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Embodied Medicine: Integrating Dance/Movement Therapy into Physical Medicine & Rehabilitation

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Abstract

Physical medicine and rehabilitation (PM&R) is a field of medicine that addresses a variety of disorders impacting the brain, spinal cord, muscles, and bones. When approaching patient care, the goals of dance/movement therapists are similar to those of physiatrists, because both strive for a holistic approach to treatment that considers more than just physical ailments. Adding dance/movement therapy sessions in parallel with PM&R services would enhance the overall patient experience and quality of life. Previous studies that explore the use of dance/movement therapy with various neurodegenerative diseases, neuromuscular diseases, and sustained injuries are reviewed for potential application in PM&R settings. The benefits of dance/movement therapy for patient autonomy and body image are discussed, along with the inclusion of music and rhythm for emotional expression. This includes the delineation of prospective dance/movement therapy interventions and techniques for treating neurodegenerative diseases, neuromuscular diseases and sustained injuries in parallel with PM&R treatment. Future research should explore the quantitative impacts of dance/movement therapy on rehabilitation outcome measures, as well as the qualitative impacts of dance/movement therapy on patients' mental and emotional welfare while undergoing PM&R treatment. The tailored integration of emotional, social, and cognitive therapeutic interventions directly alongside physical rehabilitation supports the healing process from multiple angles, which can promote better patient outcomes and satisfaction. Overall, physiatry and dance/movement therapy have separately helped so many people but developing a synergy between these fields has the potential to transform rehabilitative medicine.

*Keywords***:** medicine, rehabilitation, physiatry, dance/movement therapy, disease, neurodegenerative, neuromuscular, sustained injury, integration, body-based approach, holistic

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Physical medicine and rehabilitation (PM&R) is a field of medicine that addresses a variety of disorders impacting the brain, spinal cord, muscles, and bones. The goal of PM&R medicine is to restore as much function, movement, and quality of life as possible to those with physical impairments or disabilities (American Academy of Physical Medicine and Rehabilitation, n.d.). PM&R physicians, also known as physiatrists, are medical doctors who have completed three years of specialized PM&R training in addition to the one year of requisite general clinical training. They focus on diagnosing illnesses, designing treatment protocols, and prescribing any required medications for treatment. Within the general population and, even within the medical community, PM&R is a lesser-known specialty, though physiatrists serve as the leaders for directing rehabilitation and recovery. Physiatrists work in a variety of disciplines including neurorehabilitation, pain management, musculoskeletal care, sports injuries, and post-operative care (American Academy of Physical Medicine and Rehabilitation, n.d.). Because there is such a broad range of application for PM&R medicine, each physiatrist can have a different area of focus for their practice. No matter what the setting, the overarching goal of every physiatrist is to create individualized, patient-centered plans to maximize the quality of life for individuals who require rehabilitative services (American Academy of Physical Medicine and Rehabilitation, n.d.).

PM&R services are found in both inpatient and outpatient settings. Physiatrists in the inpatient setting of hospitals focus on diagnosing illnesses and improving functional capacity (Braddom, 2011) while managing medical complications that may arise when patients have physical impairments or disabilities. Blood pressure, diabetes, pain, and other comorbidities require close monitoring during and after an acute hospitalization (Wells et al., 2003). Additionally, sustained injuries can result in secondary medical complications that require

immediate attention (Frontera, 2013). Physiatrists work closely with an interdisciplinary team consisting of physical therapists, occupational therapists, speech therapists, nutritionists, and other medical specialists (Braddom, 2011; Frontera, 2013). They compare the current functional status to the functional status required for community reintegration (Wells et al., 2003). The physiatrist sets goals for the treatment plan, and together the team helps facilitate the rehabilitation process with any interventions that may be helpful depending on the patient's unique case.

Physiatrists in the outpatient setting have a slightly different treatment lens. Since the patients are stable enough to live outside the hospital, there is less of an emphasis on medical condition management. Outpatient physiatrists deal more with therapy planning, and they write therapy prescriptions for patients to attend physical therapy, occupational therapy, and any other services deemed necessary for recovery. These therapy prescriptions are centered around individualized rehabilitation goals such as strengthening, gait improvement, stability, balance, and spasticity management (Frontera, 2013). Since each healthcare professional has their own area of expertise, physiatrists will set specific objectives for each service based on the patient's current functional status. For example, physical therapists will focus more directly on the body through stretching, strengthening, and exercising, whereas occupational therapists are more focused on achieving maximum independence with activities of daily living such as feeding, grooming, and toileting. Each healthcare professional will approach these goals from the perspective of their field, but everyone is working together to achieve a certain outcome. Physiatrists can use therapy, medication, injections, prosthetics, orthotics, and other techniques to treat patients (Braddom, 2011).

