

RHYTHMIC MOVEMENT FOR BODY AWARENESS
AND CONFIDENCE IN CHILDREN
WITH LEARNING DISABILITIES

By

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ABSTRACT

The purpose of this project is to present a program that can be implemented into schools and therapeutic settings for children with learning disabilities. This study will also present an in-depth literature review of current research examining the effects of rhythmic movement intervention on body awareness and perceived confidence in children with learning disabilities. Children with learning disabilities present with an average or above average IQ, but have difficulties with executive functioning that interferes with their learning capabilities. Rhythmic movement intertwines the benefits of physical activity with rhythm to produce a profound mind-body connection that can enhance body awareness and self confidence, which can be beneficial for executive functioning skills in the classroom. Participants engage in four weeks of interactive movement sessions, and their confidence and levels of body awareness are measured pre- and post-intervention through questionnaires. Research suggests that children with learning disabilities will likely improve their gross motor skills and body awareness after intervention, as dance and rhythmic movement has been found to be beneficial for coordination, mindfulness of the body's location in space and overall locomotor development. Thus, incorporating rhythmic movement sessions into therapy settings and physical education programs in schools could provide numerous benefits to children with learning disabilities.

Rhythmic movement for body awareness and confidence in children with learning disabilities

Dance and other related rhythm intervention techniques indicate numerous beneficial physiological and psychological effects. These benefits include the physiological advantages of aerobic exercise, such as improved cardiovascular endurance and weight maintenance, while psychological benefits include increased mood, self-esteem, well-being, and social contact (Malkogeorgos et al., 2011). Movement therapy is based on the notion that there is a correlation between changes in movement patterns through intervention techniques and resulting improvements in emotional, intellectual, and physical health (Alpert, 2010). Additionally, movement therapy incorporates music and rhythm, which engages an area of the brain that is involved in prediction, paying attention, and updating one's memory storage. Alpert (2010) found that children who play an instrument possess superior language, math, and spatial-temporal reasoning skills, which are all competencies deficient in individuals with learning disabilities. In addition, Hardy and LaGasse (2013) suggested that movement therapy can be integrated in therapeutic settings after their finding that rhythmic intervention caused increased plasticity in the brain and thus, a direct interaction between auditory rhythm and motor responses. Plasticity explains the brain's ability to change with learning and experiences, and it decreases with age. Since brain plasticity is greatest in children and is amplified by rhythmic intervention, dance could help strengthen some executive functioning skills early on for children with learning disabilities.

By definition, learning disabilities are a result of structural and neurological differences in a person's brain, which results in difficulties in information reception, storage, processing, and

communication (Cortiella & Horowitz, 2014). These processing problems can impact an individual's ability to learn basic skills such as reading, writing, and math. Furthermore, individuals with learning disabilities have difficulties with organization, time planning, abstract reasoning and attention. As a result of these complications, this population typically suffers with low self-esteem, frustration, and social-withdrawal; thus, it is critical to effectively plan intervention techniques that will benefit these individuals' psychological well-being from a young age. Moreover, the most common learning disabilities include auditory, visual, non-verbal processing, and executive functioning deficits and examples include Dyslexia, Dyscalculia, Auditory Processing Disorder, and Visual Processing Disorder. Though each of these presents itself with unique cognitive deficits, several commonalities exist between them in relation to cognition, motor and body awareness. First, most individuals with a learning disability have an average or above average intelligence quotient (IQ), so it is abnormalities in mental processing and brain structure rather than cognition that makes learning more difficult for this population. Due to structural and neurological differences in the brain, this population also struggles with skills outside of the classroom that are underemphasized, including perception-motor processing, or using visual cues to coordinate their body patterns appropriately, understanding spatial relationships, sequencing events, reading body language, and spatially and temporally planning as well as organizing events.

Students with learning disabilities represent 5% to 15% of the school-aged population, which may actually be an under-representative number due to students not being identified (Grigorenko et al., 2020). Moreover, according to the National Center for Education Statistics (2020), 33% of the 7.1 million students receiving special education services under the IDEA had a learning disability during the 2018-2019 school year. Although learning disabilities are

typically identified in the classroom during early elementary education, many students continue to struggle in school without realizing they have a learning disability until reaching college. In fact, as a result of No Child Left Behind, which utilizes standardized testing as a diagnostic measure for academic success, and Response to Intervention, which is a model to prevent academic failure for children struggling to learn, less students with learning disabilities are being identified at a young age despite a stagnant prevalence (“Response to Intervention”; Klein, 2020).

However, research suggests that rhythm and movement interventions can improve physical functioning, social interactions, and psychological welfare. For example, Malkogeorgos et al. (2011) found that dance helped students explore the reciprocity between thoughts and actions in students who have trouble expressing themselves. This information could be beneficial for individuals with learning disabilities because they often struggle in transmitting their thoughts through their physical and verbal communication. Additionally, for many patients, and especially children, attending physical therapy can be unmeaningful, repetitive and tedious, which makes it difficult to keep them engaged in their prescribed exercise and thus stunts their therapeutic growth and development. Providing a safe and welcoming environment for children to explore their emotions and express themselves freely can facilitate the development of natural communication and ease behavioral and attention problems (Schottelkorb et al., 2020). Dance movement therapy (DMT) is already being used in therapeutic settings and is emerging as a potent psychotherapeutic tool to improve health and well-being (Koch et al, 2019). DMT exploits the interconnection between the body and the mind in order to strengthen a multitude of skills, such as emotional, physical, and cognitive skills, in order to benefit a variety of populations.

