warranted. Both the role of family and others present in CDM and the impact of music therapy on them.

Clinical Implications

The primary clinical objective of music therapy treatment for this study was pre-determined to be mood elevation. Since patients experienced a stroke, some form of

rehabilitation following hospital discharge was anticipated, which would require active engagement. Therefore, all clinical decisions made and evaluated sought to improve the possibility of patients participating in active rehabilitation treatment.

All patients in this study had experienced a stroke; however, the CDM process discovered in this study could be used with other acute medical populations in which active patient participation is encouraged. To these ends, a variety of techniques were employed based on the MT-BC's knowledge, evaluation (cognition and metacognition) of AASE, and evolving input from the patient and others present with the patient. Higgs et al. (2008) refer to these interactions as "critical creative conversations" (p. 5) To conceptualize this process, a framework was developed (see Figure 5.3) and can be used by students, clinicians, and teachers. Visible in this framework is the interaction of components requiring clinical reasoning and CDM skills to navigate. It is important to keep in mind that CDM is not a straight sequential path, but a dynamic, interactive, contextual phenomenon (Higgs et al., 2008). Likewise, interventions in healthcare are complex and difficult to evaluate (Craig et al., 2008). Not surprisingly, there are differences in clinical reasoning skills and processes based on the therapist's level of expertise. Loftus and Smith (2008) found that expert practitioners use forward reasoning rooted in "if-then" predictions and draw on pattern recognition. Alternatively, novice practitioners rely on backward reasoning, or hypothesis testing (Loftus & Smith, 2008). This may also be considered as reflection-on-action versus reflection-in-action. Reflection-on-action is retrospective, supporting planning for the future; reflection-in-action allows for modification of what is being done while it is being done (Christensen,

Jones, Higgs, & Edwards, 2008). The framework provided here aids in the moment -to-moment consideration of the patient via observation.

Baker (2007) found that prior to a course on CDM, students could articulate effective music therapy but not the decision-making process. The enhancement of clinical reasoning and CDM skills can be taught. Scholars posit that frameworks and related tools can aid new professionals in planning, implementing, and evaluating music therapy treatment (Dvorak, 2016; Kern, 2011; Magee & Burland, 2008; Silverman, 2015; Thompson, 2013). Baker (2007) conducted action research by designing and implementing a music therapy CDM graduate course. Throughout the course, problem-based learning opportunities, such as small groups developing full treatment plans and presentation of clinical case scenarios, were used. Baker (2007) found that following the course, students could better justify clinical decisions, could cite supporting literature, and had increased confidence and competence in decision-making. This suggests that CDM within music therapy can be taught. Frameworks such as the one presented in this study may aid in the teaching and learning of CDM.

Conclusion

The literature reveals that music can be used to positively modulate mood and that there is a growing interest in the application of music therapy for mood management following acquired brain injury. However, music therapy neurorehabilitation trials targeting psychosocial outcomes lacks clarity in intervention reporting due to the use of a wide variety of interventions even within a single session of treatment. Use of a variety of interventions presents challenges for researchers as it is difficult to replicate and pool findings across studies.

A main goal of the present study was to describe music therapy clinical practice through the investigating of the CDM process via the perspective of a MT-BC targeting mood elevation following acute stroke. The ensuing conceptual framework illustrates how clinical decisions are made in an active music therapy treatment when targeting mood elevation following stroke and can serve as a guideline for treatment. It is argued here that this framework could serve as a guideline across the acute medical setting for mood elevation.

CDM in this study involved the MT-BC's progression through a four-stage treatment process (rapport building, ongoing assessment, implementation, and termination); monitoring and influencing patient levels of arousal, affect, salience, and engagement (AASE); and selecting music-based and therapy-based techniques to facilitate the most desirable changes in AASE and thus, elevate mood. In order to elevate mood, the task demand of interventions and techniques that patients were being asked to participate with had to match or slightly influence their current levels of AASE. Foundational to this CDM process was the music therapist's knowledge base and ongoing evaluation. In summary, the developed CDM conceptual framework can be used for study replication, as a clinical guideline for intervention implementation, and as a tool for teaching and learning clinical music therapy skills.

Table 5.1*Music-Based and Therapy-Based Techniques*

Rapport	Assessment	Implementation	Termination
Music-Based			
PPLM	PPLM	PPLM	PPLM
Matching/Mirroring	Mood vectoring	Mood vectoring	Matching best
Choice	Cueing/Prompting	Cueing/Prompting	response
	Modeling	Modeling	Most successful
	Windows for interaction	Music making	interaction
		Rhythmic structuring	Summarizing with song
Therapy-Based			
Humor	Cueing verbally	Cueing verbally	Summarizing
Use of known information	Use of known information	Socratic questioning	Suggestion of benefit
Get-to-know-you questions	Furthering questions	Reminiscing	Conclusive statements
Closed/open ended questions	Probing	Minimal encouragers	
Reflective listening	Closed/open ended questions	Probing	
Peer modeling	Choices	Didactic	
Validation	Peer modeling	Consulting the patient	
Matching/Mirroring	Clarifying	Choices	
Disclosure		Peer modeling	
		Validation	

*PPLM = Patient preferred live music

Note: This is a table of commonly used techniques by the MT-BC observed in the present study. It was found that of more importance than the specific technique used was that the task demand (what the technique asked of the patient) matched or slightly influenced their current levels affect, arousal, salience, and engagement. Thus, this is not a comprehensive list of possible techniques and interventions.