Physiatry is a unique medical specialty because it retains the connection between disease processes and the social context of human experience (Giustini, 2005). Traditional medical interventions separate the biological processes from the psychological, whereas PM&R considers the patient in a holistic manner, taking into consideration the functional, behavioral, motivational and emotional factors involved in the healing process (Giustini, 2005). There is a recognition that the physical body is inextricably connected to the mind, and that this whole person is a function of their connection to their surrounding context (e.g., community, relationships, socioeconomic status) which creates a need for synergistic treatment plans that account for the complexity of humanity (Giustini, 2005). Physiatrists look at not only what is required for physical healing, but also what resources are needed to support mental health and community reintegration. This process is facilitated through the physiatric history and physical examination, along with the psychological assessment performed by a rehabilitation psychologist (Braddom, 2011). The result is an individualized multidisciplinary treatment plan geared towards delivering functional improvement while maximizing patient motivation. Although physiatry strives to integrate socio-cultural context along with a biopsychosocial approach to treatment, there are still many clinical challenges to consider. Even with a multimodal treatment team, mental health difficulties and low patient motivation can hinder the healing process if not specifically addressed.

Depression is a common comorbidity in geriatric rehabilitation patients, and is often undiagnosed and untreated (Wells et al., 2003). Patients with depression are less motivated to participate in therapy, which can delay discharge and complicate functional outcomes (Wells et al., 2003). It has been shown that in hospital rehabilitation wards, improvements in mood have associated improvements in physical functioning (Wells et al., 2003). Physiatry integrates psychological assessments and interventions by including a rehabilitation psychologist on the

treatment team (Braddom, 2011) but difficulties with mental health are addressed separately from the patient's physical issues. If a patient requires mental health services, these needs are addressed by a mental health professional with a distinct focus on psychological problems.

A current goal of PM&R medicine is to improve patient autonomy by empowering patients to actively participate in their recovery and enabling them to fully reintegrate back into their communities (Kuczewski & Fiedler, 2001). The new framework for rehabilitative medicine emphasizes the relationship of the patient to their environment, which requires them to be able to access the opportunities in their community (Kuczewski & Fiedler, 2001). In order to achieve this, physiatrists must be able to motivate patients to continue with treatment, even through pain and discomfort (Kuczewski & Fiedler, 2001). Phillips, et al. (2004) noted that PM&R physicians have a difficult time motivating older adults to exercise and participate in treatment for various reasons. Motivation to exercise is dependent upon the patient's perceived odds of success, the importance of the goal, the costs of the activity, and the inclination to remain sedentary (Phillips et al., 2004). Self-efficacy was one of the most important determining factors for exercise participation in older adults (Phillips et al., 2004). How a person feels about their capability to perform an action and their confidence in their abilities can be the difference between active involvement in treatment and refusal to partake in any therapeutic interventions. Phillips, et al. recommended that exercise plans promote goal-oriented, gradual activity progression to build comfort and confidence through an enjoyable experience (Phillips et al., 2004). They also recommend that providers should use appropriately adapted activities and exercise equipment to enable older adults to participate in treatment regardless of physical ability (Phillips et al., 2004). Having organized group activities to promote socialization can reduce isolation and improve

motivation (Phillips et al., 2004). Additionally, facilitating individual empowerment through patient-planned sessions is especially effective for increasing motivation (Phillips et al., 2004).

When physiatrists are crafting a rehabilitation treatment plan, there is an established need for input from different fields, so that various methodologies can be incorporated into the treatment process (Giustini, 2005). Dance/movement therapy is a psychotherapeutic modality that could be of value to the field of PM&R. When approaching patient care, the goals of dance/movement therapists are similar to those of physiatrists, because both strive for a holistic approach to treatment that considers more than just physical ailments. Adding dance/movement therapy sessions in parallel with PM&R services would enhance the overall patient experience and quality of life. In rehabilitative medicine, dance/movement therapy is rarely seen in conjunction with physical, occupational, and/or speech therapists who are a part of the multidisciplinary healthcare team. Dance/movement therapy is uniquely suited to simultaneously address the physical, social, mental, and emotional needs of the patient in a way that motivates patients to actively participate in their treatment.

Dance/Movement Therapy

Dance/movement therapy is a form of psychotherapy which uses movement to elicit the expression of unconscious emotions (Payne, 1992). The physical body can be a valuable source of psychological information, and dance/movement therapists are trained to interpret movement and create body-based treatment plans (Levy, 1988). The purpose is to use movement to improve health and well-being. Dance/movement therapy takes a holistic approach to address the emotional, social, cognitive and physical integration of the individual (Levy, 1988). Dance as a performance art or activity is focused on execution, whereas dance/movement therapy is about self-initiated movement for communication and expression (Payne, 1992). Dance/movement

therapy seeks to identify how emotional stress manifests in the body, and then create individualized coping mechanisms (Mitra et al., 2020). It is an interactive process of assessment and reflection for the purpose of relating to people on a body level.

Dance/movement therapy methodology and theory can be used to help achieve PM&R goals such as treatment for impaired bodily structures, restoration of bodily function, overcoming obstacles that arise as a result of limited body function, and prevention of further disability (Giustini, 2005). Dance/movement therapy utilizes a holistic approach to support the reintegration of the body and mind (Lynn Gray, 2001). The dance/movement therapist will craft an appropriate treatment plan for each individual by taking into account the patient's diagnosis, symptoms, movement profile, and personality. While the specifics of the approach may vary, there are certain dance/movement therapy concepts that can be applied within most rehabilitative medicine cases. Dance/movement therapists can approach the individual as a multi-faceted energetic body consisting of physical, mental, emotional, and spiritual components (Serlin, 1996). When working with the physical body, the muscle tension often seen in patients undergoing rehabilitative medicine affects physical alignment, posture, and breathing, which hinders expressive movement (Lynn Gray, 2001). Wilhelm Reich was one of the first psychiatrists and psychoanalysts to introduce nonverbal orientation into a clinical setting, which influenced the field of dance/movement therapy (Levy, 1988). Reich's nonverbal orientation work discovered that some patients developed muscular tension as a defense mechanism, so he introduced muscular manipulation as a technique to release repressed psychological material (Levy, 1988). In dance/movement therapy, tension flow is the underlying determiner of emotion behind a posture, gesture or movement (Plevin & Parteli, 2014). Patients can either be suspended in bound flow, or rapidly alternate between bound and free flow, but they are not able to control