Dance movement therapy and other dance and rhythm-based intervention techniques can be particularly beneficial for children with learning disabilities. Typically, these individuals receive cognitive intervention in the classroom, however other deficits, such as with motor skills, spatial-awareness, and social skills, are frequently not addressed (Pieters et al., 2012). For example, children with mathematical learning disabilities present with significant deficits in visual perception, motor coordination and visual-motor integration in comparison with their typically developing peers. It is important to note that it is still unclear whether said deficits are due to perception-related abnormalities or developmental delays, and that the learning disability population is heterogeneous and every individual presents with varying strengths and weaknesses. Researchers such as Grigorenko et al. (2020) have found structural differences in the brains of individuals with learning disabilities that, in combination with perception difficulties, hinder their communication skills and their ability to form relationships with others. Additionally, although there is existing research on movement therapy in various populations, there seems to be a gap in research examining the effect of such techniques in children with learning disabilities.

By providing these children with a rhythmic and movement intervention, they may experience advantageous effects in various skills. For example, they may improve their body awareness and limb perception in space as well as increase their level of confidence. Improved confidence could translate into improved coordinated movement and more meaningful interpersonal interactions in their social sphere. Rhythmic movement intervention techniques can benefit individuals with varying learning disabilities, so therapists, coaches, parents, and teachers alike could utilize this information to effectively formulate engaging intervention techniques to

improve the quality of life of these children as they mature and develop physically and psychologically.

The purpose of the following literature review is to provide research-backed support for the development of a novel program that could be implemented in physical education programs and physical therapy settings. More specifically, a rhythmic movement therapy program integrates the benefits of dance with other fundamental movement-based principles, such as yoga and other common physical education activities, to strengthen psychological and motor skills, as well as one's mind-body connection, for atypically developing individuals. The proposed rhythmic movement intervention program aims to strengthen both physical and psychological skills in children with learning disabilities with the ultimate goal to enhance their overall quality of life.

Literature Review

In order to develop an effective program, it is important to understand and review background information, characteristics of learning disabilities, benefits of a rhythmic movement intervention in other similar-aged populations, and benefits of similar interventions in other age groups of the same population. The following literature review will discuss the history of rhythm and movement in therapeutic settings and its effects on the brain and one's body awareness and confidence. The review will then examine the physical and psychological characteristics of individuals with learning disabilities. Finally, past studies will be presented and discussed that have utilized rhythmic movement for children of varying disabilities and for individuals with learning disabilities in older age groups.

History and Modern Development of Dance and Movement for Therapy

Dance has a rich historical and cultural importance as a means of nonverbal communication (Nemetz, 2006). Traditionally, dance was used to express both individual and communal feelings as well as to connect the mind, body and spirit. The origins of movement as a form of therapy stems from these cultural roots of dance that have served a myriad of purposes for centuries across all societies; from giving meaning to Egyptians' daily tasks of hunting and gathering to serving as a gateway for Indians' spiritual connection with gods, dance has a powerful ability to help individuals connect with themselves and others.

In the late 1800's, researchers began to increase their focus on the potency of nonverbal communication in relation to behavior rather than just focusing on linguistics alone (Nemetz, 2006). Interestingly, subtle, constant messages sent through nonverbal communication are more important emotionally than those through language. Around the same time period, early modern dance choreographers began to explore the deeper psychological impacts of dance and

emphasized that dance could serve a therapeutic purpose rather than just provide entertainment. While modern dance pioneers were paving the way for dance's place in the realm of therapy, movement therapists studied and formulated a system of motion analysis that dance therapists would later use to describe pathological movement patterns. These individuals specifically investigated four aspects of movement, which are known as BESS (body, effort, shape, and space), and are utilized to analyze how an individual's movement sequencing affects different aspects of perception including sensation, feeling, intuition, and thinking. Furthermore, the BESS principle can provide a foundation for designing other movement-based therapeutic programs by offering four fundamental movement principles that exercises should aim to encompass. For example, "body" refers to what body parts are being utilized, "effort" refers to the velocity and acceleration of the movement, "shape" refers to how the mover is shaping their body into different positions relative to their environment, and "space" refers to how the external environment is being used for movement. Together, designing movement programs that are focused around these four fundamental principles can enhance body awareness by challenging the mover to be present and mindful of how their body is moving relative to their surroundings.

As a foundation of knowledge supporting the usage of dance and movement began to gain strength and support, it was ultimately pioneers in the field of dance that made the monumental moves for its place in the therapeutic field. In the mid 1900's, dancers' passion for their art helped pave the way for the true growth of movement therapy (Boughton, 2013). Specifically, Marian Chace was a significant modern dancer and teacher who noticed that some of her students focused more on the emotional expression of their dancing than the movement mechanics themselves. Chace became interested in the therapeutic effects of dance and began working at St. Elizabeth's Hospital where she became the first formally employed dance

therapist and soon attracted interns and notability with her work. Here she worked with patients of various populations, including children struggling socially and individuals with motor and psychiatric illnesses, and noted that the patients felt more relaxed and socially connected with others while dancing in unison.

