

The Honors Program at the University of Missouri-Kansas City

Music Therapy as a Nonpharmacological Treatment for Post-Stroke Depression: A Scoping Review

Hannah P. Edwards

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Written under the direction of Dr. Dawn Iwamasa, PhD, CCLS, MT-BC

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Abstract

Post-stroke depression (PSD) is a well-documented phenomenon which affects upwards of 30% of stroke survivors. The primary treatment for PSD is pharmacological, and research on nonpharmacological intervention is limited. Music therapy uses music to achieve nonmusical goals, such as physical wellness or emotional regulation. While music therapy is often used to address other areas of stroke recovery, research on using it to treat PSD is also limited. PSD increases post-stroke healthcare costs and mortality rates while decreasing the benefit from rehabilitation services. A scoping review was conducted to evaluate current research on nonpharmacological interventions for PSD. Implications for the application of music therapy for PSD, including a clinical framework for using music therapy to treat PSD, is discussed along with further research needs.

Keywords: music therapy, post-stroke depression, nonpharmacological treatment

Introduction

Socioemotional problems following a stroke were often linked to illness adjustment. Post-stroke depression (PSD) is a much bigger problem than that due to a substantial number of stroke survivors who experience negative effects as a result.

Researchers found that stroke survivors with post-stroke mental health issues such as depression or psychosis “had the shortest duration between index date and death” (Almeida & Xiao, 2007, p. 276) as opposed to other mental illnesses or substance abuse disorders. PSD also heavily contributes to post-stroke care costs. Husaini et al. (2013) found that healthcare costs for patients who experienced both stroke and depression were 63% higher than patients who experienced only stroke.

Perhaps most importantly, PSD has been found to inhibit rehabilitation in stroke survivors. Gillen and associates (2001) studied stroke admissions to a rehabilitation facility over a two-year-period. Higher depression scores were associated with a longer length of stay and less efficient use of services available to the patient, which included physical and occupational therapy.

Additionally, researchers found that survivors whose PSD was in remission enjoyed greater quality of their activities of daily living and functionality than survivors who still suffered from PSD (Chemerinski et al., 2001).

Literature Review

Stroke

Having a stroke is a life-changing event for hundreds of thousands of Americans each year. Tsao and associates (2022) found that stroke is the leading cause of long-term disability in America. The same report, published by the American Heart Association’s journal, *Circulation*,

estimated that approximately 795,000 Americans experience a stroke each year, with 77% of these incidents being first-time strokes for these individuals (Tsao et al., 2022). Stroke can cause physical deficits such as unilateral weakness or paralysis, making it difficult to walk steadily or use both hands. In addition, stroke affects not only the brain's ability to communicate with parts of the body, but also causes communication errors within the brain itself, leading to loss of cognitive skills such as memory or word-finding ability.

Baker and Tamplin (2010) identified that stroke can cause vast life changes. These include loss of independence, function, appearance, career, finances, role within the family, and even recreational activities. These authors suggest that stroke recovery can be complicated by illness adjustment, and propose that a stroke survivor may face socioemotional problems due to illness adjustment. Indeed, Baker and Tamplin note that communicative and cognitive impairments may impede recovery, and suggest that music therapy can help with this period of illness adjustment.

Post-stroke care was also an economic burden for survivors and families. Some of the most expensive levels of care include acute, nursing home, and ambulatory care, and the cost is linked to the severity of stroke and the length of stay in treatment. In the United States, stroke survivors pay an average of \$4,644 per month for inpatient/outpatient care, and \$1,236 per month for outpatient-only services (Rajsic et al., 2019). In 2022, the American Heart Association estimated that post-stroke care costs \$53 billion annually (Tsao et al., 2022).

According to Silva et al. (2021), health-related quality of life (HRQoL) can decrease after a stroke. Stroke often leads to physical disability, as well as straining social roles and relationships. The impact on physical disability and socialization led to difficulties with treatment compliance, leading to less involvement in rehabilitation activities such as physical

and occupational therapy. The researchers also found that higher age along with serious impairment were linked to greater isolation. These factors led to a reduced HRQoL. Additionally, factors were exacerbated by stroke-related depression, anxiety, and stress.

PSD

There are many neuropsychiatric disorders associated with cerebrovascular disease. Post-stroke depression, or PSD, has been documented for over a century, but scientific studies on the disease only began around fifty years ago. Robinson & Jorge (2016) estimated that between 39% to 52% of stroke survivors developed PSD within five years of their stroke. In a study designed to discern whether “emotional disturbance” resulted from the physical disability or the stroke itself, Folstein and colleagues (1977) compared stroke patients to orthopedic patients. They found that stroke survivors were diagnosed with a mood disorder more often than their orthopedic patient counterparts.

Diagnosing PSD is complex. The Patient Health Questionnaire-9 (PHQ-9) is commonly used to diagnose depression in the general population. However, the specific needs of a particular stroke patient may limit the practicality of using the PHQ-9 in this population. For instance, the PHQ-9 requires the individual to comprehend the questions, via reading them or having heard them audibly, and the individual must be able to communicate which answer is to be selected. Dajpratham et al. (2020) assessed the PHQ-9 to determine its effectiveness at diagnosing PSD. The researchers used the Thai version of the PHQ-9 to screen Thai stroke patients for PSD. However, the study excluded patients who had a cognitive or communicative impairment and noted that patients experiencing communication loss would likely be depressed.

Researchers attempted to identify the risk factors that might indicate an individual’s development of PSD. In 2021, Perrain et al. identified previous history of a mood disorder as a

significant factor. Additionally, according to Robinson & Jorge (2016), risk factors for PSD included the type and severity of stroke, the area of the brain which sustained damage, social support, age, genetic factors, gender, and medical and psychiatric history. Therefore, the diagnosis of PSD was found to be complicated by other factors.

Treatment for PSD

Currently, a common treatment for PSD is pharmacological therapy. Paolucci (2008) highlighted the use of antidepressants, or SSRIs, in treatment for PSD. However, they found the side effects were troublesome for stroke survivors. Additionally, SSRIs complicated certain bleeding disorders. This complication can be a contraindication for stroke survivors. Paolucci reviewed literature supporting the use of cognitive behavioral therapy in PSD treatment, and found it to be “worthy of further exploration” (Paolucci, 2008, p. 149).

Music Therapy and Depression

Music therapy is the use of music to achieve nonmusical goals. In other words, certified music therapists use music to help their clients modify behavior, execute tasks, and, ultimately, improve their lives. Music therapy sessions can incorporate several types of interventions. Songwriting, for instance, can assist therapy clients in making goals, discussing important events and feelings about those events, and exploring concepts such as self-identity or change. Progressive muscle relaxation is a technique that music therapists can use to help their clients improve relaxation. Copying rhythms and melodies can improve clients’ working memory, and learning instruments such as the ukulele can help clients find new leisure activities. Music therapy is an evidence-based field with a growing body of literature.

