

The effects of Performing Arts on Cerebral palsy

Sarah Schranz

Department of Art, Touro University

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Professor Fleisher

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Cerebral Palsy is a motor and for some a cognitive disorder that disrupts the function of many individuals worldwide. Cerebral Palsy (CP) may affect their walking abilities along with other daily activities. Through performing arts new treatments have been proposed to better the lives of these patients. Through things like Neurological Music Therapy (NMT), Rhythmic Auditory Stimulation (RAS), Therapeutic Instrumental Music Performance (TIMP), and dance the lives of these individuals can be enhanced and bring meaning. NMT uses music to treat the nervous system of those who have CP. NMT is the broader category of all music therapies. RAS is a common type of NMT where tempo is used to improve the individual's gait. TIMP is another form of NMT that uses specific musical instruments for repetitive finger movements to improve coordination. Dance is another form of performing arts that provides CP individuals with the ability to gain self-worth and improve motor functions. Through multiple types of dances, there are endless ways of regaining motor control. Neurological Music Therapy should be encouraged to parents and prospective cerebral palsy patients to enhance their recovery and gain independence.

Cerebral palsy is an impairment that affects movement and posture making it hard for individuals to perform daily activities. This affects their daily lives, threatening their independence. The word Cerebral means brain and Palsy means weakness or problems using muscles (Centers for Disease Control, 2024). The Centers for Disease Control (CDC) says this disorder is caused by abnormal brain development or damage to the brain. Cerebral palsy (CP) can look different in each person. A severe case might mean the individual needs equipment to be able to walk or they might not be able

to walk at all. A mild case can be someone who walks awkwardly without any help. CP doesn't get better as time goes on. Many individuals with CP have additional conditions that might result in seizures or problems seeing and hearing. They might have scoliosis and joint problems (Centers for Disease Control, 2024). Overall, CP is a physical impairment that makes it hard for an individual to walk or perform other tasks. With the use of different therapies, these individuals can gain motor control giving them independence.

Neurological Music Therapy (NMT) helps individuals with CP by using music to treat the nervous system. It can be used for "...motor, sensory, cognitive, and language dysfunction..." (yang, 2022). This is unlike most traditional therapies. NMT understands the deep connection between music and the brain. By utilizing this powerful tool it can improve one's functioning. Therapists will take a neuroscientific model to rehabilitate their brain responses. Yang says that NMT shows promise in aiding individuals with CP when paired with other therapeutic programs. By having highly tailored sessions it can target the specific needs of the individual. Music can be used as a tool to promote brain neuroplasticity and repair damaged brain networks rehabilitating and helping individuals improve their quality of life

The most common type of NMT is Rhythmic Auditory Stimulation (RAS). RAS is a neurological therapy that uses the physiology of rhythm to help rehabilitate motor abilities in patients. Specific patterns of music are used to improve coordination. It is commonly used to improve gait performance (Kwak, 2007). Gait is the pattern of a particular person's walking. Kwak explains that when a person's gait is not rhythmic it is because their internal timekeeper is not working. RAS can be used "to help regulate the

motor control system by stimulating lower-level brain functions of the basal ganglia, cerebellum, brain stem, and spinal cord...” (Kwak, 2007). The goal is to make CP patients have an efficient gait by not having to exert so much energy for short distances. In specific a goal for RAS might be for an individual with CP to have ambulation (Kwak, 2007). Another outcome of RAS includes stability and rehabilitation.

However, NMT is not a common treatment due to a lack of awareness of the therapy. Not all doctors are aware of the incredible benefits of this music therapy. Music is a powerful tool and can accomplish things thought unimaginable. NMT should be highly encouraged for CP patients. To help promote awareness there should be public health campaigns to do educational outreach. There should be posters and media advertising. This will encourage individuals to partake in NMT and for doctors to advocate for the therapy. If NMT is readily available more people can benefit from this groundbreaking therapy.