Table 5.2

Arousal, Affect, Salience, and Engagement in Clinical Decision-Making: Rapport Building - Barbara

Construct	Definition (American Psychological Association, 2015)	Barbara	MT-BC Actions
Arousal	<p>1. a state of physiological activation or cortical responsiveness, associated with sensory stimulation and activation of fibers from the reticular activation system.</p> <p>2. a state of excitement or energy expenditure linked to an emotion. Usually arousal is closely related to a person's appraisal of the significations for an event or to the physical intensity of a stimulus. Arousal can either facilitate or debilitate performance.</p> <p>Arousal level: the extent to which an organism is alert to stimuli.</p>	<p>Soft spoken, withdrawn</p> <p>Audible increase in vocal volume & decrease in latency from song choice to patient response</p> <p>Continued verbal engagement</p>	<p>Soft spoken; calm; slow pacing of interaction</p> <p>Identification of a song that was salient to the patient and thus played</p> <p>Increased animation in verbal speaking. Asked get to know you questions. Increased speech volume</p>
Affect	<p>Any experience of feeling or emotion ranging from suffering to elation, from the simplest to the most complex sensations of feelings and from the most normal to the most pathological emotional reactions. Often described in terms of positive affect or negative affect, both mood and emotion are considered affective states.</p>	<p>Initial quiet verbalizations</p> <p>Increase in animation of vocal tone</p>	<p>Matched affective disposition with musical elements.</p> <p>Corresponding shift in music element qualities</p>
Salience	<p>Salience hypothesis: a theory of perception according to which motivationally significant stimuli (objects, people, meanings, etc.) are perceived more readily than are stimuli with little motivational importance. It has relevance in social perception, advertising, and linguistics.</p> <p>Salient: distinctive prominent. A salient stimulus in a multi-element array will tend to be easily detected and identified.</p>	<p>Increase in animation of vocal tone and latency of verbal response when a more salient song choice was given</p>	<p>Identification of a song that was salient to the patient and thus played</p>
Engagement	<p>Volition: 1. the faculty by which an individual decides upon and commits to a particular course of action, especially when this occurs without direct external influence. ...active rather than passive response to events. Participation:</p> <p>1. taking part in an activity, usually one that involves others in a joint endeavor.</p> <p>2. the interaction of two or more systems that mutually influence each other.</p>	<p>Shift from one-word or syllabic responses to singing full chorus of a song</p> <p>Decrease in latency from question to response</p>	<p>Increased volume of guitar accompaniment, brightness of music, and decreased own singing volume to allow space for the patient</p> <p>Shift to open-ended questions</p>

Table 5.3*Treatment Processes in Music Therapy*

Steps/Stages	American Music Therapy Association (2015b)	Hanser (2018)	Thaut and Hoemberg (2014)	Bruscia (1998)	Presented
Referral	x	x			
Rapport		x			x
Assessment	x	x	x	x	x
Goals & Objectives		x	x		
Observation		x			
Strategies/Protocol		x			
Treatment Plan	x	x	x		
Implementation/Treatment	x	x		x	x
Documentation	x				
Evaluation/Reassessment		x	x	x	
Transfer to Real World			x		
Termination / Closure	x	x			x

Figure 5.1. Event Flow Chart – Pam

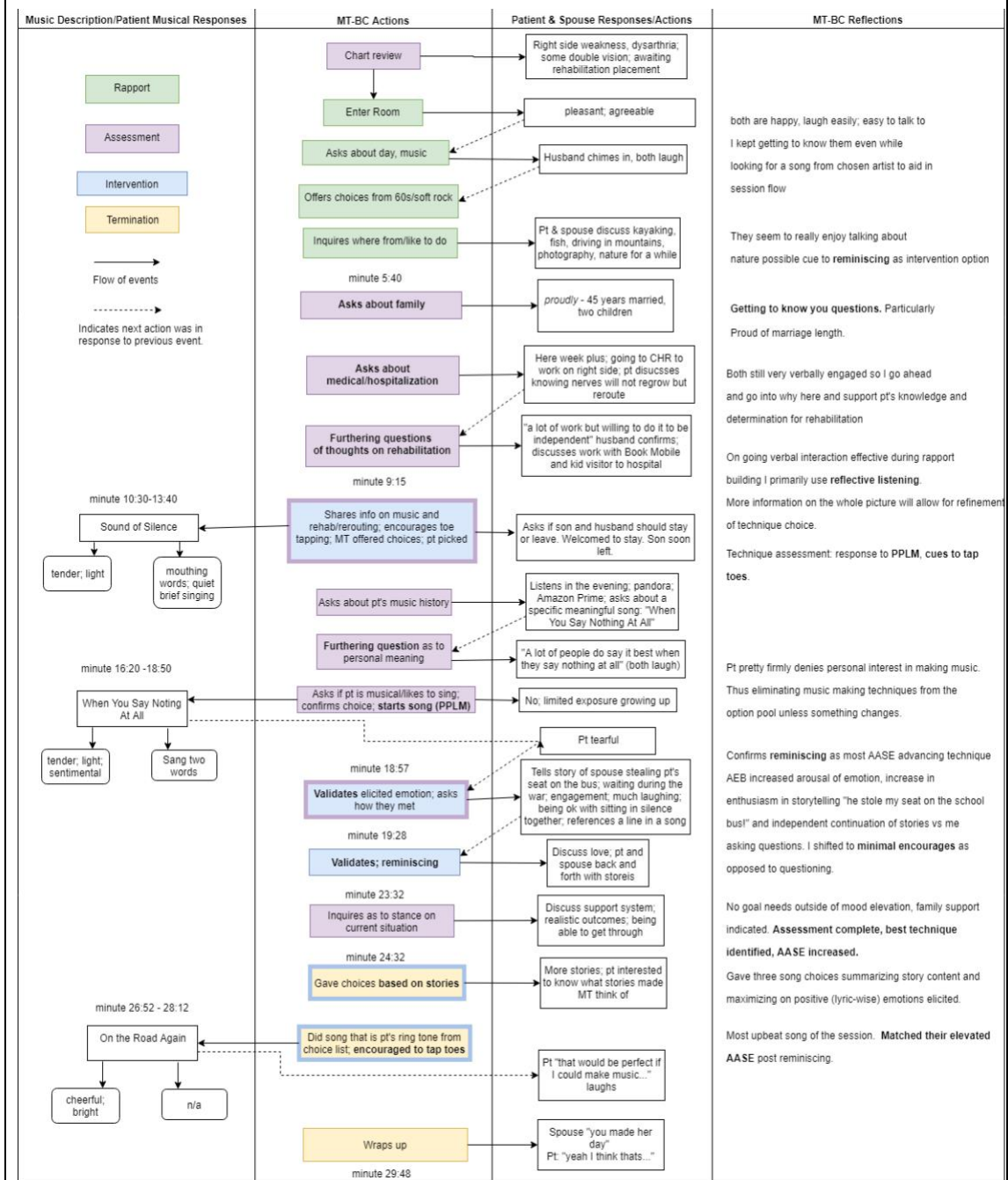


Figure 5.1. The event flow chart reflects musical events and responses, MT-BC (music therapist) actions, patient and spouse responses, and MT-BC reflections on events. Arrows reflect the flow of events. Dotted arrows indicate clinical decision making directly impacted by the previous event.