Music therapy was used to treat depression for decades. In 1998, Suzuki conducted a study investigating whether music therapy was useful in treating older adults with depression and

found that they experienced positive mood changes after receiving music therapy. Additionally, participants recalled negative events significantly less often after music therapy. A case study by Smeijsters (1999) details how music therapy assisted a widow through grief, and that music therapy helped the client achieve her goals of alleviating depressive symptoms and finding a personal identity. Music therapy was also shown to treat depressive symptoms in older adults with other neurological needs. Reminiscing through familiar songs was effective at alleviating symptoms of depression in dementia patients (Ashida, 2000).

Baker et al. (2017) explained that songwriting in music therapy can be an effective way of supporting clients through a traumatic brain injury (TBI). The researchers found that songwriting helped patients explore self-concept and enabled them to tell personal stories, respond emotionally to those stories, and be engaged in a process of self-reflection. The researchers also noted that songwriting called for a creative process that prompted the clients to more fully engage in different facets of exploration and processing of experiences. In another study aimed at looking at themes TBI patients choose to write about during songwriting, Baker et al. (2005) discovered themes such as: loneliness, lack of freedom, frustration, happiness, and anger. When accounting for gender differences, researchers noted that men tended to write about concern for the future, and women tended to write messages to others.

In a study published in 2014, Baird and Samson found that patients with neurological injury could still have music evoked autobiographical memories, or MEAMs. Study participants were matched with controls and both groups experienced MEAMs at similar frequencies. Researchers noted that injury severity did not impact ability to report MEAMs. Additionally, researchers noted that songs more likely to evoke MEAMs were familiar and preferred by the participants who reported MEAMs evoked by those songs.

Lesiuk (2010) found that preferred music positively affected mood when study participants were exposed to work-related stress. Study participants were employed as computer developers in North America, and were tested on mood and cognitive performance. Cognitive performance scores were self-reported, but they also improved in the presence of preferred music.

Music Therapy and Stroke

Music therapy has been studied for its use in stroke recovery. In 2005, Kim and Koh conducted a study to see if music therapy improved pain perception in stroke survivors who were exercising. Although no statistically significant differences were found, the researchers found that study participants in the music group portrayed positive affect and made positive comments.

Kim (2010) tested music therapy's benefit for stroke survivors with dysphagia. Study participants were assessed on cough, swallow, and drool reflexes, respiration at rest and in speech, and laryngeal time, pitch, volume, and in speech. Study participants engaged in singing with the music therapist. Researchers found that there were statistically significant differences between the beginning of treatment and the end, and that more research should be done to further examine music therapy's implementation in this area.

In 2016, Yoo and Kim conducted a systematic review and meta-analysis to determine if music therapy can be effective in motor rehabilitation after stroke. During rhythmic cueing, the music therapist plays music with a strong beat. Patients may walk or move to this beat. This continuous, steady sound helps smoothen movements which may have been erratic.

Keyboard playing can also be effective in rehabilitating hand function in stroke patients (Chong et al., 2017). Researchers engaged study participants in twelve 30-minute keyboard

training sessions, and found that hand-function test scores were significantly improved between pre- and post-test.

In 2017, Tamplin and Baker reviewed the effects of therapeutic singing for speech disorders in adults, including disorders caused by traumatic brain injury and stroke. The researchers determined that music therapists have been using music to address respiratory support, nondegenerative dysarthria, and apraxia, among other disorders.

Raglio et al. (2017) tested the effectiveness of active music therapy on the mood of stroke survivors. Although there was no statistically significant difference between the control and test group, there was a trend which suggested that active music therapy provided an increase in quality of life, and a decrease in anxiety and depression.

In 2017, Ulrich et al. determined that music therapy reduced negative symptoms of schizophrenia and improved interpersonal relationships between study participants. The researchers observed that, to date, no side effects of music therapy have been reported for patients using music therapy in psychiatric care.

The problem

Hundreds of thousands of Americans suffer from PSD every year, and PSD is known to be associated with higher healthcare costs and mortality rates. Socioemotional factors and illness adjustment coupled with the lack of support for traditional pharmacological therapy indicate a need for nonpharmacological intervention. Despite the evidence-based use of music in treating depression and aiding in stroke rehabilitation, few studies have been conducted on the use of music therapy to treat PSD, and there is little guidance for music therapists on how to approach treatment of this disorder. Therefore, the purpose of this study is to determine:

1. Does research on non-pharmacological treatment support the use of music therapy as a treatment of PSD?
2. If so, what would a clinical model for using music therapy to treat PSD look like?

Methods

To identify applicable peer-reviewed research, a scoping review was considered most appropriate for this project. A scoping review has several objectives. It assesses current research on the topic and determines the applicability of a more comprehensive analysis of that research. It identifies the current strengths and weaknesses across the existing literature, and it aims to summarize and distribute the research which was reviewed (Arksey & O'Malley, 2005). Scoping reviews have been used in the music therapy literature before and have been sufficient to answer similar research questions (Gooding & Langston, 2019). Arksey and O'Malley (2005) set forth a framework for how to conduct a scoping review, listed below:

1. Identify an objective or research question.
2. Identify appropriate studies.
3. Select the most relevant studies for inclusion.
4. Extract data from the studies and chart it.
5. Summarize and report on the results.

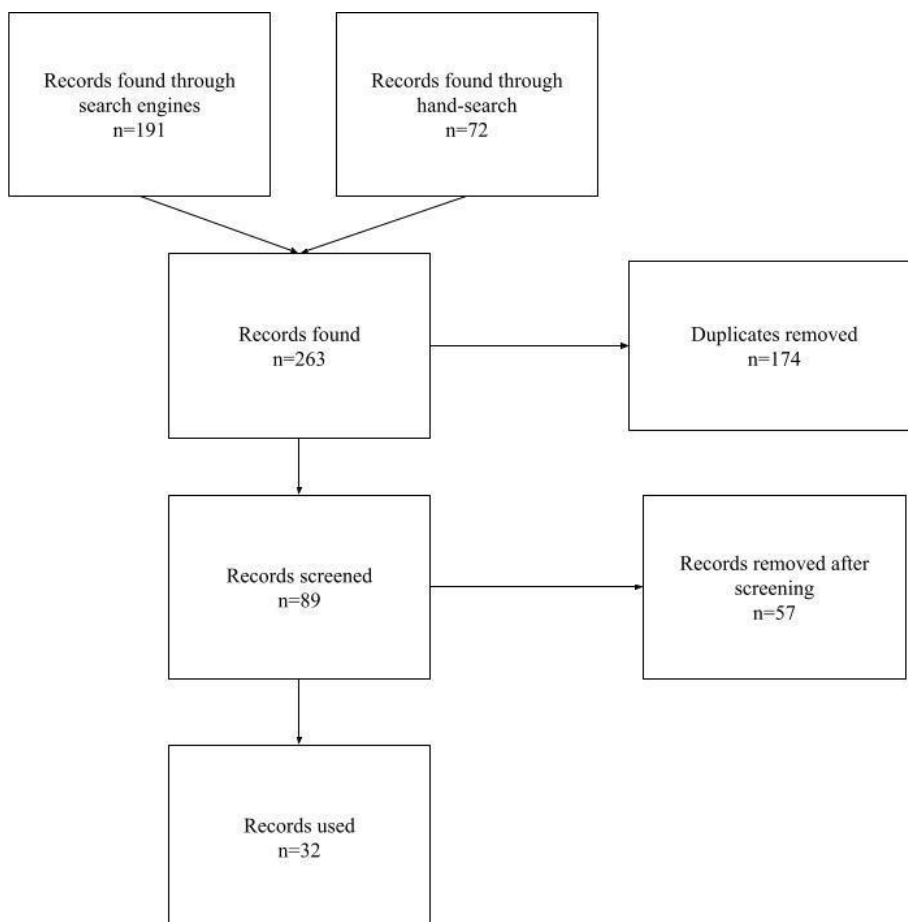
The research databases, PsychARTICLES, and PubMed were searched using PSD and post-stroke depression with: “nonpharmacological intervention,” “nonpharmacological therapies,” and “post-stroke depression”. Additionally, databases for the *Journal of Music Therapy* and *Music Therapy Perspectives*, as well as hand search method were used. Data which was extracted about each article included:

- Date accessed

- Which database was used
- The number of articles propagated in each search
- Inclusion and exclusion criteria
- What search terms were used

Duplicates were removed. See figure 1 for a flowchart of the search results.

Figure 1. Records accessed, removed, and used.



Eligible articles for the review included studies which measured the efficacy of nonpharmacological intervention without the use of pharmaceuticals for the purpose of treating PSD. For instance, a study may compare pharmacological and nonpharmacological treatment,

but one group must have only nonpharmacological intervention. In addition, studies also needed to have participants who experienced stroke, and measured depression scores in some way.

Results

Table 1. Publication characteristics

<u>Author and Year</u>	<u>Purpose</u>	<u>Country</u>	<u>Population</u>	<u>Description</u>
Aguiar, Nadeau, Britto, Teixeira-Salmela, Martins, Samora, da Silva, & Faria (2020)	Inspected the effects of aerobic treadmill training and low-energy activities.	Brazil	Adults were 20 years or older with stroke in the prior 6 months, were inactive, and had sufficient cognitive and physical abilities.	40-minute sessions three times per week for twelve weeks overseen by a physiotherapist. Participants walked for 5 minutes warm-up, 30 minutes of aerobic treadmill training, and 5 minutes of cooldown. Intensity was based on each individual's vital signs.
Ali, Gammidge, & Waller (2014)	Investigated an alternative approach for treating anxiety and depression in stroke patients.	United Kingdom	Stroke patients in rehabilitation, above 16 years of age, judged to be clinically stable and able to consent.	Art therapy 2x/week for 6 weeks overseen by an art therapist. Patients drew and painted on white paper, used pencils and crayons, made clay figures, drew on an iPad, and took photos with a camera.
Baylan, Haig, MacDonald, Stiles, Easto, Thomson, Cullen, Quinn, Stott, Mercer, Broomfield, Murray, & Evans (2020)	Determined whether novel mindful music listening affects stroke recovery.	United Kingdom	Native English-speaking adults (18-80), imaging-confirmed stroke; no history of neurodegenerative disease, major psychiatric disorder, substance abuse, or unable to give informed consent.	Participants were provided an iPod Nano and asked by a psychologist to listen to their preferred music for 1 hour daily for 6 weeks. Mindful-music participants were given mindfulness exercises.
Chalmers, Leathem, Bennett, McNaughton, Mahawish, et al. (2019)	Determined whether problem solving therapy would be effective in reducing	New Zealand	18-65-year-olds, 6 months-3 years since onset. Did not have to be first-time stroke and no formal diagnosis of	Six group sessions with 4-8 participants; the first two sessions lasted 90 minutes and the latter four 60 minutes. Structure was outlined by Mynors-Wallis and involved: problem solving therapy explanation and

	distress experienced by stroke survivors.		depression/anxiety. Functional impairment not necessary. Participants were excluded if they could not participate in group therapy.	rationale, problem definition, goal setting, solution generation, solution selection, and action plan implementation. Sessions were overseen by a psychologist.
Chan, Immink, & Hillier (2012)	Investigated whether yoga could be effective in easing depression and anxiety in "chronic poststroke population.”	South Australia	Patients were 6 months post-stroke with chronic hemiparesis; individuals completed acute stroke rehab and were able to walk 10 meters or more with no assist; exclusion included other movement disorders, unable to follow two-step directions, current participants in other movement-based research studies; currently practicing yoga-related activities like tai chi	6 week standardized program involving 90-minute yoga classes as well as at-home practice, overseen by an accredited yoga instructor.
Cheng, Liu, Fan, Bai, & Liu (2018)	Determined whether a comprehensive rehabilitation training (CRT) program would decrease cognitive impairment, anxiety,	China	18 years and older, diagnosed with ischemic stroke as confirmed by imaging, no prior history of stroke, no serious visual or hearing impairment, no	Families were provided with a book about stroke and rehabilitation along with a phone number to call for help (nurse, rehabilitation specialist, social worker). Occupational therapist provided cognitive training including simple instruction, oral and facial muscle mimic training, rehearsal training.

	and depression in poststroke patients.		psychiatric disorder, no serious illness, and a life expectancy of greater than 12 months.	Related research therapist provided rehab training including teaching family how to provide massage, and patients visited rehab department once a week for 6 months. Patients underwent regular exams including blood pressure, blood lipids, and blood glucose monitoring
Davis (2004)	Determined if life review therapy would lower depression scores in patients with right hemisphere cerebrovascular accidents.	United States	Patients had no prior history of CVA, had experienced CVA within 6 months of study, possessed verbal communication skills, and had no other acute medical or psychiatric conditions.	3 individual 60-minute sessions using Haight's Life Review and Experiencing Form (1982). Sessions were overseen by a registered nurse. The first session reviewed childhood; the second session, adolescence through middle-adulthood, and the last reviewed adulthood and summary questions, which reviewed which aspects the person was happiest with and what the patient would change or not change about their life.
Fang, Mpofu, & Athanasou (2017)	Evaluated a constructive integrative psychosocial intervention program in treating PSD.	Singapore	30-75 years; English or Mandarin speakers; depressive or anxiety symptoms; clinically diagnosed new stroke within the last week; "satisfactory mental status."	Psychoeducation included education on recovery, stroke, challenges, services, rehabilitation process, possible recovery, prognosis, impacts, stress management techniques. Narratives included sharing stories of the past and current difficult times and coping, revisiting positive, and building resilience to cope with changes. Problem Solving included problem solving and self-appraisal, reinforces relevant resources and practice coping. Crisis Management included identifying available resources, including community and personal; goal setting. Activity Participation included an