it. Dance/movement therapists can complement the work of the physiatrist by facilitating interventions that explore the use of weight within the body in order to consciously shift the patient's tension flow quality. Dance/movement therapists can also provide guidance for patients to examine the sensations in their body (either specified to one region or generalized for the entire body) for a more embodied therapeutic experience. Blanche Evan recognized the importance of both the physiological and the psychological within humans, and she developed a system of functional technique (Levy, 1988). Functional technique works to improve posture, coordination, strength, and range of motion based on individual anatomical needs (Levy, 1988). This allows the patient to regain control of their body and feel more secure about physical expression, which enables movement-based emotional exploration (Levy, 1988). She also incorporated imagery, auditory stimuli, and movement directives, which can help improve movement repertoire (Levy, 1988). Additionally, breath work can be incorporated and expanded for bodily awareness.

Movement is fundamentally connected with feeling, and this relationship is the foundation of emotional expression in dance/movement therapy (Serlin, 1996). The process of rehabilitative medicine involves a constant shifting of functional ability, which can cause feelings of instability and uncertainty with the body. Paul Schilder was another early psychiatrist and psychoanalyst who worked alongside dance/movement therapists, researchers, and other clinicians to explore verbal and nonverbal projective methods (Levy, 1988). Schilder studied the relationship between movement and body image, and found that the mental image of the body is what forms the emotional response to the body (Levy, 1988). Dance/movement therapy can help patients rebuild their trust of their body even as it undergoes constant changes. By taking a strength-based approach to treatment, dance/movement therapists focus on what is possible in

the present moment, as opposed to the goal-directed approach of physiatry. Many patients who suffer from injuries have neurobehavioral problems as a result of their altered functional status (Braddom, 2011) so dance/movement therapy can help restore a positive body image to encourage patient participation in rehabilitation. Building self-confidence encourages development of movement repertoire, which further builds bodily trust in a positive feedback loop. The more comfortable a patient is within their body, the greater the potential for emotional expression. Marian Chace postulated that movement fulfills the basic human need for communication, and she introduced the circular formation into dance/therapy sessions to facilitate participant interactions (Levy, 1988). She also developed the concept of "mirroring," which is the reflection of the patient's movement quality by the therapist to build a relationship and develop deep emotional understanding of the patient's experience (Levy, 1988). Many portions of the Chace dance/movement therapy technique are valuable tools for use within rehabilitative medicine.

Each patient's mental body is shaped by their subjective experiences, and these are what form the images, associations, and thoughts that may arise during a dance/movement therapy session (Serlin, 1996). Understanding individual background enables therapists to extract meaning from movement and develop the therapeutic relationship. Movement can be an externalized representation of events that have unconsciously shaped a person's psyche, so bringing these experiences into the conscious cognitive space better allows for reflection and processing. A patient who requires rehabilitative services may have varying attitudes towards treatment depending on their past experiences with medicine, hospitals, rehabilitation, or any associated fields. Dance/movement therapists are cognizant of the importance of context and can incorporate this into treatment plans.

Spirituality is a deeply personal component of human experience, and it is not always easily defined. Some patients have a strong connection to organized religion, and others may connect to broad concepts like a higher power, nature, or bodiless essence. There are also patients who may not be spirituality inclined or have an active aversion to such ideas. No matter what the defined (or undefined) belief system, it is the way in which the patient connects to their innermost self and the external world. The crux of dance/movement therapy is relation and connection, so integrating spirituality into practice is a vital factor. Understanding the spiritual body of the patient can help dance/movement therapists facilitate internal processing along with external communication to help with community reintegration.

While both PM&R and dance/movement therapy serve a variety of populations, the treatment methods and therapeutic strategies will vary based on the individual diagnosis and movement profile. The existing literature for dance/movement therapy is more focused on the psychotherapeutic use of movement and less on the physiological benefits of movement interventions. The current body of research concentrates on certain populations where dance/movement therapy has already been applied. This thesis will focus on three major categories of conditions where dance/movement therapy has been studied and could potentially be implemented in parallel with PM&R: neurodegenerative disorders, neuromuscular disorders, and sustained injuries.