Figure 5.2. Event Flow Chart – Virgil

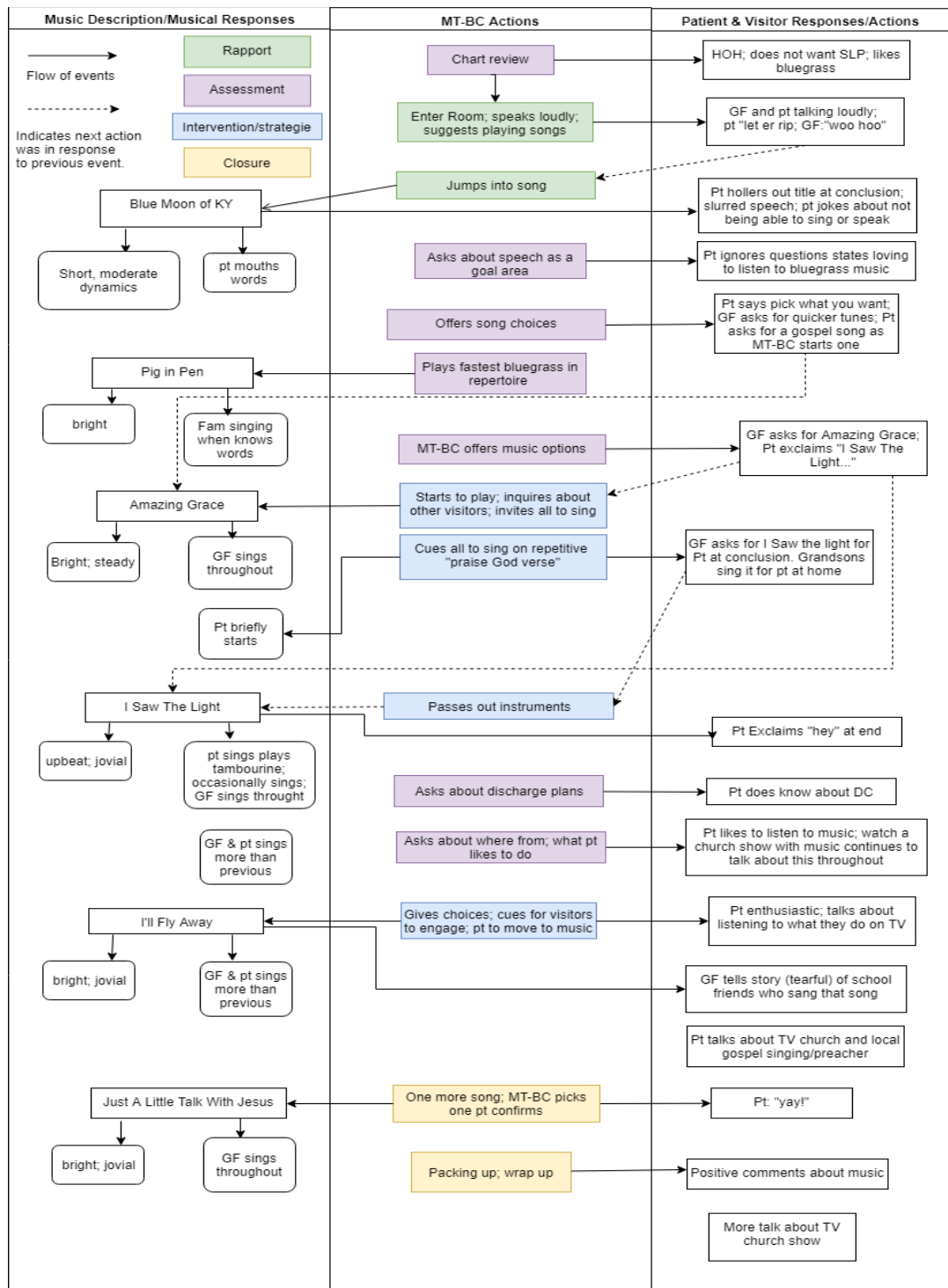


Figure 5.3. The event flow chart reflects musical events and responses, MT-BC (music therapist) actions, and patient and spouse responses. Arrows reflect the flow of events. Dotted arrows indicate clinical decision making directly impacted by the previous event.