In a study published in the Journal of Music Therapy, Kwak made a groundbreaking study in Korea involving 25 CP patients who went through RAS. The patient's ages ranged from 6 to 20 years old and went through the study to improve mobility and quality of life. His goal was to improve “velocity, cadence, stride length, and symmetry, as well as kinematic improvements of knee and hip ranges of motion and trajectories and to do self-lead therapy along with self-therapist led.” (Kwak, 2007). Something to note is how the study emphasized self-led therapy along with therapy-led interventions. The participants received gait training throughout the study while music therapists facilitated the groups. Each session was individualized to the specific needs of the participant. The specific goals for each person let them ensure success for each

person. There were various tasks that the participants had to do each session. Their goals included completing a 14-meter walk while walking to a tempo. The participants were first to walk the 14 meters at their normal tempo. By doing this, everyone received their baseline assessment for their walking ability. This provided insight into each participant's initial walking abilities. They prescribed music for each participant based on their scores. In the following weeks, each participant continued to walk the 14 meters with a 5 percent increase in the tempo per week. Some received a decrease in tempo based on how they were progressing. The tempo increased if the gait and balance had improved. This approach of music and therapy helps enhance mobility for those who have CP.

Kwak's study helped transform the participants by helping them learn to walk independently. Through the use of the prescribed music individuals with CP improved their equilibrium. The individuals used the music they were given to synchronize their walking patterns. By doing this the participants gained stability in their walking patterns. Additionally, the patients walked backward to improve their balance and motor coordination. RAS should be highly marketed to parents to show them the incredible achievements their children can accomplish. A lot of times parents think that their child will stay codependent and disabled forever. This is untrue. RAS can give their children independence and a sense of identity. If this is appropriately marketed to parents more children with CP can benefit. More early intervention can take place with a higher awareness on the parent's end. This will lead to long-term improvements. RAS additionally brings in real-life scenarios to help individuals with CP acclimate and become independent. With the help of RAS, they were able to form new motor pathways with better gait and velocity. However, due to the participants needing to change motor

pathways, there needs to be prolonged intervention with RAS. Three weeks of RAS was shown to be not sufficient enough to rewire gait patterns. There needs to be extended time learning through RAS to create new gait patterns ingrained within the patients (Kwak, 2007). Kwak's study shows the potential of how RAS can influence and help intervene in motor ability and should become a regular prescribed therapy for individuals with CP.

Barriers like insurance coverage prevent people from attending therapies like NMT or RAS. There needs to be more advocacy that can lead to more resources being allocated towards NMT. More training and availability will result in a higher demand. However, insurance may view NMT as an unnecessary cost and not want to cover it. They don't see that in the long term, it is cost-effective because it will reduce potential costs later down the line. NMT can provide individuals with CP with better health outcomes. It can lead to the individual's improved motor abilities and overall well-being.

After Kwak made his initial case study on RAS other therapists such as Kim et al. further explored the effects RAS has on individuals with CP. Kim et al. saw the benefits of RAS from Kwak and built off his initial findings in improving walking distances. They decided to prescribe pedometers to their patients to do a revolutionary therapy called premotor-based gait training. They incorporated auditory stimulation along with their therapy sessions. A pedometer was placed on the individual's waistband while it played melodies that had motivational messages in it. The pedometer tracked distance and synchronized the individuals' movement with the melodies. Children who received the motivational messages reached more goals than the children who listened to music alone (yang 2022). This shows the power of what positive messages can achieve. The positive

messages can help the person combat their negative thoughts about what they can accomplish. This gave them the extra push to succeed in the training. The synchronization of the pedometer helped the participants coordinate their movements leading to improvements in gait. Pedometer-based gait training was shown as an effective way to increase gait, velocity, and stride length. Gait training was shown to even help those with neurological diseases to help synchronize heel strokes (yang, 2022). Pedometer-based gait training is a useful technique when it comes to improving gait and motor control. More resources need to be given to study RAS to achieve more strides in the therapy. There is always room for improvement. If RAS is used by more individuals then therapists will be able to have a bigger pool of people to test hypotheses. They will be able to fine-tune the therapy to make it more efficient like how they did with RAS. Continuous research needs to be done to make it the most effective.