				encouraging activity participation, reviewing and reflecting on activity participation, mood and thought. Sessions were overseen by a rehabilitation specialist.
Faulkner, McGonigal, Woolley, Stoner, Wong, & Lambrick (2015)	Determined if an exercise and education program can affect psychosocial health in TIA and mild stroke patients.	New Zealand	Adults within 7 days of onset of TIA or mild stroke, without unstable cardiac condition, unmanaged diabetes mellitus, severe pain in arms or legs, oxygen dependence, dementia, inability to communicate in English, or unable to exercise.	Two 90-minute exercise sessions per week, for 8 weeks, overseen by health and exercise practitioners; 30 minutes of aerobic training, 60 minutes of resistance, core-stability, and postural training. Education sessions were 30 minutes once per week for 8 weeks and included teaching and reinforcing behaviors "known to facilitate healthy behavior change". Groups discussed vascular risk factors, stroke prevention, medication compliance, nutrition, stress management, and emotional/behavioral changes.
Gillham & Endacott (2010)	Evaluated the effectiveness of secondary prevention on health outcomes.	United Kingdom	Patients were diagnosed with first minor stroke or TIA.	Intervention included psychoeducation, health education about stroke/risk factors, motivational interviewing and plan creation/implementation. This intervention was overseen by the research team.
Immink, Hillier, & Petkov (2014)	Evaluated if yoga is effective for motor function, mental health outcomes, and quality of life in people with stroke-related chronic hemiparesis.	Australia	Participants were 18+, being 9 months out from a stroke which caused chronic hemiparesis, completion of post-stroke rehabilitation, ability to follow 2-step commands, and ability to	10-week program consisting of 90-minute group classes once per week taught by yoga instructor and 40-minute daily home practice sessions.

			ambulate with or without an assistive device. The participants were free of unrelated neurological/muscular conditions, current or previous participation in yoga, and current participation in structured exercise programming.	
Jun, Roh, & Kim (2013)	Assessed the effectiveness of music-movement therapy on physical and psychological functioning of hospitalized stroke patients.	South Korea	Patients with acute ischemic stroke, no prior neurological or psychiatric disease, no hearing deficit, hospitalized less than two weeks, were fully conscious, could communicate verbally, and had a Korean Mini-Mental State Examination score of greater than 20.	Preparatory activities: Patients stretched briefly for 20 minutes while listening to meditative music. Main activities: Patients sang along while playing various musical instruments and "were encouraged to express their emotions". Finishing activities: Patients verbalized difficulties and benefits while their comments were written down. This study was overseen by the research team, and a music therapist selected the background music.
Kim, Park, & Choi (2011)	Investigated music therapy for depressive symptoms in post-stroke patients.	South Korea	18 adults, within 6 months of onset, MMSE score of over 20; in the Rehabilitation Medicine department. Some took antidepressants in conjunction with the	Sessions were conducted by a music therapist. Sessions included a hello song; sharing events of their lives (5 min), planned musical activities (30 mins: respiration; improvisation, hand bell play, songwriting, expression); sharing of feelings and goodbye (5 mins). Keyboards, hand bells, percussion,

			groups (both control and experimental).	flutes, picture cards, flowers, fruit scents were all used.
Kirk, Kersten, Crawford, Keens, Ashburn, & Conway (2014)	Evaluated if "standard NHS cardiac rehabilitation programme" would reduce risk factors in minor stroke and TIA patients.	United Kingdom	Patients were within one month of minor stroke or TIA, independently mobile, considered medically fit for exercise, and had a cognitive ability to participate in group exercise.	Health check included blood pressure check, pulse check, changes in medication, subjective health; Exercise consisted of walking, circuit, step ups, walking/running, heel rises, step backs, bicep curls, lateral raises, shoulder presses, trampet, squats, upright rowing, stretching. Education consisted of information about medication, alcohol, exercise, diet, the heart, and wellbeing - including mood and stress disorders and information about returning to work, hobbies, romantic relationships, etc. This study was overseen by a cardiac rehabilitation team.
Kongkasuwan, Voraakhom, Pisolayabutra, Maneechai, Boonin, & Kuptniratsaikul (2016)	Evaluated if creative art therapy plus physical therapy is more effective than only physical therapy in the rehabilitation of stroke patients.	Thailand	Patients over 50 years who had experienced stroke; could communicate verbally. Exclusion criteria included history of unstable medical condition, dementia, or agitation/confusion.	The creative arts therapy group met twice a week for 4 weeks, in groups of 5-10, with sessions lasting 1.5-2 hours. Sessions were overseen by a creative arts therapist and a physical therapist, and began with meditation to music, a warmup activity, a main activity with group singing, and a healing circle. The activities were "art process-based", and during the singing, patients chose lyrics to talk about with the group.
Kootker, Rasquin, Lem, van Heugten,	Determined if individual, tailored CBT can reduce	The Netherlands	Participants sustained any type of stroke at least 3 months prior, had	4 months of CBT, including patient-identified goals and 3 sessions of occupational therapy based on the goals. The

Fasotti, & Guerts (2017)	depressive symptoms post-stroke.		a HADS score indicative of depression, were over 18 years old, had only mild cognitive impairments, and could communicate in Dutch.	sessions were overseen by a psychologist and occupational therapist.
Lai, Studenski, Richards, Perera, Rigler, & Duncan (2006)	Examined the effect of exercise on depressive symptoms of stroke survivors.	United States	Stroke survivors who had had a stroke within 2 weeks.	Progressive exercise program in the home overseen by a physical or occupational therapist, 3 times a week for 36 sessions. Patients trained in strength, balance, endurance, and upper extremity function.
Lincoln & Flannaghan (2003)	Evaluate CBT as treatment following stroke.	United Kingdom	Adults with stroke; no deaf, blind, dementia, non-English speakers, or prior history of depression.	1 group received the placebo (conversation/social visit, no therapy); 1 group received 10 hours of CBT over 3 months with a psychologist.
Lincoln, Flannaghan, Sutcliffe, & Rother (1997)	Evaluated cognitive behavioral therapy for PSD.	United Kingdom	Adults who scored more than 13 on BDI or more than 10 on depression scale of the HAD; did not have severe stroke, did not have dementia, were not blind or deaf, were not receiving treatment for depression prior to stroke, and gave consent.	Therapy with a psychiatric nurse or psychologist consisted of distractional activities, behavioral tests, and identifying and challenging negative thought patterns.
Minshall, Castle, Thompson, Pascoe,	Investigated the effectiveness of a	Australia	Adults (18+) who experienced stroke,	Patients received a workbook and had 8 one-hour weekly sessions along with a