Figure 5.3. Conceptual Framework for Mood Elevation Following Stroke

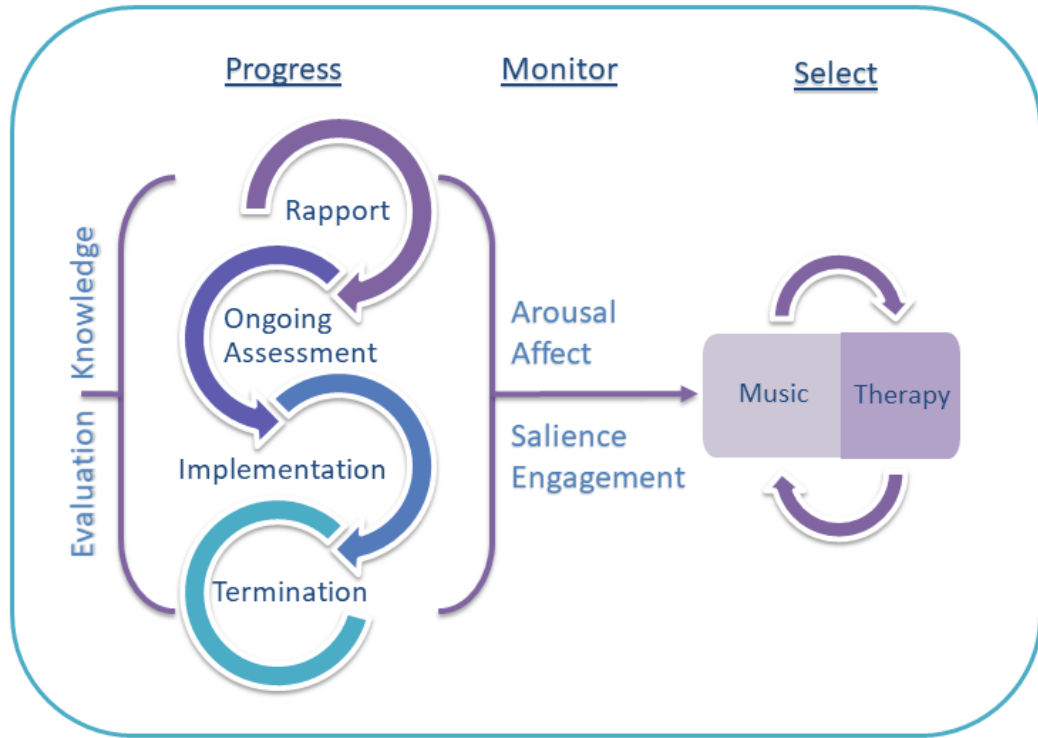


Figure 5.3. The above is a conceptual framework to elevate mood for adults hospitalized following stroke. This framework involves the music therapist’s knowledge, ongoing evaluation, progress through the treatment process with the patient, monitoring and influencing of patient levels of arousal, affect, salience, engagement, and selection of music-based and therapy-based techniques.

Chapter 6: Synthesized Discussion

Summary of Findings

The principle aims of this dissertation were to investigate the use of active music therapy treatment to elevate mood for adults hospitalized following a first-time acute ischemic stroke and investigate the clinical decision-making process involved. To these ends, three studies were designed and conducted to answer research questions resulting in a comprehensive and evidence-based approach to treatment. Studies are summarized below. Clinical implications and future research are also discussed.

Study 1 Aim: To examine the impact of a single treatment of active music therapy (AMT) on elevating mood for adults during acute hospitalization following a first-time acute ischemic stroke.

Study 1 Hypothesis: It was hypothesized that one AMT treatment during acute hospitalization following a stroke would have a positive impact on mood as measured by a change in The Faces Scale taken immediately prior to and after AMT.

Study 1 Findings: Results supported the hypothesis that AMT would improve mood as findings indicated a statistically significant improvement in mood following one treatment.

Study 1 Summary: Study 1 investigated the use of AMT to improve mood for hospitalized adults ($N = 44$) following a first-time acute ischemic stroke. A single-arm, repeated measures design was used. Participants received one AMT treatment lasting an average of 31 minutes. AMT consisted of music making interventions that elicited and encouraged active engagement from participants involving creating music, playing instruments, singing, improvising, and/or moving to music. It was hypothesized that

AMT would improve mood from immediately prior to, to immediately following the AMT treatment. Additional information collected included stroke severity (NIHSS score), depression score (PHQ-9), cognitive impairment score (MiniMoCA), treatment characterizations (such as additional goals, length of treatment and hospitalization), and participant comments on their experiences with music therapy. The PI, who also served as the music therapy clinician, was blinded to all measures.

Findings supported the hypothesis indicating a significant improvement in mood following one AMT treatment. In addition to statistical significance ($p = 0.002$), participants reported AMT as a positive experience. Previous music therapy studies have demonstrated that a variety of interventions can improve mood outcomes following stroke. This was the first to look at the use of music therapy at the most acute stage of stroke recovery. Additional data collected indicated that the study cohort had mild to moderate stroke severity with significant improvement across hospitalization. Mild mean depression scores and moderate cognitive impairment were found with no significant changes from hospital admission to discharge.

Treatment length was a mean of 31 minutes ($SD = 6.78$). Hospitalization was an average of 7.07 days ($SD = 5.02$). Occasionally, other goals were addressed during the treatment. The goal most addressed in addition to mood was fine/gross motor skills. Targeting physical goals along with mood has been done previously demonstrating effectiveness in both goal areas (Jun et al., 2012). Additionally, A Cochrane systematic review found that music therapy may be effective in improving gait and upper extremity functioning following stroke (Magee et al., 2017). Further investigation into the impact

of AMT on functional outcomes, including social participation, in addition to mood is warranted.

Eight themes from patient comment analyses were found. Order of themes from most represented to least were: experience as positive, characteristics of/reference to the therapist, other, self-identified change in mood/state, impact of participant music preference, active engagement, personal insight/depth of the experience, and comments on music. These findings confirm the positive impact of AMT rooted in patient preferred live music to elevate mood through brief intervention.

Although there were several limitations, this study adds to the evidence supporting active music therapy intervention to improve mood during stroke recovery. Findings align with prior research using a variety of interventions as well as evidence of benefits to single-session music therapy in acute medical care (Bergh & Silverman, 2018; Cassileth et al., 2003; Crawford et al., 2013; Fredenburg & Silverman, 2014b; Ghetti, 2011; Hogan & Silverman, 2015; Madson & Silverman, 2010; Rosenow & Silverman, 2014). These results are encouraging in light of the prevalence of post-stroke depression, its subsequent impacts, and the call for early intervention.

Study 2 Aim: To examine the impact of two AMT treatments, as compared to one, on mood elevation for adults during acute hospitalization following a first-time acute ischemic stroke.

Study 2 Hypothesis: It was hypothesized that two AMT treatments would have a greater impact on mood as compared to one, as measured by a change in The Faces Scale administered immediately prior to the first AMT treatment received and immediately following the last (either AMT treatment one or two depending on group stratification).

Study 2 Findings: Results did not support the hypothesis that two treatments would have a greater impact on mood elevation as compared to one ($p = 0.328$).

Study 2 Summary: Study 2 investigated the effects of two AMT treatments on mood for hospitalized adults ($n = 19$) compared to one ($n = 25$) following a first-time acute ischemic stroke. A single-arm, repeated measures design was used. Group 1 participants received one AMT treatment during the course of their hospitalization; Group 2 received two AMT treatments. AMT consisted of music making interventions that elicited and encouraged active engagement from participants involving creating music, playing instruments, singing, improvising, and or moving to music (see Chapter 3 “Intervention” section and Appendix G for treatment details). It was hypothesized that two AMT treatments would have a greater impact on mood as compared to one. Baseline differences were found between groups for stroke side, vascular distribution, and stroke severity. Group 2 presented with higher stroke severity and a significantly longer hospitalization.

Adjusting for differences, findings did not support the hypothesis that two AMT treatments improved mood across hospitalization to a greater extent than one AMT treatment ($p = 0.328$). Group 1 demonstrated a significant improvement in mood during treatment one ($p = 0.037$). Group 2 demonstrated a significant improvement in mood during treatment two ($p = 0.017$), but not greater than treatment one ($p = 0.524$).