Another notable contributor to the field of dance therapy is Mary Whitehouse (Boughton, 2013). Like Chace, Whitehouse was a dancer who developed a process called “authentic movement”, a form of contemporary dance in which individuals are instructed to use dance as a medium to express their emotions and feelings about past or current life struggles. Dance therapy became officially organized and recognized with the formation of the American Dance Therapy Association (ADTA) in 1966. Thanks to the efforts of the ADTA, the field of knowledge around dance, movement and rhythmic therapy continues to grow in an effort to formulate novel options for physical and mental growth for a variety of populations, including but not limited to those with anxiety, depression, Autism Spectrum Disorder (ASD), dementia, cardiovascular disease, disordered eating, and posttraumatic stress disorder.

At its essence, movement therapy uses creative dance and movement as a means of therapeutic intervention for a variety of populations, and provides a vehicle through which an individual can draw connections between movement and emotions for personal growth (Payne, 2008). Additionally, movement therapy is founded upon the principle that there is an integral connection between personality and movement, so intervening in one’s movement behavior affects the emotional, intellectual, and physical health (Alpert, 2010). While dance is just one means of therapeutic movement, music and rhythm have a large contribution to the overall effect on the brain and psyche. In modern society, movement is still a primary medium used by physicians, physical therapists and movement therapists alike to observe and assess an

individual's current abilities and to set intervention goals. Thus, rhythmic movement therapy integrates the benefits of dance with other fundamental movement-based principles, such as yoga and other common physical education activities, to strengthen psychological and motor skills, as well as one's mind-body connection, for atypically developing individuals.

Dance/movement therapy today is beneficial across a multitude of populations, including those with physical, mental health, cognitive, and social issues, and thus can be utilized to achieve an array of goals that are population-specific (*Dance / Movement Therapy (DMT)*, 2018). By tapping into the mind-body connection, dance in a therapeutic setting is used to benefit emotion, cognition, physical abilities, and social interactions. Intervention techniques can also vary to meet the specific goals for a population; for example, "mirroring", or echoing a partner's movements, can be used for improving empathy skills by validating their partner's experience through their own personal experience. Dance therapy encourages individuals to express themselves in a safe space which promotes self-awareness and self-esteem, all while providing the physical benefits of improved coordination, strength, and mobility.

Effects of rhythm and movement on the brain, body awareness and confidence

Rhythmic movement therapy inherently takes advantage of the therapeutic benefits of rhythm to strengthen movement patterns and body awareness. Researchers have begun investigating the effects of extrinsic auditory cueing, such as in music or beats, on initiating movement patterns (Bieńkiewicz & Craig, 2016). For example, after therapy in somatosensorially enriched environments (such as those with audible beats playing from a track to stimulate a given behavior), patients with Parkinson's Disease presented an increased ability to use external stimuli to initiate and control movements that are typically controlled by intrinsic brain mechanisms and motor patterns. Additionally, music and rhythm aids in the circular

connection between the brain, body and surrounding environment, which makes it effective not only for the motor behavior, but also for general psychological and social well-being. These findings suggest that rhythm has a profound effect on the mind-body-environment connection, so utilizing rhythm and/or music in therapy or rehabilitation may be effective in improving multiple signs and symptoms of various disorders.

Interestingly, the body may actually be more efficient at producing motion when movement patterns are paired with rhythm (Thaut et al., 2015). Thaut et al. (2015) studied the concept of entrainment, which is a process in which a certain body system's motion or frequency affects the frequency of another system, and how it can apply to human sensory and motor systems. In fact, these researchers conducted a study in which individuals with movement disorders were taught various movement patterns that were to be executed in conjunction with auditory rhythmic patterns. Results indicated improvements in movement timing, spatial and force parameters. This study also supports the theory that associating rhythmic cues with motion can optimize motor planning and execution. More specifically, rhythmic cues add time constraints that specify the dynamics of the movement cycle and thus make movements more precise and efficient.

It is also well known that anticipation is a key element in planning movements and improving movement quality, and rhythm provides anticipatory cues that prepare the brain for motion. Foreknowledge of the duration of a movement period alters motor planning by optimizing movement velocity and acceleration throughout the movement cycle for efficiency; rhythm and rhythmic cues provide this temporal information for the brain to coordinate motor control. In other words, auditory sounds provide information for the brain to pre-plan the body's instructions for moving. For example, rhythmic cueing may be useful in rehabilitating an

individual with Parkinson's Disease by having them step in accordance with the beat of a metronome. This exercise could help them to walk more safely and efficiently by using a full range of motion and by picking up their feet as opposed to shuffling.

Furthermore, using rhythm in therapy has shown to be beneficial in affecting factors other than motor control, including intelligibility, articulation, voice control, well-being, social relationships, and emotional responses (Thaut et al., 2015). Since timing and frequency play a critical role in cognitive abilities, rhythm may be a useful tool in rehabilitating and improving cognitive functioning. For example, music and rhythm has a temporal and a sequential component that aids in the mapping and representation of certain cognitive information, such as memory. The temporal structure of musical and rhythmic patterns may segment incoming information into smaller chunks, as opposed to one large chunk of information, which reduces the total memory load and enhances memory capabilities. Thus, music and rhythm may assist in deep memory encoding by organizing the incoming information units and thereby easing the sequencing and intake of information. This can be especially useful when working with students with learning disabilities because they commonly present difficulties with working memory and processing incoming information.