Additional methods besides RAS and pedometer-based gait training can be used such as Therapeutic Instrumental Music Performance (TIMP) to rehabilitate individuals with CP if doctors advocate to parents. TIMP is a method where musical instruments are used to improve motor functions in someone who faces motor impairments. For example, a piano might be used for an individual to repetitively hit the same notes. TIMPs main goal is to have the individual do repetitive movements with rhythm to create new motor pathways (yang, 2022). The main goals of TIMP “are to improve coordination, range of motion, manipulation, and finger dexterity including palmar and pincer grasp” (yang, 2022). TIMP increases the patient’s quality of life and motor capabilities. If TIMP is shown to parents in a way that they will see that their children will gain skills along with recovering more prospective parents might sign their children who have CP. It needs to

be done in a way that parents will be convinced that their child will recover faster and more efficiently. Individuals with CP can engage in therapy to gain independence and motor function.

TIMP is efficient due to the repetition of finger movements, coordination, and auditory engagement. When the individual can coordinate movements based on sound it increases their motor refinement. When using instruments like the piano the person can hear immediate feedback and adjust accordingly. This will improve the individual's fine motor and auditory skills (yang, 2022). TIMP is unique in the way that it is not focused on creating a perfect song but on developing motor coordination. The emotional aspect of music plays a crucial role in TIMP. Music has an inherent emotional aspect that is very healing. Music can bring out any emotion like happiness, sadness, or determination. The patient is motivated to continue working on their motor recovery because of the musical aspect. TIMP's ability to take music and therapy in one makes it a powerful tool for rehabilitation. TIMP will help individuals gain independence and have a better quality of life.

Another important aspect of performing arts is dance. Dance helps rehabilitate the physical symptoms and brings emotional empowerment to individuals with CP. Dancing gives individuals with CP the ability to gain self-worth by breaking through the boundaries of what they think they can do. This is a key thing that therapists need to highlight to parents to convince them of the successful outcomes of performing arts. People with CP might feel as if their bodies are defective but through dance, they can feel strengthened and liberated. Through structured dance sessions with repetitive movements and dance routines, patients can gain motor control and balance. Additionally, the dance

sessions allow for self-expression through the mastery of movements. This boosts the self-confidence of those who partake in the class. This is an incredible expressive outlet for one to connect with their body and express themselves through it. Dance can reduce stress and improve the well-being of a person. Recently, there has been research that suggests that dance improves “motion and emotion and learning and well-being” (Lentzarintzari et al., 2023). Dance has the property to combine physical therapy while giving the individual a sense of independence. Once the individual is confident in themselves they can regain motor control over their body giving themselves independence. Additionally, with more advocacy of dance, this form of therapy will become more standardized. More resources will be given and allow it to be accessible to the general population. Barriers like it being too expensive will go down.

Lentzarintzari et al. conducted a study that centered around CP individuals in integrated dance groups. There were non-structured groups of modern dance and structured groups of ballet. The purpose of the study was to rehabilitate the individuals through the use of the two dances. The therapists wanted to make sure dance was accessible to all who wanted to express themselves through this outlet. Those who could stand proceeded to a standing position while those in wheelchairs participated in sitting down. Each session a short choreographed dance was presented to the group to learn and complete. The therapists used a technique called Laban Movement Analysis (LMA). This is “a detailed movement observation and analysis tool that informed creative or modern educational dance” (Lentzarintzari et al., 2023). It focuses on describing the moves. The participants underwent a 10-20 minute warm and then continued the rest of the hour-and-a-half session.