In regards to frequency and duration, it was found that participants received their first AMT session on average 3-4 days following hospital admission, with a mean of 2.26 days between treatment one and treatment two. Group 2 had significantly shorter first treatment sessions than Group 1 ($p = 0.025$). Additionally, Group 2 had a

significantly longer hospitalization than Group 1 ($p = 0.077$). Group 2 presented with more severe strokes which may have contributed to an extended hospitalization and thus a greater likelihood of receiving two treatments. Stroke severity, but not stroke location, is consistently found to impact recovery outcomes including post-stroke depression (Kim, 2016; Kutlubaev & Hackett, 2014). Findings suggest that stroke severity may contribute to dosing effectiveness with Group 2 declining in mood until the final time point, but Group 1 improving immediately. Additionally, a one-treatment variance may not be large enough to demonstrate dosing differences.

Despite limitations, this study adds to the evidence supporting further investigation into dosing for music therapy interventions to improve mood in acute medical settings. Since both one and two treatments were effective, with a mean of 2.26 days between treatments, future investigations should increase dose and frequency as well as evaluate the long term impact on both mood and depression. Stroke severity is likely an important variable in determining optimal treatment.

Study 3 Aim: To describe the clinical decision making process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute ischemic stroke.

Study 3 Hypothesis: Hypotheses were not predetermined for this qualitative self-study. Two questions were explored: 1) What are the components of the clinical decision making (CDM) process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute ischemic stroke?; and, 2) What determines the clinician's course of action (i.e. what influences progression through the stages of the treatment process)?

Study 3 Findings: Results indicated that the CDM process involved progressing through four stages of the treatment process (rapport building, ongoing assessment, treatment implementation, and termination) and the use of a variety of music-based (MB) and therapy-based (TB) techniques. Courses of action were found to be based on the monitoring and influencing of patient arousal, affect, salience, and engagement (AASE).

Study 3 Summary: Study 3 investigated the CDM process of a music therapist targeting mood elevation for adults hospitalized following a first-time acute stroke. Qualitative self-study was used to identify components of CDM and to understand what determines the clinician's course of action. It was found that CDM involved the MT-BC's progression through a four-stage treatment process (rapport building, ongoing assessment, treatment implementation, and termination); monitoring and influencing patient levels of arousal, affect, salience, and engagement (AASE); and selecting MB and TB techniques to facilitate the most desirable changes in AASE and thus, elevate mood.

Progression through the treatment process is a standard of music therapy clinical practice. Different approaches to treatment vary in named stages and are provided in Table 5.3. In this study, stages during direct patient contact included rapport building, ongoing assessment, implementation, and treatment termination. Across the course of treatment, a variety of MB and TB techniques were used. In order to determine pacing of the progression and what technique(s) to use, patient levels of arousal, affect, salience, and engagement (AASE) were continuously monitored. The MT-BC aligned MB and TB techniques (based on their task demands) with patient AASE levels. Matching AASE levels with technique task demands increased the likelihood that

patients would engage volitionally. For example, if a patient was not very aroused or engaging there might be a low probability that she/he would answer an open ended question or play a musical instrument. Instead, she/he might answer a close-ended question and begin to tap a foot to a beat. Once matched, levels of AASE could then be used to facilitate a positive change in mood by selecting the technique(s) that were assessed to elicit the most desirable changes. To illustrate these concepts, a conceptual framework (Figure 5.3) was developed. This framework can aid in treatment planning, treatment implementation, and clinical knowledge.

Clinical Implications

The research described here is the first to provide evidence of improved mood using active music therapy (AMT) during acute hospitalization following stroke and to describe the clinical decision-making process used to do so. Based on these findings, the first recommendation for clinical application is that approximately 27-31 minutes of AMT can result in a measurable change in mood during hospitalization following stroke. It is possible that those with more severe strokes may require more than one AMT treatment to demonstrate improvement. AMT was defined as: music making interventions that elicited and encouraged active engagement from participants involving creating music, playing instruments, singing, improvising, or moving to music (Sihvonen et al., 2017; Vink et al., 2004). Intervention theory and approach is outlined in each chapter's methods sections. Furthermore, Appendix G provides treatment guidelines. Of note is that participants in this research presented with a first-time mild-moderate acute ischemic stroke, mild to no depression, no more than moderate cognitive impairment, a mean age of 68, and were white. The clinician providing AMT had

approximately 10 years of experience at the time of data collection with a large portion of clinical experience completed in acute medical settings.

The second application developed from the presented research is the conceptual framework of clinical decision making (CDM) used to effectively elevate mood (Figure 5.3). The CDM process under investigation involved progression through four stages of the treatment process (rapport, ongoing assessment, implementation, and termination), and the use of a variety of music-based (MB) and therapy-based (TB) techniques. Courses of action were found to be based on the monitoring and influencing of participant levels of arousal, affect, salience, and engagement (AASE).

Entry-level music therapists are expected to be familiar with treatment processes which include stages such as rapport building, assessment, music-based intervention implementation, and treatment termination. They music therapists are presumed to have demonstrated competency with many music-based techniques and strategies for effective communication (therapy-based techniques). What is of most interest here, is the intentional monitoring and influence of participant AASE levels. AASE levels can be used to determine what technique(s) to use and how to implement the techniques through musical and non-musical (e.g. clinician vocal quality when speaking) matching and influencing participant AASE levels. These findings are discussed in detail in chapter 5 and are represented in the conceptual framework found in Figure 5.3.

An additional factor in clinical implementation of any music therapy intervention and reflected in findings here, is the interaction between the therapist and the participant; the therapeutic relationship. The importance of the therapeutic relationship was confirmed through participant comments from study one and the identification of

rapport building as a core stage of the treatment process in study three. Characteristics of the therapist or reference to the therapist was the second most frequently identified theme from participant comments regarding their experience of receiving music therapy. The importance of therapeutic interactions has been echoed by Forsblom and Ala-Ruona (2012) who identified interaction as a critical factor when working in acute stroke care. Similarly, development of the therapeutic relationship through rapport building is posited as a strategy to foster engagement in neurorehabilitation and a working alliance in mental health (Danzl et al., 2012; Silverman, 2015). The clinical decision making process described in chapter 5 can aid in developing rapport.