Cameron, McCabe, Apputhurai, Knowles, Jenkins, & Ski (2020)	"novel psychosocial intervention" on stroke survivors with depression.		English-speaking and able to converse, no developmental disability or memory loss, absence of severe illness, and absence of serious complications from stroke (i.e., severe cognitive decline or severe aphasia).	psychologist, with a "booster session" at 3 months. The workbook included psychoeducation and self-management, reflective exercises which developed into a health plan.
Olukolade & Osinowo (2017)	Determined the efficacy of cognitive rehabilitation therapy in the treatment of PSD.	Nigeria	Adults with no history of major psychiatric disorder or recent depressive episode, intracerebral disease; able to give informed consent, first time stroke, level of education sustainable for psychoeducation.	Patients received nine sessions with a physician. The first three focused on activity stimulation, the second 3 on negative thinking, the third three on "people contacts." "Psychoeducation therapy consisted of nine sessions focusing on knowledge on stroke and poststroke depression."
Robinson-Smith, Harmer, Sheeran, & Bellino Vallo (2016)	Evaluated the impact of psychoeducational interventions in post-stroke care.	United States	Stroke survivors and their spouses who had an absence of other neuromusculoskeletal disease, absence of major psychiatric disorders, and cognitive function adequate for participation.	Elements of counseling implemented by a psychiatric nurse included: taking a balanced view, advising to take one step at a time, focusing on present, focusing on reasonable goals, positive reframing, communicating support to spouse, integrating body image changes into self-concept, incorporating social and pleasurable activities into a new reality.

Robinson, Jorge, Moser, Acion, Solodkin, Small, Fonzetti, Hegel, & Arndt (2008)	Determined if escitalopram or problem-solving therapy are effective at preventing post-stroke depression.	United States	Patients between 50 and 90 and within 3 months of stroke; were not diagnosable with major or minor depressive disorder, had no comprehension deficits or decision-making deficits, and did not incur stroke due to other disorders. Patients also did not have other major diseases.	One group received a placebo pill. One group received escitalopram. One group received problem-solving therapy. Patients underwent 6 sessions in 12 weeks with a therapist, and then 6 reinforcement sessions once per month for 3 months and then once every other month for 3 months. During problem-solving therapy, a patient selected one problem and proceeded through 7 steps which brought the patient to a course of action.
Rushing, Capilouto, Dressler, Gooding, Lee, & Olson (2022)	Determined the effect of active music therapy on depression, assess which treatment variables are present during acute stroke treatment, and to determine how participants describe their experiences with AMT.	United States	English-speaking adults admitted to hospital. Mean age 67.77 years, mild to moderate score on National Institute of Health Stroke Scale.	Individual AMT which involved the use of preferred, consonant music activities, engaged in "active doing" such as playing an instrument or singing. The sessions were overseen by a music therapist.
Särkämö et al. (2008)	Determined if self-directed music listening can improve mood.	Finland	Finnish-speaking adults 18-75, admitted to the neurology department at Helsinki University Central Hospital with acute ischemic MCA	Patients were given a portable CD player and CD of preferred music from a music therapist.

			stroke. No prior neurological or psychiatric disease, hx of substance abuse, or hearing deficit. Right handed.	
Smith & Thompson (2008)	Explored benefits of treadmill training for patients with chronic stroke.	United States	Patients with ischemic stroke in the distribution of the middle cerebral artery between 3 months and 2 years prior; walking more slowly than prior; excluded for cognitive impairment, inability to ambulate, or concomitant pathology that prevented treadmill training.	Participants received a phone call once a week from the research team asking about quality of life and encouraging logging entries into a log. Patients engaged in 12 sessions of treadmill training over 4 weeks. The starting speed was appropriate to the patient based on their statistics. The speed was increased by 0.2 mph in each 10-minute-increment. Participants walked for a total of 20 minutes but were allowed rests as needed.
Sumakul, Notobroto, Widani, & Aima (2020)	Evaluated the effects instrumental music therapy has on post-stroke depression.	Indonesia	Adults between 30-75 who experienced stroke.	Patients listened to instrumental music on an MP3 player for 15 minutes, rested, and then listened again for 15 minutes. The music listening was overseen by the research team.
Taylor-Piliae, Hoke, Hepworth, Latt, Najafi, & Coull (2014)	Investigated the effects of Tai Chi on physical function and quality of life.	United States	Adults older than 50 who survived a stroke at least 3 months prior and lived in Tucson, Arizona.	Patients 1-hour Tai Chi classes which were taught by a Tai Chi instructor 3x/week for 12 weeks. Patients were asked to replicate movement and speed; they were allowed to briefly rest and to use assistive devices like walkers if necessary. SilverSneakers participants attended a 1-hour class 3x/week

				for 12 weeks, which were taught by a SilverSneakers instructor. Classes consisted of strength training and range of movement. Participants were allowed to briefly rest and to use assistive devices.
Ward, Turner, Hambridge, Halpin, Valentine, Sweetapple, White, & Hackett (2016)	Evaluated a group cognitive behavioral therapy program called <i>Brainstorm</i> .	United Kingdom	Stroke survivors 18+ who had adequate communication skills, could read, and could fill out questionnaires independently. Exclusion criteria included dementia or non-English speaking.	Patients attended 7-10 weekly sessions held by the research team for 2-3 hours per session. The program included activities such as psychoeducation, mood monitoring, thought challenging, brainstorming, goal setting, and motivating tools.
Watkins, Auton, Deans, Dickinson, Jack, Lightbody, Sutton, van den Broek, & Leathley (2007)	Determined whether motivational interviewing would affect mood 3 months post-stroke.	United Kingdom	Adults (18+) 5-28 days after stroke; no severe cognitive or communication disorder, not known to be moving from the area, no current psychiatric or psychological treatment.	30-60 minute session once per week for up to 4 weeks. During the first session, the therapist and patient talked about adjustment to stroke and current concerns (physical, functional, social support). Patients talked about goals which were personal and realistic. Therapists worked with patients to identify solutions.
Watkins, Wathan, Leathley, Auton, Deans, Dickinson, Jack, Sutton, van den Broek, & Lightbody (2011)	Determined whether motivational interviewing would affect mood post-stroke.	United Kingdom	Adults (18+) 4-28 days after stroke; without severe cognitive or communication issues, not known to be moving from the area, and not already receiving	30-60 minute session once per week for up to 4 weeks. Therapists prompted patients to speak about adjusting to stroke and current concerns as well as introducing concepts of optimism and self-efficacy to prompt patients to identify solutions.

			psychiatric or psychological care	
Zhang, Zhang, & Sun (2019)	Determined whether introducing a caregiver education program would reduce cognitive impairment, depression, and anxiety in acute ischemic stroke patients.	China	AIS diagnosed by imaging; able to complete questionnaire evaluation independently; had a "fixed family caregiver" and life expectancy of greater than 1 year.	Intensive Caregiver Education Program (ICEP) led by nursing staff. Included education for caregivers and "psychological nursing."

Discussion

The purpose of this study was to examine the applicability of music therapy in treating post-stroke depression. More specifically, the study examined interventions that researchers from other disciplines are using to treat post-stroke depression.