Individuals before the dance experiment felt as if their bodies were useless and they felt discomfort within the group. One individual expressed this when they said “This can be a problem for the team or for some people who want to pass by quickly” (Lentzarintzari et al., 2023). This highlights how those with CP found it challenging to keep up with dancers who have no impairments leading them to feel like they are hindering the group. Additionally, the soreness of their body becomes a continuous reminder of their CP condition during training. However, the dance groups help those with CP have a sense of belongingness and security. (Lentzarintzari et al., 2023). Through dance, they learned to push their bodies beyond their limits and comfort zones. They found within themselves confidence and strength. After each session, the participants felt relaxed and a sense of well-being even if their bodies ached from the exercises. The dance liberates them physically and emotionally. The dancing itself helps the CP patients forget any pain they have in their bodies. In the dance session, individuals can forget about any condition and strengthen their bodies while gaining self-confidence.

Dance provides a sense of identity for individuals with CP. Dance provides them with a title to identify with. The ability to have a title as a dancer gives them a sense of belonging to a group. Furthermore, interacting with the audience during a performance helps them feel connected to their title as a dancer. With their newfound identity, they are given the strength to go through all their struggles. When parents see their child on stage they can see firsthand the benefits of the therapy. The parents will be overcome with pride in their child and push them to be there for their child more. The benefits of dance should be relayed from therapists through media and other sources to help promote the therapy. Social acceptance through dance is crucial for the individual since most people

with a disability experience social exclusion. Individuals in the study said it was a “passage from darkness to light” (Lentzarintzari et al., 2023). Dance can bring these individuals to a new state of mind. By having a supportive community they are given something that not many people with a disability have. True acceptance gives them the power to continue and gain confidence, and connection to themselves and others.

Various dance genres contribute to specific motor skills. For instance, tango, salsa, and tap dance are all good methods to increase fitness and gait performance through their specific movements (Joung, 2021). Tango may promote balance through the heavily focused footwork of the dances. While salsa may strengthen coordination. Each dance has its focus strengthening a specific area in its participants. However, creative dance gives an outlet to those who lack prior dance capabilities. Creative dance allows beginners to participate in an accessible way. Creative dance allows participants to not be constrained by formal choreography or moves. It is a personal type of dance that lets participants explore their unique style of moves. Hence, creative dance creates a sense of empowerment and independence in the individual. Creative dance will increase various types of rehabilitation depending on the person.

In Jeoung’s study on creative dance for individuals with CP, he made an innovative approach to sensory awareness and motor coordination. He first created sensory awareness in individuals with CP. He did this by asking participants to focus on a specific body part. By doing this the participants did a technique called “body scan” that heightens their awareness of that body part. Once they were hyper-aware they focused on initiating a movement starting with their specific body part. They start with one body part and then shift focus to the rest of their body to create a seamless flow of motion. The

setting for this study was a classroom where participants had to navigate through. The participants were also asked to stop, walk, or run at certain times during their sessions. Through Jeoung's approach, the individuals were able to improve motor functions because of how he broke down complex movements into small manageable ones. He found that "8 weeks of creative dance improved standing stability, balance recovery, and directional control in a child with CP. " (Jeoung, 202?). The integration of sensory awareness and motor coordination proved to be successful in rehabilitating physical impairments. Creative dance improves spatial awareness and boosts confidence in those with CP.

The exploration of performing arts on individuals with cerebral palsy illuminates the extreme potential of how performing arts can emotionally and physically rehabilitate individuals. Doctors and therapists need to advocate the use of performing arts therapy to bring higher success rates in rehabilitation. The first step is to convince parents of the wonders of the therapy so that the children can benefit. Through therapies like Neurological Music Therapy (NMT), Rhythmic Auditory Stimulation (RAS), and Therapeutic Instrumental Music Performance (TIMP) individuals with CP saw an increase in motor functions. Dance was another outlet provided by performing arts that helped individuals gain motor control and emotional stability. Performing arts is important in helping people who have CP gain independence in their lives. Moving forward, performing arts should be a go-to method when rehabilitating people with impairments and be accessible to public use.

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