Finally, the research presented here continues to align with literature reflecting the importance of using music salient to participants. Patient preferred live music is recommended for use in acute medical settings to increase patient engagement in treatment and facilitate a shift from passive to active participation (Ghetti, 2011; Silverman et al., 2016). The “impact of participant music preference” also emerged as a theme from participant comments. Of interest to the setting of acquired brain injury is the use of salient experience to drive neuroplasticity in neurorehabilitation. Kleim and Jones (2008) argue that experiences must be salient to induce plasticity. In other words, if the experience is not meaningful to the participant (i.e., preferred versus non-preferred music) or if the therapeutic relationship is not meaningful, the likelihood of engagement in rehabilitation is decreased. In summary, this work suggests that salience of the music therapy experience aided in driving changes in arousal, affect, engagement, and thus, mood.

Future Research

The findings from this line of research demonstrate the impact of active music therapy (AMT) intervention on mood following stroke. Novel to this research is the investigation into the clinical decision making (CDM) process to effectively elevate mood. However, more work needs to be done. First is the need for a longitudinal investigation into the impact of AMT on post-stroke depression and those who may benefit most. Participants in this study presented with low levels of depression and mild-moderate stroke severity. Future research should examine cohorts based on stroke severity (acute disability) and pre-stroke mood disorders predictive of PSD (Caeiro et al., 2006). Relatedly, the PHQ-9 used in this research is more appropriate to measure depression over a longer period of time (minimum two weeks). Therefore, alternative measures and or additional time points of follow up are recommended.

Findings here show that both one and two treatments of AMT produce significant improvements in state mood independently; however, across hospitalization no dose proved more significant. Possible reasons for the lack of a dosing effect could be the limited difference in the amount of treatment between groups or variations in stroke severity between groups; there is a possibility that different amounts of AMT are needed for different degrees of stroke severity. Literature indicates that mood continues to improve given more music therapy treatment (Cassileth et al., 2003; Guetin et al., 2009). However, when participants with serious mental disorders received music therapy, a minimum of three treatments were required to produce small effect sizes (Gold et al., 2009). Furthermore, psychotherapy treatment literature has revealed that more than 10, but less than 20 sessions, are needed for 50% of participants to

demonstrate recovery (Hansen et al., 2002). This calls for continued investigation into treatment schedules including dosing, duration, and frequency. In considering how to effectively evaluate short- and long-term impacts of AMT, alternative mood measures should be considered, as The Faces Scale is primarily representative of state mood and the PHQ-9 screens depression across time. Possible alternatives might be The Positive and Negative Affect Schedule as well as the Difficulties in Emotion Regulation Scale.

Outcomes outside of mood and depression are also important to consider in future trials. Multiple authors have discussed the impact of PSD on social participation and engagement during stroke recovery (Cooper et al., 2015; Danzl et al., 2012; Langhorne et al., 2011; Nayak et al., 2000; Wheeler et al., 2003). The results here found that engagement was a key driver of CDM and mood change, supporting the need for more focused investigation. These constructs may be important for future investigation to provide a comprehensive understanding of the impact AMT may have on rehabilitation. It is also important to note that caregivers were not examined in the presented research; however, the antidotal impacts that AMT had on informal caregivers (e.g., a spouse) were repeatedly recognized over the course of study execution. Caregivers are considered part of the rehabilitation team with their own needs, such as caregiver strain and burden, warranting simultaneous examination (Langhorne et al., 2011; Miller et al., 2010; Rigby et al., 2009).

Finally, further development and testing of the CDM conceptual framework is needed. Framework development and testing would involve further defining and measuring AASE constructs, refined identification of techniques used and their task demands, and testing of the intervention framework by multiple clinicians.

Conclusion

The line of research presented advances three main areas within the field of music therapy. The first is improvement of mood following music therapy in adults who have had a stroke. This study is novel as it is the first to examine mood constructs during the most acute phase of stroke recovery. The second area of impact is medical music therapy. The presented research builds upon the current body of music therapy evidence addressing psychosocial needs in acute medical settings through brief intervention. Finally, the investigation into clinical decision making addresses the call to improve intervention reporting, design replicable interventions, and increase the understanding of mechanisms of change within the treatment process (American Music Therapy Association, 2015a; Robb et al., 2011). Outside of the field of music therapy, this research offers a non-pharmacological approach to improving mood following stroke. While results could not speak to a direct impact on post-stroke depression, the significance of the findings are encouraging and provide a foundation for future research.

APPENDIX A - IRB APPROVAL LETTER



Initial Review

Approval Ends:
2/27/2019

IRB Number:
43721

TO: Jessica Rushing,
Therapeutic Services
PI phone #: 8593234330

PI email: jessy.rushing@uky.edu

FROM: Chairperson/Vice Chairperson
Medical Institutional Review Board (IRB)

SUBJECT: Approval of Protocol

DATE: 3/1/2018

On 2/28/2018, the Medical Institutional Review Board approved your protocol entitled:

Evaluating Mood Outcomes Following Active Music Therapy during Acute Hospitalization for Ischemic Stroke Patients: A Pilot Study

Approval is effective from 2/28/2018 until 2/27/2019 and extends to any consent/assent form, cover letter, and/or phone script. If applicable, the IRB approved consent/assent document(s) to be used when enrolling subjects can be found in the "All Attachments" menu item of your E-IRB application. [Note, subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.] Prior to the end of this period, you will be sent a Continuation Review Report Form which must be completed and submitted to the Office of Research Integrity so that the protocol can be reviewed and approved for the next period.

In implementing the research activities, you are responsible for complying with IRB decisions, conditions and requirements. The research procedures should be implemented as approved in the IRB protocol. It is the principal investigator's responsibility to ensure any changes planned for the research are submitted for review and approval by the IRB prior to implementation. Protocol changes made without prior IRB approval to eliminate apparent hazards to the subject(s) should be reported in writing immediately to the IRB. Furthermore, discontinuing a study or completion of a study is considered a change in the protocol's status and therefore the IRB should be promptly notified in writing.

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" available in the online [Office of Research Integrity's IRB Survival Handbook](#). Additional information regarding IRB review, federal regulations, and institutional policies may be found through [ORI's web site](#). If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at 859-257-9428.