Neurodegenerative Diseases

Parkinson's Disease

Neurodegenerative diseases are classified by the progressive death of nerve cells in the central nervous system. Parkinson's disease is a neurodegenerative disorder characterized by the loss of dopamine producing neurons in the substantia nigra (Frontera, 2013). Parkinson's patients

exhibit a variety of positive and negative symptoms. Most commonly, the signs of Parkinsonism include tremors, muscle rigidity, flexed posture, bradykinesia, loss of posture maintenance, instability, and freezing phenomena (Frontera, 2013). Current rehabilitation strategies for individuals with Parkinson's disease integrate a multidisciplinary approach, with the care team consisting of neurology, physiatry, physical therapy, occupational therapy, speech therapy, social work, psychology, and/or nutrition (Frontera, 2013). The role of the physiatrist is to assist with non-surgical orthopedic problems, musculoskeletal issues, and any pain impediments that the patient presents with (Frontera, 2013). The goal is to develop a therapeutic plan to manage the various impediments that manifest as a result of the condition. The priority is short- and long-term functionality and quality of life (Frontera, 2013).

For individuals with Parkinson's disease, studies have shown that physical rehabilitation is an effective way to manage motor and non-motor symptoms (Mitra et al., 2020). However, maintaining motivation for treatment is difficult because of progressive difficulties with physical disability and co-existing emotional factors, so as a result not many adults engage with enough physical exercise (Mitra et al., 2020). By incorporating cognitive, emotional, and social components, the exercise environment could become more engaging and multi-dimensional (Mitra et al., 2020). One experimental study examined the effects of dance/movement therapy sessions on the cognition, quality of life, and motor symptoms of patients with Parkinson's disease (Mitra et al., 2020). They used a variety of techniques such as targeted body exercises, memory games, movement improvisation, guided imagery, rhythm work, contact improvisation, mirroring, body coordination and movement reflexes (Mitra et al., 2020). Music was also used to incorporate rhythm and sensory motor cues (Mitra et al., 2020). As a result, participants showed a significant increase in cognitive functioning and a decrease in

Parkinson's related health difficulties. Additionally, patients reported improvements in coordination, mood, and memory (Mitra et al., 2020). Another study analyzed the effectiveness of music-based movement therapy on gait related activities in Parkinson's patients (Dreu et al., 2011). They examined both individual music-based gait training and partnered-dance interventions. The music provides rhythmic cues that help synchronize movements and also facilitates emotional responses in the participants (Dreu et al., 2011). Participants showed improvements in walking velocity and balance (Dreu et al., 2011).

Dementia

Another neurogenerative disorder that has been the focus of research in dance/movement therapy is dementia. Dementia is a category of progressive neurodegenerative disorders that most commonly affect older adults. The disease is characterized by various cognitive impairments such as memory loss, speech difficulties, decline in executive functioning, and reduction in psychological well-being (Karkou & Meekums, 2017). As a result, individuals with dementia experience a drastic decrease in the ability to complete daily tasks, which negatively impacts their quality of life (Karkou & Meekums, 2017). In addition, socioemotional skills can deteriorate, making communication and interpersonal connection difficult (Karkou & Meekums, 2017). These challenges can isolate individuals from loved ones and cause psychological distress, which is why symptoms such as mood swings, irritability, and agitation are commonly seen in individuals diagnosed with dementia (Karkou & Meekums, 2017). Existing literature highlights the need for holistic treatment plans that address the physical, social, emotional, and cognitive needs of the patient (Karkou & Meekums, 2017).

Dance/movement therapy can be a useful intervention for individuals with dementia, because it takes an embodied approached to treatment (Karkou & Meekums, 2017).

However, Karkou & Meekums (2017) discovered that most studies that implemented dance/movement therapy with this population were not conducted by licensed dance/movement therapists, or they did not show data gathered through a randomized controlled study. Recently, one study examined the psychophysiological effects of dance/movement therapy on individuals with dementia (Ho et al., 2018). This was a randomized controlled design where older adults clinically diagnosed with dementia were divided into three groups: dance/movement therapy, exercise, or waitlist control (Ho et al., 2018). The dance/movement therapy intervention was led by either a licensed dance/movement therapist or a student in training (Ho et al., 2018). It included four elements: group dance, movement games, improvisational dance, and movement interactions among group members (Ho et al., 2018). The group dance components were designed to help with memory loss by encouraging participants to remember the steps in a particular sequence (Ho et al., 2018). Movement games were introduced to improve participant mood and vitality (Ho et al., 2018). Improvisational dance activities were included to foster creativity and imagination, which has the potential to activate the entorhinal and hippocampal neural networks associated with spatial memory (Ho et al., 2018). Movement interactions helped facilitate communication and social exchange, and participants also had the opportunity to verbally share their experiences with the group (Ho et al., 2018). All elements of the intervention emphasized the use of rhythm in contralateral movements in order improve coordination and facilitate a stronger connection between the cerebral hemispheres (Ho et al., 2018). The dance/movement therapy group showed significant decreases in depression, loneliness, and negative mood, while also exhibiting improved daily functioning and diurnal cortisol slope (Ho et al., 2018). These results were unique to the dance/movement therapy group, as the exercise group did not have significant effects on these measures (Ho et al., 2018). Additionally, the

dance/movement therapy group had a significantly lower attrition rate than the exercise group, which could be due to greater enjoyment in the sessions and satisfaction with the treatment (Ho et al., 2018). This is the first study to show quantitative data in support of using dance/movement therapy for the treatment of dementia (Ho et al., 2018). The authors have postulated it may be beneficial to incorporate dance/movement therapy into a rehabilitation program for older adults to address the psychosocial needs of the population (Ho et al., 2018).