Movement itself also relies upon intricate, dynamic inter-connections within the central nervous system (CNS), and damage to the CNS results in altered movement patterns with regards to rhythm and timing (Ford, Wagenaar, & Newell, 2007). This implies that there is a system of intrinsic rhythmicity that dictates movement and symmetrical movement. Ford et al. (2007) reports enhanced inter-segmental movement patterns while walking in post-stroke individuals after metronome training and verbal instructions to walk to the external cueing and beat. Therefore, it may be useful to utilize rhythmic beats to enhance coordination skills and

coupling of upper and lower extremity movement patterns in populations with motor skill deficits or even with those who are seeking to improve their coordination and body awareness. Moving to an auditory cue, such as to the beat of a song, provides the mover with an organized and metrical reference to which they should move their body and could help them increase their awareness of when and where their limbs are moving in space.

Dance as a means to integrate rhythm into therapy

DMT has emerged as a useful psychotherapeutic tool that utilizes movement and rhythm to improve health and well-being (Koch et al, 2019). The practice assumes the interconnection between the body and the mind to strengthen social, emotional, physical, cognitive and even spiritual skills that enhance the overall quality of life. In addition to the benefits of the movement intervention itself, the group setting that is often utilized for DMT and other rhythmic therapy sessions provides social benefits; group settings promote feelings of being a part of something larger than oneself, such as a team, as well as cohesion, mirroring skills, moral support, empowerment, and interpersonal learning. Koch et al. (2014) researched the effects of DMT on 15 different populations and found numerous psychological improvements, including improved anxiety and depression, well-being, quality of life, body image, and confidence. While DMT is a useful practice for therapeutic settings, other forms of rhythmic-based programming, such as yoga, general children's dance classes in studios, and physical education classes incorporating dance, have also been demonstrated to be beneficial for one's confidence which suggests that multiple forms of rhythm-based movement offer psychological benefits.

Dance is not only beneficial to one's physical health and well-being, but it has been shown to enhance self-esteem (Maraz et al., 2015). In a survey involving 447 Latin dancers, Maraz et al. (2015) found that the strongest motivational factor for dancing is mood

enhancement followed by self-confidence, which was measured by their own Dance Motivation Inventory (DMI)- a scale designed to identify participants' motivations for dancing. Another component addressed by the DMI includes motivation to dance to achieve a feeling of control over one's body. Positive responses from this question indicates that dance and rhythmic movement can produce a mind-body connection that may enable improved body awareness of one's motions in space.

Similarly, Meric and Ilhan (2016) studied a younger population of Latin dancers and noted the importance of confidence and self-efficacy, especially in children, for one's creativity, independence, and ambition, as well as their willingness to take on new opportunities and risks with limited fear of failure. After just 12 weeks of Latin dance training, Meric and Ilhan (2016) found significant improvements in the internal (i.e. self-love and positive thinking), external (i.e. behavior, communication and emotional control) and total self-confidence in 30 university students. Therefore, rhythmic movement may be an enjoyable therapeutic method to benefit one's confidence, social relations and thus overall quality of life.

In addition to the benefits of dance by itself, DMT incorporates therapeutic mechanisms that are specifically targeted at improving quality of life and other psychological outcomes (Koch et al., 2019). These mechanisms are also called "active factors" in the therapy setting, and they act as the ingredients for therapeutic intervention. For dance therapy, researchers have identified five "active factor" realms that therapists tend to work within: hedonism (play/non-goal oriented movement), aesthetic experience (mind-body connection), enactive transitional space (self-efficacy), non-verbal meaning-making (communication, social interaction, and emotional expression and regulation), and creation (productivity and creativity). Within these realms, therapists or instructors devise strategic activities that are aimed at improving some of

the aforementioned skills, such as mirroring, meditative techniques, imagining, introspection, and non-verbal metaphors (such as pretending to “be” or look like an object, such as a tree). Interventions also commonly take advantage of group settings, and the instructor will take special care at planning activities that foster a supportive environment that allows the participants to connect emotionally with their peers and feel like they are a part of something bigger than themselves. These types of environments encourage individuals to empathize with one another, learn from one another, and provide mutual support and empowerment. While these are the realms that dance therapists work within in devising plans for their students or patients, there is a need for increased research to explore more population groups that would benefit from DMT.