APPENDIX B - PHQ-9

Date: _____ Time: _____ MRN: _____ Circle: Pre Post

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____ DATE: _____

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns + +

(Healthcare professional: For interpretation of TOTAL, please refer to accompanying scoring card). TOTAL:

10. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	_____
	Somewhat difficult	_____
	Very difficult	_____
	Extremely difficult	_____

APPENDIX C - MINI MOCA

Date: _____ Time: _____ MRN: _____ Circle: Pre Post

Mini MoCA score

5-word immediate memory subtest

MEMORY	Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.		FACE	VELVET	CHURCH	DAISY	RED
		1st trial					
		2nd trial					

No points

6-item orientation subtest

[] Date [] Month [] Year [] Day [] Place [] City ___/6

1 letter phonemic fluency (letter F)

Name maximum number of words in one minute that begin with the letter F []

(N≥11) ___/1

5-word delayed memory subtest

DELAYED RECALL	Has to recall words WITH NO CUE	FACE []	VELVET []	CHURCH []	DAISY []	RED []	Points for UNCUED recall only
Optional	Category cue						
	Multiple choice cue						

Total ___/12

Scoring:

10-12: May indicate no cognitive impairment or mild cognitive impairment

- *Administer Krames on Demand cognitive decline stroke handout
- *Document patient/family education

7-9: May indicate moderate cognitive impairment

- *Administer Krames on Demand cognitive decline stroke handout
- *Document patient/family education
- *Recommend formal follow-up assessment

6 or less: May indicate severe cognitive impairment

- *Administer Krames on Demand cognitive decline stroke handout
- *Document patient/family education
- *Recommend formal follow up assessment

APPENDIX D - UBACC

UBACC Adapted

ITEM	CIRCLE ONE		
What is the purpose of the study that was just described to you?	To get better	To see how my mood is affected music (therapy)	To prevent getting worse
Do you believe this is primarily research or primarily treatment?	Treatment with a bit of research	Research about how I do in treatment	
Do you have to be in this study if you do not want to participate?	YES	NO	
If you withdraw from this study, will you still be able to receive regular treatment?	NO	YES	
If you participate in this study, what are some of the things that you will be asked to do?	Listen to music, move to music, or make music	Take medication	Receive physical exams

APPENDIX D - UBACC (continued)

UBACC Adapted - Key

ITEM	CIRCLE ONE		
What is the purpose of the study that was just described to you?	To get better	To see how my mood is affected music (therapy)	To prevent getting worse
Do you believe this is primarily research or primarily treatment?	Treatment with a bit of research	Research about how I do in treatment	
Do you have to be in this study if you do not want to participate?	YES	NO	
If you withdraw from this study, will you still be able to receive regular treatment?	NO	YES	
If you participate in this study, what are some of the things that you will be asked to do?	Listen to music, move to music, or make music	Take medication	Receive physical exams

APPENDIX E - INFORMED CONSENT

Date: _____ Time: _____ MRN: _____

IRB Approval
2/28/2018
IRB # 43721
ID # 16396

For ORI Use Only:

Combined Consent and Authorization to Participate in a Research Study

Evaluating mood outcomes following active music therapy during acute hospitalization for ischemic stroke patients: A pilot study.

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about music therapy following stroke. You are being invited to take part in this research study because you have had a stroke. If you volunteer to take part in this study, you will be one of about 55 people to do so here at UK Healthcare.

WHO IS DOING THE STUDY?

The person in charge of this study is Jessie Rushing of University of Kentucky. Jessie is a Ph.D. student in the Department of Rehabilitation Sciences. She is being guided in this research by Gilson Capilouto, Ph.D. There may be other people on the research team assisting at different times during the study.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to evaluate the use of music therapy treatment on patient mood following a first time ischemic stroke. Research suggests that engaging with music therapy interventions following stroke may affect people's mood. This study will examine the effects music therapy intervention might have on your mood.

ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

Subjects should not participate in this study if they have a previous medical history of stroke or a prior neurological or psychiatric disease such as Lewy Body Dementia, severe Alzheimer's, Schizophrenia, Schizoaffective disorder or other. Note that depression is not considered an exclusion criterion.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures will be conducted during your hospitalization at UK Healthcare. You will be visited by a music therapist approximately every other day during your hospitalization. Each of those visits will last about 25 minutes. You will be asked to participate in three music therapy treatments or until discharged if that occurs prior to receiving three treatments.

WHAT WILL YOU BE ASKED TO DO?

As part of the music therapy treatments described above, you may be asked to listen to live music, participate in music making, participate in movement to music, and/or other music based activity, as you are comfortable. Prior to beginning music therapy you will be asked to complete this consent form. Immediately prior to and following each music therapy treatment you will be asked to respond to one question about your current mood. Following your third music therapy treatment and/or prior to discharge you will be asked to again respond to two brief scales you would have already completed as part of standard care and comment on your experience with music therapy.

APPENDIX F - ASSENT

IRB Approval
2/28/2018
IRB # 43721
ID # 16386

For ORI Use Only:

ASSENT FORM
STUDY TITLE

You are invited to be in a research study being done by Jessy Rushing from the University of Kentucky. Research studies are done when doctors and clinicians want to find new ways of treating patients. You are invited because you have had a stroke.

This means that you are invited participate in a research study about music therapy and mood following stroke. Participating in music therapy may or may not improve your mood. There are no known risks to participating in music therapy.

If you are in the study, a music therapist will visit you during your hospitalization. When you are discharged from the hospital, you will have completed your participation in this study.

Your family and your doctor and nurses will know that you are in the study. If anyone else is given information about you, they will not know your name. A number or initials will be used instead of your name.

There is no payment or cost related to participating in this study.

If something makes you feel bad while you are in the study, please tell Jessy Rushing, a staff member, or a family member. If you decide at any time you do not want to finish the study, you may stop whenever you want.

You can ask Jessy Rushing or Dr. Jessica Lee questions any time about anything in this study. You can also ask your representative (family member) with you today any questions you might have about the study.

Signing this paper means that you have read this or had it read to you and that you want to be in the study. If you do not want to be in the study, do not sign the paper. Being in the study is up to you, and no one will be mad if you do not sign this paper or even if you change your mind later. You agree that you have been told about this study and why it is being done and what to do.