Neuromuscular Diseases

Cerebral Palsy

Neuromuscular diseases are characterized by sensory and motor problems due to issues with the peripheral nervous system. Previous studies have examined the impact of dance/movement therapy on cerebral palsy, a group of neuromuscular disorders that affect mobility, muscle tone, balance, and coordination. It is the most common motor disorder found in children and is caused by early neurological damage (Frontera, 2013). Most cerebral palsy is a result of brain damage or abnormal neurological development in utero, which permanently affects the connection between the brain and the body. Children with cerebral palsy may exhibit movement difficulties, speech impairment, learning disabilities, cognitive deficiencies, as well as other neurological and physical deficits. Children diagnosed with cerebral palsy may be affected with spasticity, dyskinesia, and/or ataxia depending on what part of the brain is damaged (Frontera, 2013). There is no cure for cerebral palsy, but the current rehabilitative standard of care emphasizes the multidisciplinary management of the motor handicaps (Frontera, 2013). The most popular form of therapy is neurodevelopmental therapy, which focuses on improving muscle tone and posture through movement and positioning techniques (Frontera, 2013). There is also conductive education, which encourages spontaneous movement with less emphasis on

the clinical concepts of abnormal movement (Frontera, 2013). Other therapeutic systems include craniosacral manipulation, hyperbaric oxygen treatment, and various electrical stimulation procedures (Frontera, 2013). The physiatrist aims to facilitate normal movement patterns while reducing abnormal tone and avoiding deformities as much as possible (Frontera, 2013). To achieve these goals, physiatrists use orthoses and prescribe medications to manage spasticity (Frontera, 2013).

Dance/movement therapists use a multimodal approach to address the cognitive, psychosocial, and physical challenges associated with cerebral palsy (Turkcan, 2016). Teixeira-Machado, et al. (2017) examined the impact of dance on the functionality and psychosocial adjustment of individuals with cerebral palsy. The interventions included range of motion exercises, motor coordination movements, body image considerations, and skill and agility components (Teixeira-Machado et al., 2017). The patients showed increased mobility and locomotion (Teixeira-Machado et al., 2017). The study reinforced the importance of considering functionality, cognitive function and psychosocial regulation when crafting rehabilitation plans for individuals with cerebral palsy (Teixeira-Machado et al., 2017). In a dance/movement therapy session, the therapist will create a space that is engaging and motivating for the patient (Turkcan, 2016). Children are able to participate in pleasurable activities that contribute to an overall positive self-concept. Dance/movement therapy is also focused on boosting verbal and non-verbal communication, which enhances the communication skills for a cerebral palsy patient and enables them to more effectively socialize with others (Turkcan, 2016). In a dance/movement therapy session, the therapist provides emotional and neurological stimulation through the use of imagery, symbolism, imagination, and other techniques (Turkcan, 2016). In this way, the child is given an outlet for safe expression and they can focus on their abilities

rather than their disabilities (Turkcan, 2016). The child's limitations are no longer the center of the experience as is the case with other treatment modalities. Dance/movement therapists encourage children with cerebral palsy to discover new capabilities in order to nurture self-sufficiency and provide the patients with a sense of accomplishment (Turkcan, 2016). This helps build self-esteem and confidence. Dance/movement therapists will facilitate experiences to enhance motor functioning in children with cerebral palsy (Turkcan, 2016). Relaxation techniques are built into the sessions to help reduce muscle tension and increase body awareness (Turkcan, 2016). Rhythm is a powerful tool for organization, and rhythmic auditory stimulation can help children develop coordination, strength, and endurance (Turkcan, 2016). Dance/movement therapists can focus on isolating certain body parts to provide targeted attention for individual limbs (Turkcan, 2016). Mirroring is another tool used by dance/movement therapists to help children with cerebral palsy reach their full potential and expand their movement repertoire (Turkcan, 2016). In a group-setting, therapists will design sessions in order to build trust, encourage risk-taking, and ultimately form emotional bonds within the group (Turkcan, 2016). Children thrive when they are able to make friends in a safe, non-judgmental environment. A group dance/movement therapy session gives children with cerebral palsy a chance to meet other kids who may have the same/similar disorder and allows them to flourish in a positive environment (Turkcan, 2016).

Multiple Sclerosis

Multiple Sclerosis is a long-term neuromuscular disorder that has been the subject of previous dance/movement therapy literature. It is a progressive autoimmune disease characterized by the demyelination of neurons in the cerebral hemispheres, brain stem, and spinal cord (Frontera, 2013). As a result, there is a loss of axonal conduction which causes the

clinical symptoms of multiple sclerosis to arise (Frontera, 2013). Symptoms include fatigue, ataxia, weakness, numbness, spasticity, cognitive problems, depression, and pain (Frontera, 2013). Because the clinical presentation of multiple sclerosis is highly variable, rehabilitation models do not follow the traditional protocols (Frontera, 2013). While rehabilitation cannot cure multiple sclerosis, it can help improve the functional mobility and quality of life of individuals affected with this disease (National Multiple Sclerosis Society, 2004). Physiatrists employ rehabilitation strategies that focus on symptom management to optimize patient function and comfort (Frontera, 2013). The National Multiple Sclerosis Society has identified "exercise, functional training, equipment prescription, provision of assistive technology, orthotics prescription, teaching of compensatory strategies, caregiver/family support and education, counseling, and referral to community resources" as effective rehabilitation interventions for impairments in multiple sclerosis. Unfortunately, many individuals with multiple sclerosis have great difficulty accessing rehabilitative services because of insurance coverage limitations and late referrals (National Multiple Sclerosis Society, 2004). Maintenance therapy is not valued as much as restorative therapy, and many insurance providers require functional recovery even though that is rarely possible for patients with multiple sclerosis (National Multiple Sclerosis Society, 2004).