Physical and psychological characteristics in individuals with learning disabilities

Dance and rhythmic movement may be particularly advantageous in improving the lives of individuals with learning disabilities because of the expansiveness of its benefits. According to the American Psychological Association (APA), a learning disability is “a potentially disabling condition that interferes with adaptation at school and in society” (p. 38). Learning disabilities are found among 5% to 15% of the school-aged population, and manifests itself as academic deficiencies as well as social, behavioral and emotional difficulties (Grigorenko et al., 2020). Learning disabilities also encompass the largest category of students receiving special education services in the United States (Cortiella & Horowitz, 2014). To understand the prevalence of learning disabilities in the United States, in 2012 the National Center for Learning Disabilities reported that 12% of 1,980 surveyed adults had a learning disability, and 8% had a child with a learning disability. Furthermore, 84% of the respondents saw learning disabilities as a growing concern in the United States, and 63% reported personally knowing someone affected

by a learning disability. Moreover, according to the National Center for Education Statistics (2020), 33% of the 7.1 million students receiving special education services under the IDEA had a learning disability during the 2018-2019 school year. It is important to note that strides have been made for students with learning disabilities inside the classroom. The passage of the Individuals with Disabilities Education Act (IDEA) in 1975 provides students with learning disabilities with free and appropriate education; in fact, students with learning disabilities have historically accounted for approximately 50% of the total students ages 3-31 served by the IDEA, although this number is decreasing (Grigorenko et al., 2020). Intervention is crucial for this population, as cognitive and academic processing deficits persist throughout one's life and may even deteriorate without proper attention. However, there is limited research on therapeutic methods and intervention plans to address deficits outside of cognition in this population, such as body awareness and confidence.

Although learning disabilities are quite heterogeneous in that they vary between individuals and that there exists a variety of unique learning disabilities, they seem to share commonalities that allow for generalizations for research purposes. For example, researchers such as Grigorenko et al. (2020) have found structural differences in the brains of individuals with learning disabilities that affect their neural connections and thus the emergence and development of various cognitive capabilities. However, the most common specific learning disabilities impact reading, writing and mathematical skills (Cortiella & Horowitz, 2014). Namely, dyslexia is the most prevalent learning disability and primarily affects phonological processing and reading, dysgraphia is associated with learning disabilities affecting writing skills, while dyscalculia presents difficulties with mathematics and problem-solving (Cortiella & Horowitz, 2014). In other words, individuals with dyslexia, dysgraphia and dyscalculia have

average or above average intelligence, but the disability affects their ability to process words and numbers, such as when reading, writing or doing a math problem.

Despite differences between and within specific learning disabilities, most individuals with a given learning disability present problems with working memory, executive functioning and metacognition (Watson et al., 2016). Researchers are aiming to better understand the causes of learning disabilities by working within the realms of cognitive psychology and neuroscience. Watson et al. (2016) notes differences in executive functioning in this population, which is an umbrella term that includes multiple cognitive processes such as attention and working memory. Executive functioning can also include one's ability to negotiate educational and social situations, such as problem solving, making goal-directed decisions, being behaviourally flexible and inhibiting inappropriate behavior. The frontal lobe may be of particular interest with regards to the role of mental processing and functioning in the etiology of learning disabilities. The frontal lobe controls multiple cognitive processes categorized under "executive functioning", including metacognition (one's knowledge about their own thinking), working memory (the ability to receive and utilize information for a temporary period of time or specific task), attention, and impulse control. Watson et al. (2016) determined that these basic executive functioning skills are strong predictors of cognitive, academic, and social functioning in individuals with and without learning disabilities. However, students with learning disabilities routinely present with significant deficits in executive functioning skills. Mattison and Mayes (2012, as cited in Watson et al., 2016) compared 437 children with learning disabilities with 158 students without learning disabilities and found that the former performed significantly worse on a test of executive functioning skills than their typically developing counterparts. More specifically, they often struggle with impulse control and self-regulating their behavior because

they lack flexibility in thinking and thus solving problems, which can manifest itself in social interactions through inappropriate or aggressive behavior. Since rhythmic movement provides a means to strengthen the mind-body connection and one's mindfulness, rhythmic movement could assist with impulse control because the student would hypothetically be more aware of their thoughts and the effects of their behavior prior to acting upon those impulses. They also have difficulties updating their working memory with incoming, novel information, which can present particular problems in a classroom setting where information is being constantly transmitted; students with learning disabilities have a difficult time processing incoming information whether that is from the teacher, computer, or textbook. Problems with metacognitive skills manifest themselves in difficulties with planning their own learning and detecting and correcting personal errors.

In addition to subject-specific learning disabilities, associated deficits and disorders are not designated as specific subtypes of learning disabilities, but they are commonly associated and identified with learning disabilities (Cortiella & Horowitz, 2014). Such deficits can be identified by weaknesses in receiving, processing, associating, retrieving, and expressing various types of information. Difficulty processing incoming information and communicating effectively can be frustrating for the individual and resultantly affects self-esteem. Some of these associated deficits and disorders include Auditory Processing Disorder, Visual Processing Disorder, Executive Functioning Deficits, and Non-Verbal Learning Disabilities. Individuals with non-verbal learning disabilities often present with learning profiles similar to those with dyslexia, dyscalculia and dysgraphia, but they also struggle with visual-spatial tasks, motor coordination, reading body language, and seeing social cues in both social and academic contexts. In addition to these associated deficits, there are two common categories of other learning disabilities: Non-

Verbal Learning Disabilities and Oral/Written Language Disorder and Specific Reading Comprehension Deficit (*New to LD*). The former affects the individual's ability to interpret facial expressions and body language, and sometimes their coordination skills. The latter affects one's ability to express themselves verbally and also impairs their understanding and comprehension of written and spoken language. Thus, it is evident that learning disabilities are quite heterogeneous, so creative therapeutic methods that focus on more than just cognition are necessary to improve the overall quality of life for individuals with learning disabilities.