Levac et al. (2010) provided further guidance based on Arksey and O'Malley's framework (2005) for a scoping review. One recommendation is to consistently evaluate findings against the research question as a means of assessing relevance. Another is to assign relevance to the review results by using them to create something, such as a clinical framework for treatment (Levac et al., 2010).

Of the 32 articles included for review, several interventions were found to be effective and can be integrated into music therapy sessions. A summary is provided below.

Exercise

In 2006, Lai et al. published a study investigating the benefits of exercise on depression scores. Participants exercised three times a week over the course of twelve weeks and trained in strength, balance, endurance, and upper extremity function and found that participants' scores on the Geriatric Depression Scale (GDS) significantly decreased. Similarly, Smith and Thompson (2008) used a phone call to prompt study participants to engage in treadmill walking four times a week over twelve weeks. The phone call also prompted participants to log their mood. Researchers used data from a practice session to determine a baseline walking speed and increased it 0.2 miles per hour in ten-minute increments. Participants walked for twenty minutes at a time, but were allowed rests as needed. The study found that walking on a treadmill significantly decreased participants' Beck Depression Inventory (BDI) scores.

In 2014, Kirk and other researchers implemented a standard National Health Service cardiac rehabilitation program for patients who were within one month of minor stroke or transient ischemic attack. Participants engaged in frequent health checks, including measuring of blood pressure, pulse, and mood scores. Participants also were involved in an education program which included information about cardiovascular health such as diet, stress management, and the cardiovascular system itself. During the exercise portion, participants used exercises such as walking, circuit training, step ups, running, bicep curls, lateral raises, squats, and upright rowing. Researchers found that this program significantly reduced Hospital and Anxiety Depression Scale (HADS) scores in study participants.

Faulkner et al. ran a similar program in 2015. However, this program was constructed by the researchers instead of an organization such as the National Health Service or Centers for Disease Control. The education portion of the program focused on vascular risk factors, stress management, and promoting healthy behaviors through behavioral reinforcement. During the exercise portion, participants trained in aerobic exercise, core stability, resistance, and postural training. Researchers did not find that this program significantly changed HADS scores.

In 2020, Aguiar et al. had participants partake in aerobic treadmill training. Participants completed exercise sessions in groups of two to four participants, for forty minutes three times per week for twelve weeks. Intensity was calculated for each participant based on their own vital signs. Researchers used the Patient Health Questionnaire-2 and -9 (PHQ-2, PHQ-9) to assess for depressive symptoms and found that participants' depression scores significantly decreased over time.

Yoga and Tai Chi

Chan et al. (2012) investigated whether yoga might improve mental health outcomes in stroke survivors with chronic hemiparesis. Researchers implemented a standardized program wherein participants completed ninety-minute yoga sessions over the course of six weeks. Participants were also encouraged to practice yoga at home. Results measuring depression scores using the GDS were not statistically significant, but the researchers found that intervention group members' scores had marginally better improvements than the control group. Researchers also noted that no adverse events were reported during the study and that further exploration was warranted.

In 2014, Immink and colleagues attempted to use yoga to improve quality of life, motor function, and mental health outcomes in stroke survivors with hemiparesis. During the study, participants engaged in ninety-minute yoga classes once per week for ten weeks, and were encouraged to practice for forty minutes per day at home. Participants' GDS scores did not significantly improve.

Tai chi was found to be significantly effective during a study published in 2014 (Taylor-Piliae et al). Participants were sorted into three groups; the first participated in tai chi, the second in a comparative program called SilverSneakers, and the third into usual care. Researchers used the Center for Epidemiologic Studies Depression Scale (CES-D) to measure depressive symptoms. Tai chi was more effective at reducing CES-D scores than SilverSneakers or usual care.

Psychoeducation

Education was one of the most-used interventions. Education programs often included information about cardiovascular health, effects of stroke, and stroke prevention, as well as material about depression and coping with the illness.

In 2016, Ward et al. created a cognitive behavioral therapy program for stroke survivors. One of the main components of the program, in addition to thought challenging and mood monitoring, was psychoeducation. This is typical for a cognitive behavioral therapy intervention. Researchers found that BDI scores improved significantly at one month and six-month testing. In Nigeria, Olukolade and Osinowo (2017) used psychoeducation as a comparison program. Throughout the nine sessions, participants focused on information about stroke and PSD, support systems, negative thinking patterns, and activities which improved cognition. The psychoeducation intervention was less effective according to BDI scores than the other method used in their study, cognitive rehabilitation therapy.

Gillham and Endacott (2010) provided education in addition to a therapeutic technique called motivational interviewing. No statistically significant score change was noted between groups for HADS scores. Minshall et al. (2020) provided a workbook and individual sessions focusing on both psychoeducation and “self-management,” which developed into a plan participants could use to stay healthy. This study did not see improvements in HADS scores.

Cheng et al. (2018) provided families with a booklet covering stroke information, but the main focus of their study was a rehabilitation program. Kirk et al. (2014) and Faulkner et al. (2015) both instituted exercise groups along with education groups. Both education groups consisted of information about vascular risk factors, stress management, medication compliance, and nutrition. Kirk et al. (2014) also gave participants an overview of the cardiovascular system

and its functions. While Cheng et al. (2018) noted some improvement in the CRT group based on HADS scores, Kirk et al. (2014) and Faulkner et al. (2015) did not note any improvement.

Art Therapy

In 2014, Ali et al. conducted a study in which participants attended an art therapy group twice a week for six weeks. Guided by an art therapist, participants engaged in creative activities such as painting and drawing, taking photographs, and making clay figures. Researchers noted that the sample was too small to reach statistical significance, but raw HADS scores decreased. Researchers recommended further research. Kongkasuwan et al. (2016) led a creative arts therapy group to determine if art therapy could be more effective than physical therapy in reducing depressive scores in stroke survivors. Participants met twice a week for four weeks and engaged in singing as well as art activities. Researchers found that HADS scores were significantly improved compared to the control group.

Music Therapy

In Finland, researchers used a portable CD to test if preferred music might have an effect on PSD (Särkämö et al., 2008). Participants listened to the CD for a minimum of one hour per day for two months. A comparison group listened to audiobooks. Researchers found that Profile of Mood States (POMS) scores were significantly lower in the music group versus the control group, and that scores were “still marginally significant” six months after (Särkämö et al., 2008, pg. 872).

In 2011, Kim et al. implemented music therapy groups at a facility in South Korea. Groups began with a “hello song” and talking about events of the week. Planned music activities included improvisation, playing of keyboards, hand bells, percussion, and flutes, and songwriting. Participants discussed feelings briefly and then sang a “goodbye song”. Researchers

found that participants' BDI scores significantly improved. Jun et al. (2013) investigated whether music and movement could affect physical and psychological health in stroke survivors. Group sessions began with twenty-minute stretching sessions; after, patients sang and played instruments along to various songs selected by a music therapist. Group sessions ended with a discussion about patients' current struggles and successes. Researchers did not find that participants' POMS scores significantly changed.