There is little existing research on how dance/movement therapy can help with degenerative neuromuscular diseases, but Salgado (2010) conducted a case study on the use of dance in the rehabilitation of a woman with multiple sclerosis. The researchers used dance as a therapeutic resource to improve the patient's balance and postural control (Salgado, 2010). The two-phase treatment program began by creating a safe and comfortable space for the patient to freely express herself in order to build trust within her own body (Salgado, 2010). The next

phase was focused on improving motor control and performance; specifically increasing variation in movement patterns (Salgado, 2010). The movement intervention was also designed to improve memory, creativity, emotional expression, and kinesiological perception (Salgado, 2010). They found that after a 5-month program, the patient had an improved neurological condition and gained significant improvement in cerebellar function (Salgado, 2010). The author mentions observing improvement in the patient's emotional state, but that was not measured in the study (Salgado, 2010). In order to effectively manage multiple sclerosis symptoms, a multimodal approach is required in order to craft individualized rehabilitation plans (Salgado, 2010). Dance/movement therapy can assist with returning bodily autonomy to patients and promote relaxation (Salgado, 2010).

Sustained Injuries

Traumatic Brain Injury

Sustained injuries are a category of conditions that result from incidents during the lifespan of an individual. Dance/movement therapy has previously been utilized for patients suffering from traumatic brain injury (TBI). TBI is a type of closed head injury and is one of the leading causes of disability (Frontera, 2013). The etiologies of TBI include motor vehicle accidents, falls, and assaults (Frontera, 2013). The type of injury and the severity of the deficits vary greatly depending on the individual (Frontera, 2013). TBIs affect all age groups, and each demographic presents with unique challenges for treatment. Children with TBI have complex issues because of how the injury affects biopsychosocial development (Frontera, 2013). Older adults tend to have a slower recovery process and there can be complications due to preexisting comorbidities and reduced neuroplasticity (Frontera, 2013). TBIs most often result in physical, cognitive and behavioral impairments (Frontera, 2013). Deficits in cognition, memory, attention,

motor skills, and executive functioning are common (Frontera, 2013). Additionally, patients affected by TBI are prone to developing depression, anxiety, substance abuse, and other psychiatric illnesses (Frontera, 2013). With regard to physical deficiencies, the physiatrist will perform a gait analysis and examine any other motor disturbances (Frontera, 2013). Tremors are a common movement disorder, along with paralysis, balance issues, and muscle weakness (Frontera, 2013). Physiatrists use medication, orthoses, adaptive devices and various exercises to support patient mobilization (Frontera, 2013). A team approach is vital to crafting an individualized rehabilitation plan for a person with TBI, because of the wide range of impairments that need to be addressed using multiple treatment modalities (Frontera, 2013). The rehabilitation team will assess the patient's injury, along with their lifestyle, personal needs, and family dynamics (Frontera, 2013). All of this information helps the team set goals and priorities for treatment (Frontera, 2013). Individuals with TBI require continuous medical management and therapeutic support for the rest of their lives to manage physical and psychosocial difficulties (Frontera, 2013).

Berrol & Katz (1985) discussed the use of dance/movement therapy with patients with TBI. Techniques mentioned include bodily organization, imagery to stimulate cognitive processes, socialization, community building, exploration of movement, and theme development (Berrol & Katz, 1985). Exploring polarities, range of motion, and dynamics of movement help facilitate full body integration (Berrol & Katz, 1985). The use of imagery stimulates cognitive processes such as sensory awareness, memory and movement conceptualization (Berrol & Katz, 1985). Group therapy sessions are valuable experiences to promote socialization and community integration, while providing opportunities for leadership and independence (Berrol & Katz, 1985). One important theme that frequently arises in group sessions is the concept of

independence versus dependence (Berrol & Katz, 1985). Exercises in dyads support movement exploration, reflection, awareness and coordination (Berrol & Katz, 1985). Additionally, closing techniques such as breathing, relaxation, recollection, and summarization help connect the movement experience with a cognitive application (Berrol & Katz, 1985). Repetition as a therapeutic technique is a valuable tool when working with this population (Berrol & Katz, 1985). TBI affects the whole person, not just one part, so a holistic intervention such as dance/movement therapy can address the physical, mental, social and emotional aspects of the individual's life (Berrol & Katz, 1985).