Although research and teaching methods regarding learning disabilities focus on cognition and assisting with scholastic abilities, learning disabilities manifest themselves in a multitude of areas of one's life, including social-emotional skills and oftentimes in unconscious, automatic gross body movements (Cortiella & Horowitz, 2014). Therefore, strengthening these other skills may in turn improve these students' academic achievement. As a result of difficulties with executive functioning, specifically regulating their behavior and responding appropriately to different situations, this population sometimes presents with inept social skills and may sometimes use aggression to react. It is common for individuals with learning disabilities to struggle with their self-esteem, making friends, and setting low expectations for themselves. However, improving confidence in these individuals could translate into improved social skills, and potentially, into their academic achievements.

In fact, there is an important relationship between social behavior and academic achievement such that deficits in social skills negatively impact students' participation and interest in school (Yazdi-Ugav et al., 2020). Yazdi-Ugav et al. (2020) researched elementary students with and without learning disabilities and found that those with high social skills portrayed fewer behavioral problems. For example, students with high social skills demonstrate

their ability to appropriately manage and express their emotions by appropriately matching their reactions to the mood of the situation, such as by not reacting with aggression to a small inconvenience. Students with high social skills also represented a significantly larger number of students without a learning disability than those with learning disabilities. It is also crucial to begin improving confidence and self-awareness from a young age to motivate these students to become independent and be able to overcome obstacles that encourage self-doubt.

Although learning disabilities are not notorious for causing obvious neuromuscular or movement deficits, children with learning disabilities do not perform gross motor skills at the same caliber as their typically developing peers (Woodard, 2001). Again, every individual with a learning disability presents a unique degree of deficit, meaning that some children may show minor signs of motor difficulties while other children display obvious challenges with balance or spatial awareness. Challenges with motor skills usually become apparent during school age years when the child is playing on the playground and asked to perform typical gross motor skills in their physical education class alongside their peers, such as skipping, galloping and running. Individuals that do present challenges in their elementary years usually continue to show motor difficulties throughout adolescence and adulthood, so it is important to identify and strengthen gross motor skills while the individual is still growing and developing. Moreover, Westendorp et al. (2011) found a strong correlation between cognitive skills and motor skills in a study of 104 children with learning disabilities. More specifically, children with lower reading skill scores also presented with lower gross locomotor skill scores. From these results and the fact that cognitive and motor skills develop during the same time span, the researchers deduce that these two skills may have a reciprocal relationship; in other words, higher cognitive skills may be able to predict more developed motor skills and vice versa.

According to Westendorp et al. (2011), it is generally accepted by researchers that there is a strong correlation between cognitive functioning- specifically academics- and motor skills. As Woodard (2001) and Westendorp et al. (2011) noted, children with learning disabilities also have less developed and precise gross motor skills than their peers. Additionally, Flaughnacco et al. (2014) notes how children with developmental dyslexia, one type of learning disability that affects one's ability to read despite typical cognitive functioning, also present with poor rhythmic perception. Rhythmic perception refers to one's ability to perceive and understand external rhythms, which can be through words or music. Flaughnacco et al. (2014) predicts that phonological and linguistic development may heavily rely on an acute perception of rhythmic structures. Thus, improving these populations' temporal skills through the beneficial effects of rhythm and movement may enhance both their gross motor skills as well as their cognitive and scholastic capabilities.

There are multiple reasons that children with learning disabilities may present with less developed motor skills than their peers (Pieters 2012; Westendorp et al., 2011, Woodard, 2001). For example, Woodard (2001) suggests that deficits in attention, problem solving, memory, and information processing may contribute to less developed gross motor skills. On the other hand, Westendorp et al. (2011) suggests that deficits in complex cognitive processes, specifically problem solving and working memory, may contribute to problems with movements that require a higher degree of cognitive, conscious control, such as object manipulation. The opposite of consciously-controlled skills is automated skills, which become automatic with practice, and which Westendorp et al. (2011) suggests are also affected in individuals with learning disabilities. For example, they note a relationship between deficits in the automated cognitive process of reading and the automated motor skill of walking, which may be related through

shared neural pathways controlling automaticity. Using the Test of Gross Motor Development-2, which measures childrens' fundamental gross motor skills according to their stage in development, a study of 104 children with various learning disabilities showed a strong correlation between locomotor and object-control skills and different sectors of academic performance, including reading, spelling and mathematics. Most specifically, the larger the deficit in reading skill, the poorer their motor performance score. Researchers also agree that differences in the ability to perceive and move through their environment may contribute to movement difficulties (Pieters 2012; Woodard, 2001). Pieters (2012) supports this hypothesis by explaining that students with learning disabilities may have a mild developmental delay in visual perception and visual-motor integration skills. For example, a student who struggles with visual perception in the classroom may have a hard time recognizing words when they are written in different fonts since they struggle with making sense of information. Likewise, a student with low visual-motor integration skills may struggle with reproducing a motion that they have watched someone else perform, such as when playing "Simon Says". Perception and movement are inherently connected, as one must perceive their environment in order to move and interact with it, and reversely, they must move and interact with their environment in order to perceive what is around them. Altered perception may contribute to a less-developed sense of body awareness which affects their movements in relation to their environment and in relation to others around them.