Signature of Person Agreeing to be in the Study

Date

Name of (Authorized) Person Obtaining Informed Assent

Date

Signature of Principal Investigator or Sub/Co-Investigator

APPENDIX G - AMT TREATMENT GUIDELINES

AMT Session Guidelines

Assessment and FIRST session

1. Chart Review
2. Greeting/Introductions
3. Information providing
 - a. Use of music to reach non-musical goals, such as communication or movement.
 - b. Up to three music therapy sessions during hospitalization with the option to have more.
 - c. Encourage active participation, however you do not have to do anything you do not want to do.
 - d. Discuss the role of music on mood, communication, and movement particularly as they relate to stroke.
4. Assessment – (as able)
 - a. Preferred type of music.
 - b. Patient's musical history & current use of music
 - c. Perception and understanding of stroke
 - i. Provide information as it relates to the music therapy session and within scope of practice.
 - d. Most outstanding responses – incorporate into the rest of session decision making
5. Patient preferred live music (PPLM)
 - a. *The first song will serve as an assessment of the effect of music on mood and minimally cued participation. The MT-BC will play a song from the participant's preferred genera inviting the participant to engage as they feel comfortable. The MT-BC will provide several examples such as tapping toes, singing, playing an instrument (e. g. egg shaker or tambourine), clapping, ect...*

#6 & #7 are interchangeable based on the participant's response to #5. Proceed with what the participant exhibits the most interest in, be it moving to music or singing. If the patient does not exhibit interest in engaging, continue with #5 providing cues as appropriate such as specific movements or prompts for lyric completion.

6. Communication based assessment/intervention
 - a. *As appropriate based on assessment, communication will be further assessed and addressed through non-musical interaction such as observation, directly asking about the impact of the stroke on communication, conversation, and the participant choosing songs. Music-based techniques could include singing, lyric completion, and adapted melodic intonation (if communication becomes a goal area).*
7. Movement based assessment/intervention
 - a. *As appropriate based on assessment, movement will be further assessed and addressed through non-musical interaction such as observation, directly asking about the impact of the stroke on movement, and requests to move (e.g. shake hands, raise arms, kick legs). Music-based techniques could include moving in specified ways to music (e.g. marching) and selection and positioning of instruments for the participant to play based on current and desired range of motion.*

APPENDIX G - AMT TREATMENT GUIDELINES (continued)

8. Treatment Closure
 - a. Summarize session with patient
 - b. Close with:
 - i. PPLM
 - ii. Most successful intervention
 - iii. Group Therapeutic Instrument Music Performance (include family if present)
 - iv. Preferred song singing
 - v. Most successful song for singing from the session
9. Goodbye
 - a. Remind of MT-BC's name
 - b. Discuss MT-BC plans and/or participant needs/desires for the next session
 - c. Inform of when the next anticipated session will be

APPENDIX H - ALL COMMENTS

1	I enjoyed the music therapy. I enjoyed the beat.
2	I liked it. I got to play the tambourine.
3	It was neat.
4	I enjoyed it.
5	Fun with grandkids; expected [went as]; uplifting for mood; enjoyable.
6	Really liked it, was fun, played drum.
7	I thought it helped mood and feeling of well-being, also a better outlook on future events.
8	Enjoyed it; entire thing was great; she actually-played what I wanted, made me feel important; liked country music.
9	I loved it. She played lots of music.
10	She was pretty.
11	It was good.
12	Very uplifting and gives you a feeling of self-confidence you need to get back into the main stream of life again.
13	A great idea for relaxing. I loved it. Thank you so much.
14	I didn't think I would enjoy it, but I did. She was very nice and played the music I liked.
15	She is good. Send her to hazard KY.
16	I think it's a great thing. It moved me and I loved it.
17	The girl was real sweet. She can sing, and I liked the selection. She means well and was really nice.
18	It was great. She had a pretty voice. The nurse came in and asked if we were having a party.
19	It was nice and peaceful to listen to. I enjoyed the instrumental more than the vocal.
20	It was good. She does a great job.
21	I really enjoyed it. It was really nice.
22	Was a good experience. I enjoyed it. All played the instruments. It was fun.
23	Boosted my spirits, I even played along, took my mind off of.
24	Very nice; knew all of the songs; I think it made me more cheerful; enjoyed her visit/music; I was smiling like an idiot.
25	Had a good time; feel lifted; not sure if she would do it again.
26	Alright; played my favorite music; fun; got to talk, mostly listened.
27	It's wonderful, it's fun. I love it. It beats just sitting here.
28	Pretty good.
29	I appreciated it.
30	She tried. She's a sweet girl, but it didn't do anything for me. I can't even watch TV or get into a ball game right now.
31	It was good. She did a good job! She made me play the tambourine with my left hand, she wouldn't let me use my right. It was good. Had George Strait!
32	I really enjoyed it. It was really nice.

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VITA
JESSICA L. RUSHING

EDUCATION

Years	Institution	Degree	Specialty
2008 – 2009	Florida State University	M.M.	Music Therapy
2003 – 2007	Florida State University	B.M.	Music Therapy

PROFESSIONAL and CLINICAL EXPERIENCE

Years	Institution	Role
2018 - present	University of Louisville UK HealthCare	Assistant Professor, Music Therapy
2012 - 2018		Music Therapist, Internship Director
2011 - 2014	Edge Music Therapy, LLC	Music Therapist, Business Owner
2011 - 2012	Palomar Health	Music Therapist, Program Director
2009 - 2011	Tallahassee Memorial Healthcare	Music Therapist, NICU Institute and Arts in Medicine Program Coordinator
2008	Tallahassee Memorial Healthcare/Florida State University	NICU Music Therapist, Reimbursement specialist
2008	Canopy Cove Eating Disorder Treatment Center	Music Therapist

PUBLICATIONS (*Refereed and Invited)

- ***Rushing, J.**, Gooding, L. F., & Westgate, P. (2018). What guides internship supervision? A survey of music therapy internship supervisors. *Music Therapy Perspectives*. doi:10.1093/mtp/miy020
- ***Rushing, J.** & Capilouto, G. J. (2016). Obtaining competencies with self-determination theory: The music therapy internship. *Music Therapy Perspectives*, 35(2), p. 247-253. doi:10.1093/mtp/miw017
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