Stroke

Stroke is another form of sustained brain damage that occurs from intracranial bleeding or blood vessel blockage in the brain (Frontera, 2013). Stroke survivors present with a wide range of symptoms including focal weakness, sensory loss, speech and language difficulties, and/or visual impairments (Frontera, 2013). When approaching rehabilitation, the main goals are to restore as much functional independence as possible, to promote neurological recovery, to minimize disability, and to assist with community reintegration (Frontera, 2013). Physiatrists achieve these goals through exercise, functional training, and assistive devices (Frontera, 2013). In addition to physical rehabilitation, management of psychosocial issues is an important component of the stroke rehabilitation process (Frontera, 2013). Acute stroke management is focused on limiting and/or reversing neurological damage, while secondary stroke prevention is geared towards risk factor reduction (Frontera, 2013). Behavioral modifications such as aerobic exercise and dietary changes are integrated in conjunction with medications to prevent further brain damage (Frontera, 2013). Rehabilitation is an essential part

of medical management for stroke patients and continues through all parts of the treatment process until the individual is successfully reintegrated into the community (Frontera, 2013).

One study examined the feasibility of delivering a dance intervention for stroke patients in a hospital setting (Demers & McKinley, 2015). It is important to note that this methodology was a dance intervention and not dance/movement therapy sessions. The primary focus is on physical rehabilitation, and any cognitive and psychological impairments are addressed as a byproduct of the dance modality—specific therapeutic interventions are not geared towards these goals. The dance interventions were centered on jazz dance and merengue because of potential participant familiarity with jazz movements and the emphasis on weight transfer in merengue movements (Demers & McKinley, 2015). Each dance class followed the same structure with these components: warm-up, technique-based exercises, improvisation, choreography, and a cool down (Demers & McKinley, 2015). The dance classes were able to be individualized in order to accommodate each person's limitations (Demers & McKinley, 2015). Most of the participants reported enjoying the dance classes, along with a sense of accomplishment (Demers & McKinley, 2015). Additionally, the classes were able to be held in hospital spaces with minimal disruptions, and there was support from the stroke team (Demers & McKinley, 2015). While improvements in balance score were observed, they cannot be directly attributed to the dance intervention since participants continued with their usual care in addition to the classes (Demers & McKinley, 2015).

Discussion

Dance/movement therapists balance the dedicated physical rehabilitation work of the physiatrist by maintaining the connection between physical, mental, emotional, and spiritual components of the patient. Because rehabilitative medicine is targeted at particular objectives by

nature, there are not many opportunities for patient input into the treatment plan. Conversely, dance/movement therapy utilizes a collaborative approach and broad-based ideas. Traditional rehabilitation techniques are very structured and can be confining since there is not a lot of choice (Berrol & Katz, 1985). Dance/movement therapy can include both free and guided movement interventions based on patient needs. Over a period of dance/movement therapy treatment, therapists can shift from highly structured interventions to more organic movement sessions as the physical body regains function. By doing so, patients are given freedom in a safe space where they can explore their own bodies. It is helpful for empowering them to make their own choices, and for building self-esteem. This is especially important when preparing patients for community reintegration where they will be responsible for living independently.

Dance/Movement Therapy and Reshaping Body Image

When dealing with changes in physical functionality due to gradual degeneration or trauma, a common coping mechanism is dissociation from the body and society. Patients often suffer from depression and lower self-esteem as a result of the physical decline, so dance/movement therapy techniques can help integrate mental and emotional processing with physical rehabilitation modalities. The idea is to promote acceptance of the body in its current state so that new patterns can be generated for body-mind connectivity. Guiding the patient towards internal awareness of body sensation and emotion keeps the focus on the present moment of the healing process. Once the patient is comfortable within their own body, the dance/movement therapist can help expand that awareness to the external environment to promote socialization and reintegration. Dance/movement therapy can be a way to optimize environmental enrichment by combining the fun of a dance class with direct therapeutic interventions geared towards psychological and cognitive deficits.

Music and Rhythm in Dance/Movement Therapy

Dance/movement therapy methodology often utilizes music and rhythm in a variety of ways. Trudi Schoop, an early dance/movement therapist, used rhythm and repetition to facilitate the cathartic release of emotion (Levy, 1988). As humans, we naturally find comfort in rhythm and repetition because our physiological and psychological well-being depend on it. A healthy heart beats at a steady pace, and our bodies strive towards a state of homeostasis at all times. There is a certain security associated with stability and predictability in life, and dance/movement therapists use rhythm and repetition to express these needs through body patterns. Rhythms can be internally generated or externally joined, either through group movements or music. The repetition of these rhythms promotes a greater sense of organization and mind-body connectivity. Music is a particularly motivating external stimulus and can serve as an anchor for patients. Songs with repetitive pulsating rhythms that mirror a heartbeat could encourage patients to bring the music into their bodies and express their emotions through movement.

Dance/Movement Therapy Approach for Neurodegenerative Diseases

Neurodegenerative diseases, neuromuscular diseases, and sustained injuries can share symptoms (depending on the diagnosis), but each category has hallmark characteristics. Dance/movement therapy sessions are created based on the patient's unique needs, but certain techniques can be applied based on frequent symptoms seen within the disease subgroup. The diagnosis of a neurodegenerative disease often features memory loss and other cognitive impairments in addition to the various motor deficits. While physiatrists focus on the musculoskeletal symptoms, dance/movement therapists can address the socio-emotional consequences of neurodegeneration. With these patients, it is important to create a comfortable