Learning disabilities are real and permanent disorders affecting the brain and many sectors of one's life, yet adequate guidance and support from a young age can minimize the effects and manifestations of learning disabilities to improve these individuals' quality of life (Cortiella & Horowitz, 2014). The aforementioned staggering statistics of the prevalence of

learning disabilities indicate a need for research and action that will improve the quality of life for this large population of affected individuals. Additionally, because less students are being identified at an early age with learning disabilities despite their prevalence, implementation of intervention programs that aim to strengthen body awareness, confidence and other cognitive skills can be beneficial for students who have not yet been identified with a learning disability. While it is important to focus on strengthening cognitive impairments to improve overall achievement and confidence to achieve academically, methods to lessen the other effects of learning disabilities, especially in children, are crucial and under-researched. Most current intervention strategies are in the classroom, and there is a lack of research investigating methods to strengthen the mind-body connection and social-emotional skills in the population, which may in turn improve their academic experience.

Rhythmic movement for individuals with learning disabilities

Since learning disabilities manifest themselves physically, cognitively, mentally, and socially, it is important to explore programs in addition to cognition-based interventions that could benefit the individual in multiple realms. Moreover, since rhythmic movement serves to elicit physical and emotional responses through the powerful combination of rhythm and motion, it may enhance the social and cognitive skills in individuals with learning disabilities. It seems that there is also a critical connection between the processing of rhythm and linguistics, particularly in individuals with learning disabilities, which supports the notion that rhythm in combination with movement should be further researched as a useful method for easing the challenges associated with learning disabilities. However, there are few studies that actually investigate the benefit between rhythmic movement and individuals with learning disabilities, so

further research is necessary to explore the hypotheses suggesting the benefits of programs that focus on enhancing motor and social skills outside of the classroom.

Dyslexia is one specific learning disability that may benefit from rhythmic movement. Dyslexia is a learning disability that affects an individual's reading ability despite typical intelligence (Flaugnacco et al., 2014). In a study of individuals with Dyslexia, researchers found poor rhythmic perception in these individuals as indicated by a strong link between their temporal skills and phonological reading abilities. Interestingly, rhythm is ultimately responsible for organizing events in time and is also a critical component in phonology, language and reading. In addition, Westendorp et al.'s (2011) study concludes that students with learning disabilities in particular may present with less developed gross motor skills on the Test of Gross Motor Development-2 than their typically developed counterparts. If there is in fact a correlation between rhythmic abilities and reading skills, this could indicate that interventions focused around strengthening rhythmic skills could also lessen the effects of dyslexia and other learning disabilities. This research augments the notion that the body and the mind are inherently connected, so it is reasonable to hypothesize that movement could enhance the mind-body connection. Furthermore, if there is in fact a relationship between motor skills and academic achievement, particularly in students with learning disabilities, improving locomotor skills could in turn assist in improving scholastic abilities.

When implementing rhythmic movement programs for children with learning disabilities, it is important to integrate techniques that target growth in gross motor skills, social skills, kinesthetic and environmental awareness, and perception (Schmitz, 1989). For example, the instructor should provide positive reinforcement when appropriate and provide clear instructions and verbal cues that reduce students' possible stress associated with the new environment.

Students with learning disabilities can find novel situations stressful, so familiarizing them with the program, their peers, and their environment can be beneficial in increasing their confidence to succeed. Additionally, children with learning disabilities can have a difficult time processing large quantities of incoming information at once, so segmenting the program into smaller, concise sections can accommodate shorter attention spans and facilitate learning and memory. Successful programs also utilize props and tangible materials, such as pool noodles, aerobic steps, balls, and other modalities that provide a tactile experience and object to focus on. The instructor should also utilize a variety of teaching methods to appeal to different learning styles, the most common of which include auditory, visual, and kinesthetic learning. So, the class can incorporate periods of verbally-cued instructions, mirroring techniques to strengthen visual learning, and metaphorical movement for kinesthetic learning (such as by asking the students to “act out” a certain shape with their bodies). Moreover, emphasizing different body parts through a variety of activities can help students explore spatial and bodily awareness, which ultimately encourages motor and cognitive development. This technique can easily be incorporated in a yoga-based practice or while stretching by asking the students to stretch certain parts of their body. Finally, ending the session with discussion or reflection is essential for growth and improvement in the program. Even simply having the students discuss what they learned or their favorite part of the class encourages personal and interpersonal empowerment, as well as enhanced communication and memorization skills. At the end of the day, the instructor plays a crucial role in emphasizing the students’ abilities rather than their disability by offering them multiple opportunities to succeed and feel confident in themselves.

Rhythmic movement for children (varying disabilities)

Dance is a specific form of artistic movement that incorporates rhythm and provides numerous physical, emotional and psychological benefits, especially for children with and without disabilities. Dance and other forms of creative movement stimulate childrens' psychophysical development; it is a particularly effective method for enhancing the development self-esteem, personality, self-expression, verbal and bodily communication skills, and adaptability in all children and particularly in those with emotional disorders and learning disabilities (Kourkouta et al., 2014). Moreover, rhythmic movement helps children express and manage their emotions that may be intervening with scholastic achievement, as well as improve their spatial awareness and adaptability to space. To expand, rhythmic movement provides a unique kinesthetic experience that enhances one's mind-body connection by helping children be more aware of their physical body and self which improves their overall motor skills. One way to stimulate mind-body connection and improve body awareness is through improvisation, which is essentially unrestricted movement; untaught, self-originating movement challenges one's awareness of where their body parts are moving through space and their bodily speed and energy control (Biasutti, 2013). Other benefits of improvisation include enhanced creativity, self-expression, social skills, and confidence (Kourkouta et al., 2014).