In 2020, Baylan et al. sought to determine whether mindful music listening affected stroke recovery. Directed by a psychologist, participants were given an iPod Nano and directed to listen to preferred music for one hour daily for six weeks. Participants were also introduced to mindfulness exercises and asked to practice them. Researchers did not find any significant differences in HADS ratings. Sumakul et al. (2020) used MP3 players to test if listening to music for short durations would decrease depression scores. Participants were instructed to listen to instrumental music for fifteen minutes, rest, and then listen again for fifteen minutes. Researchers found that instrumental music listening did not significantly decrease Hamilton Depression Scale (HAMD) scores.

Rushing et al. (2022) ran a preliminary study to determine if music therapy might be effective at treating PSD. Participants included individuals who had been admitted to hospital for stroke. Researchers used active music therapy to engage participants in singing and playing instruments along with patient-preferred, consonant music. Researchers noted that there were no statistically significant differences between pre- and post-test PHQ-9 scores, but mood ratings using the Faces Scale from before sessions and after sessions indicated that participants' mood level increased after music therapy sessions.

Problem-Solving Therapy

Problem-solving therapy is a counseling technique used to treat depression. Steps involved in problem-solving therapy include patient identification of a problem, definition and understanding of the problem, and solution generation and implementation.

Researchers used problem-solving therapy as a comparison group in a study measuring the effects of an antidepressant drug, escitalopram (Robinson et al., 2008). Participants were divided into three groups: one group received a placebo pill, one group received escitalopram, and one group received problem-solving therapy. In the problem-solving therapy group, participants underwent six sessions in twelve weeks. Participants then had six reinforcement sessions once per month for three months, then once every other month for three months. Participants selected a problem and proceeded through seven steps which ended with the patient implementing a course of action. Depression was assessed via a structured clinical interview integrating DSM-IV diagnostic criteria for depression. Although the escitalopram group saw the most improvement, participants in the problem-solving group did experience significantly lower depression scores compared to the placebo-only group.

In 2017, Fang et al. implemented a constructive integrative psychosocial intervention program of which problem-solving was a part. In addition to psychoeducation, telling of narratives, and crisis management, participants engaged in problem solving, identifying relevant resources, and practicing coping skills. The program did significantly decrease participants' HADS scores.

Chalmers et al. (2019) implemented a problem-solving therapy group using a structure determined by Mynors-Wallis, the psychiatrist who pioneered the technique. Researchers explained the concept of problem-solving therapy, and then participants defined a problem, generated solutions to solve the problems, selected the best solution, and implemented it.

Participants who engaged in problem-solving therapy did not have significantly different outcomes than their comparison group peers according to the CES-D; however, researchers noted that learning-based therapy may take time to be effective and participants may have benefitted from the technique as time progressed, due to the problem-solving nature of the intervention.

Life Review Therapy

In 2004, Davis conducted a study using Haight's Life Review and Experiencing Form (1982). Participants attended three sessions. During the first session, study participants reviewed childhood, adolescence through middle-age at the second session, and adulthood and summarization in the third. This intervention helped participants review satisfactory portions of their life. Davis found that this intervention did significantly reduce depression scores in participants according to the Zung Scale for Depression and the Life Satisfaction Index-Form Z.

Motivational Interviewing

Motivational interviewing is a communication technique that provides opportunity for both listening to an individual's struggles and providing advice to deal with them. In motivational interviewing, individuals are guided towards setting goals that are appropriate for their current needs.

In 2010, Gillham and Endacott conducted a study in which participants were engaged in psychoeducation as well as motivational interviewing. During motivational interviewing, the participants engaged in discussion about intended behavioral changes. Participants also created a plan of action in order to implement the changes. Lastly, participants had follow-up support via telephone and in-person discussion. Researchers did not find that the study significantly changed participants' HADS scores.

Watkins et al. (2007) provided motivational interviewing to participants in thirty-to-sixty minute sessions once a week for four weeks. Participants discussed adjustment to stroke and physical, functional, and social concerns, goals which were deemed personal and realistic, and solutions which were relevant to their concerns and goals. Researchers found that motivational interviewing significantly improved participants' depression ratings. In a followup study in 2011, Watkins et al. again tested motivational interviewing for its effect on depression scores. The intervention was similar to the one studied in 2007; key differences were discussion topics. This time, topics included concepts of optimism and self-efficacy, which prompted patients to identify solutions rather than therapists. This study also found that motivational interviewing significantly improved depression scores. Both studies used the General Health Questionnaire to measure mood.

Cognitive Behavioral Therapy

Cognitive Behavioral Therapy (CBT) has been used to treat depression and other mental illnesses. Provided by a certified therapist, CBT guides the individual toward challenging maladaptive thoughts and behaviors and using coping skills to manage them. CBT has had mixed results with stroke survivors, though, and it is thought that there may be other treatment methods for PSD that are more effective than CBT.

Lincoln et al. (1997) provided CBT to a group of stroke survivors who had been screened for depression. The frequency and length of treatment was left to the discretion of the individual therapist, and activities consisted of behavioral tests and identifying and challenging negative thought patterns. Researchers determined that the CBT group benefited from significantly improved BDI and HADS scores. In 2003, Lincoln and Flannaghan conducted a study in which stroke survivors participated in ten hours of CBT spread over the course of three months. A

comparison group participated in social visits rather than CBT. Neither group had significantly improved scores according to the BDI or Wakefield Depression Inventory.

In Nigeria in 2016, Olukolade and Osinowo provided a cognitive rehabilitation therapy (CRT) group based on the tenets of CBT. During nine sessions, study participants engaged in activity stimulation, learned about negative thinking, and discussed social support. A comparison group focused on psychoeducation and learned about stroke and PSD. The CRT had more significant BDI scores than the psychoeducation group. In 2017, Kootker et al. provided study participants with four months of CBT. In this study, participants identified their own goals and engaged in three occupational therapy sessions designed specifically to achieve those goals. A comparison group engaged in computerized cognitive training, and there was no statistically significant difference found in HADS scores between the groups.

Other

A few studies included interventions that did not fit into the categories outlined above. These studies incorporated one or more elements of interventions already discussed, but altered other elements in some way.

Cheng and colleagues (2014) created a cognitive rehabilitation therapy (CRT) program which involved several components. The first was a handbook which family could review to learn about stroke and rehabilitation, in addition to a phone number participants and family could use to receive assistance from a social worker or nurse. Second, an occupational therapist provided cognitive training, oral and facial muscle mimic training, and rehearsal training. Third, a therapist from the research team provided education to family and participants, and participants visited the rehabilitation department of the hospital once per week for six months. Lastly, participants underwent regular medical monitoring including blood pressure, blood lipids, and

blood glucose monitoring. Researchers found that this intervention significantly improved HADS scores in study participants.