and stable environment where they feel safe. Many patients are aware of the cognitive decline and the loss of motor function, which can be frightening and destabilizing. Dance/movement therapists can use music with strong rhythms to promote organization in the mind and body. Music has the power to encourage movement, especially if the patient recognizes the songs. Rhythmic sounds provide an external auditory stimulus to help patients synchronize their movements, which helps with balance, coordination, and confidence. This can provide comfort and stability in a time of great uncertainty. Group dance/movement therapy sessions are especially helpful for socialization. Oftentimes, patients become isolated as the disease progresses, so keeping them connected with their body and community can combat feelings of loneliness. Dance/movement therapists can utilize the Chacian circle formation to facilitate verbal and/or movement conversations between group members. This allows patients to tell their story and connect with others who may have shared experiences. Another technique that is effective for strengthening memory and promoting socialization is the repetition of movement sequences. The movements will ideally be offered by the patients, and each person will have the opportunity to add to the group "choreography." As a new movement is added, the dance/movement therapist can facilitate a review of the previous movements. This constant repetition of the movement sequence strengthens the connection between mind and body, and helps patients form and remember patterns.

Dance/Movement Therapy Approach for Neuromuscular Diseases

Neuromuscular disorders feature rapid changes in muscle tension along with progressive muscle weakness, and both children and adults can be affected by certain diseases in this subgroup. Dance/movement therapists can work with people of all ages because they use an embodied approach to attune to the individual needs of each patient. There are many subtleties in

body movement that can give valuable insight into a patient's mindset, and dance/movement therapists are trained to recognize these nuances to create meaning (Plevin & Parteli, 2014). By taking into account physical ability, developmental stage, psychological status, emotional level, and environmental energy, dance/movement therapists can create an engaging environment tailored to the unique interests of each patient. To support the rehabilitation goals of the physiatrist, dance/movement therapy sessions can include the targeted use of functional technique to improve posture, coordination, strength, and range of motion. Difficulties with muscle weakness can be approached using imagery, sensory elements, and tactile props. Dance/movement therapists can also use touch to bring awareness to specific parts of the body and help restore the connection between the mind and the body. Some neuromuscular diseases result in the rapid oscillation of muscle tension from rigid to flaccid, with the patient having little to no control. Dance/movement therapists can explore how these polarities present in the moment, and how they connect to the patient's overall emotional experience. Building greater shape flow through inner directed movement can be juxtaposed with the exploration of the outer bounds of the patient's kinesphere, providing purposeful body contrast. By working in cycles of exertion and recuperation, dance/movement therapists can create a more stable rhythm that promotes the release of negative energy. Similar to the approach with neurodegenerative disorders, music and rhythm can be incorporated into treatment plans for patients with neuromuscular disorders.

Dance/Movement Therapy Approach for Sustained Injuries

Sustained injuries include a broad category of disorders, but the common thread between each diagnosis is a sudden incident that results in the current condition. Because patients have little to no processing time, their emotional response is unpredictable.

Dance/movement therapy sessions can help patients explore the various emotions that may arise from the sudden loss of functionality. By connecting bodily sensations to feelings, dance/movement therapists can use an embodied approach to processing trauma. Integrating resources like imagery, memories, support systems, hobbies, interests, and personal experiences can all help restore the patient's integrity and sense of inner strength (Lynn Gray, 2001). By engaging all the sensory systems, dance/movement therapists are able to take a holistic approach to addressing cognitive functioning, emotional regulation and motor action.

Since the healing process can be complex, it is important to titrate the therapeutic interventions so as not to overwhelm the patient. Dance/movement therapists can use props like therapy balls, body bands, and scarves to assist with pacing and to add a visual-tactile element to sessions (Lynn Gray, 2001). Additionally, while physiatrists are working to restore physical functionality, dance/movement therapists can support this by facilitating exploration of body connectivity. Incorporating body-half and cross-lateral motions into sessions will help encourage bilateral movement. Emphasizing the relationship between various parts of the body helps reinforce the idea of the patient as a whole. This creates a foundation for strengthening the mind-body connection over the course of treatment. Dance/movement therapists can help patients with sustained injuries reintegrate physically, emotionally, socially and cognitively.

Conclusion

PM&R could strongly benefit from including dance/movement therapy services as part of the multidisciplinary treatment team. While both fields serve different purposes, they approach patient care in a similar way: by viewing each person in a holistic fashion to maximize their quality of life. Dance/movement therapists are uniquely positioned to use the body as the modality for treatment in a way that complements the work of physiatry. Restoring bodily

function is one aspect of rehabilitation, but linking it to the experiences that lay beneath the surface is what provides a complete picture for recovery. This type of embodied psychotherapy facilitates the connection between mind and body, giving patients greater capacity for personal expression. The multiple studies previously highlighted show preliminary evidence that dance/movement therapy has the potential to significantly improve clinical results, but more research is needed to corroborate the effects. Rehabilitation medicine is an ideal place to consider incorporating dance/movement therapy because of the shared emphasis on individualistic treatment plans. The principles of dance/movement therapy are widely applicable for a variety of physical conditions, and specific interventions can be created based on the unique needs of each patient. Dance/movement therapy also prioritizes a collaborative approach to treatment, allowing it to seamlessly fuse into existing healthcare structures. The tailored integration of emotional, social, and cognitive therapeutic interventions directly alongside physical rehabilitation supports the healing process from multiple angles, which can promote better patient outcomes and satisfaction. Overall, physiatry and dance/movement therapy have separately helped so many people but developing a synergy between these fields has the potential to transform rehabilitative medicine.

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