Robinson-Smith et al. (2016) focused on a couples psychoeducation group which was led by psychiatric nurses. In this group, participants discussed topics such as reasonable goals, communication between spouses, focusing on present problems, and incorporating body image into self-concept and the concept of the relationship. Researchers found this method to be effective at reducing CES-D scores.

Ward and colleagues (2016) developed a group CBT program titled *Brainstorm*. Participants attended two-to-three-hour long sessions once per week for seven to ten weeks. The program included typical CBT exercises such as mood monitoring, psychoeducation, thought challenging, and goal setting. Researchers found that this intervention caused a significant difference in BDI and HADS scores. Unlike other studies on CBT for PSD, this intervention was conducted in a group format. Since social isolation is known to contribute to PSD, it is possible that the group structure had an impact on the results.

Notably, Zhang et al. (2019) used a caregiver education program as their sole intervention. Caregivers were enrolled in the intensive caregiver education program (ICEP). There, they learned concepts and skills such as general knowledge of stroke, families' role in caring for the affected person, emotion management and communication, cognitive rehabilitation, physical rehabilitation, and dietary care. These skills prepared caregivers to adequately provide for patients' needs in a plethora of situations: dietary care provided information about general nutrition as well as tube feeding for survivors with dysphagia; general knowledge included information about complication prevention and common pharmacological treatment; rehabilitation training ranged from cognitive skills such as counting and memory to

physical skills such as balance training and endurance; and emotion management included skills for alleviating stress and coping with depression. Researchers found the ICEP program to be effective at reducing depression scores in participants. Furthermore, ICEP was effective at treating HAD and Self-rating Depression Scores rates in individuals with a variety of cognitive abilities, although it was most effective at those without cognitive impairment (Zhang et al., 2019).

Implications for Music Therapy

Each of the interventions listed above are applicable to music therapy.

Exercise complements music therapy well due to the concept of entrainment. Movement to rhythm improves planned movement and execution of that movement (Thaut, 2013). Music therapists use music and rhythm paired with exercise to treat physical symptoms, such as those seen in hemiplegia, and speech disruption, as seen in dysarthria (Sandness, 1995). Treating physical symptoms which linger after stroke may assist in reducing depressive symptoms (Lai et al., 2006, Kirk et al., 2014, Aguiar et al., 2020, Denk, 2022). Research also indicates that exercise paired with familiar music may improve cognitive flexibility (Moore & Lesiuk, 2018). Cognitive flexibility is an important trait which can improve the outcomes of counseling techniques such as CBT.

Psychoeducation is used to treat mental illness in psychiatric settings (Silverman, 2009, 2010). In 2009, Silverman found that participants in a psychoeducational music therapy setting perceived the session as helpful and comfortable, engaged in slightly more verbalizations than the control, and were able to discern connections between the song discussed and their own lived experiences. Additionally, songwriting can be used so that music therapy participants can demonstrate mastery of coping skills (Silverman, 2011). Lastly, it is hypothesized that

psychoeducation may have contributed to symptom reduction in a study investigating the effects of music therapy on participants with PTSD and Substance Use Disorder (Hakvoort et al., 2020).

Art therapy is its own discipline of creative arts therapy, and music therapists are not trained to conduct art therapy. However, music therapists can engage clients in art exercises within the context of music. Research supports the collaboration of music therapists and art therapists (Barker & Brunk, 1991, Christenbury, 2017). Researchers also suggest that music therapists can utilize art in music therapy with hospice patients (West, 1994). Lastly, art activities were successful at decreasing depressive symptoms in survivors of intimate partner violence (Teague et al., 2006).

Problem-solving is a goal that music therapists work on in psychiatric settings (Choi, 1997, 2010). It has also been listed as the final component in group cohesion, wherein members of a group are focused on one problem that must be solved (James and Freed, 1989). Lesiuk determined that songwriting can be an effective way to teach problem solving skills, and that music therapy can contribute to positive affect, which improves problem-solving abilities (Lesiuk 2010a, 2010b). Lastly, life review therapy can elicit participants to think of a time when problem-solving strategies were used (Engelbrecht et al., 2022).

Music therapists use client-preferred music. For many people, this elicits memories and promotes reminiscence. Several studies have examined that music therapy can support reminiscence (Clements-Cortés, 2017, Zeiser, 2022, Holden et al., 2019). As observed above, life review can be combined with problem solving (Engelbrecht et al., 2022).

Motivational interviewing is a counseling technique which elicits behavioral change, capitalizing on the patient's own motivations. This intervention has not been well-studied in the

music therapy literature, but Yoes and Silverman (2021) discussed application of the technique for individuals with Substance Use Disorder and determined that it can be applicable.

While cognitive behavioral therapy showed mixed results based on the studies included for review, it has been found to be effective for survivors of trauma and those with eating disorders (Slotoroff, 1994, Hilliard, 2001, Chang et al., 2023). Dvorak (2017) developed a lyric analysis intervention which borrowed from CBT principles, and Myers-Coffman et al. (2019) used CBT as a basis for their songwriting intervention.

Interventions Not Supported By the Literature

Of the 32 articles included for review, yoga was mentioned in two. These studies did not find yoga to significantly reduce depressive scores. Music therapy and yoga have not been studied as co-treatments.

Tai chi was mentioned in one of the 32 studies and was successful at reducing depressive symptoms. Tai chi and music therapy have not been studied as co-treatments.

One of the 32 studies mentioned caregiver support, and one mentioned involving spouses in post-stroke depression treatment. Published, peer-reviewed research involving music therapy and caregiver support focuses on treating symptoms of burnout and socioemotional skills related to caregiving. The studies reviewed during this research project focused on education of caregivers in order to reduce stroke survivors' depressive symptoms, not the symptoms of caregivers.

Further Research Needs

Research on music therapy as a treatment for PSD is vastly limited. Based on this study's findings, further research should be conducted on the effectiveness of music therapy for this population, specifically individualized activities provided by a board-certified music therapist

with the guidance of these findings. Further research should also be conducted to determine which interventions included in music therapy are most effective for stroke survivors with PSD. Lastly, future research should also seek to determine at what point in the recovery process music therapy treatment should begin, the frequency of sessions, and the overall length of treatment.

Conclusion

Stroke is the leading cause of long-term disability in the United States, and 795,000 Americans suffer a stroke each year. Post-stroke depression will affect 30-50% of stroke survivors, severely impacting healthcare costs, rehabilitation efficacy, and mortality rates. Pharmacological therapy and cognitive behavioral therapy are not effective for every person.

This study sought to determine if music therapy can be an effective intervention for PSD, and what specific exercises may be used. Review of interdisciplinary research highlighted the many effective strategies for treatment of PSD. Many strategies are supported by the music therapy literature and may prove to be effective for this population.

Ultimately, more research is needed to determine which strategies, incorporated into music therapy, may be most effective. Additional research should include at what point during recovery PSD treatment should begin as well as frequency and duration of sessions.

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