One method to implement the benefits of dance and rhythmic movement may be through dance classes, physical education classes that incorporate a dance unit, or adapted dance programs that focus on an array of gross motor skills. In a study of 521 typically-developing adolescents between the ages of 3-18, May et al. (2019) measured the effects of adapted dance programs that lasted between 7-78 hours. Results focused primarily on physical outcomes, with significant improvements in balance and jumping skills in particular, but also found other

physical, cognitive and some psychosocial benefits. These findings indicate that dance may be a beneficial therapeutic tool for children of varying disabilities, but the researcher also notes the need for further research on the psychosocial benefits of dance for children with disabilities.

Furthermore, Reinders et al. (2011) performed a case study with an adolescent, Luke, to observe the psychological effects of participating in a dance class for children with Down Syndrome. Down Syndrome is a genetic disorder that causes lifelong intellectual and developmental delays which often limit their social opportunities and self-esteem. At the beginning of each program session, the instructor led a ballet-based warm-up that emphasized stretching and moving individual parts of the body (such as pointing the feet and bending the knees). The instructor then changed up the music choice as the class transitioned into practicing different dance styles and skills. For example, she utilized current pop music while working on skipping and galloping across the floor, and slower, more contemporary music while allowing the students to practice improvisation. This particular instructor was an occupational therapist, so she incorporated verbal cueing techniques that she used in her practice with patients to encourage motor learning in the dance class. One way that she did this was through verbally stating and describing an upcoming activity, physically demonstrating the activity, and then using cue words such as “quick” or “sharp” to enhance students’ quality of movement. At the end of each session, the students individually danced across the room and thanked the teacher before receiving a sticker. At the end of the study, both Luke’s mother and instructor noted improvements in his self-esteem, confidence, body awareness, and memory. Luke was also more inclined to participate and danced with more confidence when he was familiar with the music being played. This information might be important when designing a program such that the music should be

chosen with special attention to the age group or even chosen by the participants themselves in order to maximize the benefits of the program.

With regards to body awareness, Reinders et al. (2011) noted that Luke was also better able to watch the instructor's movements and reproduce them into his own movement, which is a skill known as mirroring. Mirroring, or more specifically "neural mirroring", is a concept that helps explain an overlap in brain activity between action perception and action production (Endedijk et al., 2017). In other words, the neurons in the motor system are activated both when one observes an action and when they perform that action. Because of this involvement of the mirror system in perceiving, predicting, and preparing movements, neural mirroring is also hypothesized to be important in processing other's actions for interpersonal communication. In order to analyze the correlation between neural mirroring and social interactions, Endedijk et al. (2017) used electroencephalography (EEG) to examine children's electrical brain activity while they were observing an adult perform various simple actions, such as stacking cups. In the end, children with more motor neuron activity during action observation performed better on a cooperation test with their peers. Implementing mirroring skills, such as through copying a partners' motions, may improve one's ability to prepare and perform movements in coordination with others, which could overall help strengthen social interactions.

Although learning disabilities manifest themselves in multiple realms of a child's life, learning disabilities are fundamentally cognitive developmental disorders, so programs that enhance psychological functioning will be especially beneficial. Dancing and moving to music poses many psychological benefits (Reinders et al., 2015). Their findings indicate that music and rhythm stimulate the medial prefrontal cortex, which is partially responsible for prediction, paying attention and creating memories. So, rhythmic movement may benefit some cognitive

skills, such as the ability to make and store memories. In combination with the physical and socioemotional benefits, dancing/moving to music may be particularly beneficial for children of varying abilities in the aforementioned areas, as well as for their cognitive capabilities.

Moreover, from interviews, journals and video transcriptions, Giguere (2011) studied children's cognitive activities and processes involved in choreographing and performing dances. Using interviews, participants' journals, and videos, the researcher created categories to better understand and explain the creative and cognitive processes used in choreographing and demonstrating their dances. Two of these categories included *Making Movement* and *Organizing Movement*. *Making Movement* focuses on how participants create and choreograph their dances, such as through improvisation, imitating/mirroring others, and using props. This subsection presents ways in which the participants translated their thoughts and emotions into movement, which indicates the role of cognition during this creative process. *Organizing Movement* describes ways that the children manipulated and developed their movement to be effective and efficient in their given environment. For example, a couple of ways that the dancers organized their movement was through responding to external and internal stimuli, which required them to be aware of their environment, and through revising their choreography either via others' or their own suggestions. Ultimately, Giguere (2011) concluded that dance aids in the development of physical, emotional, cognitive, and creative processes that are further developed with practice, specifically through choreography, physical symbol-making, improvisation and collaborating with others.

Several other researchers have focused on the benefits of dance and rhythmic movement for children with Autism Spectrum Disorder (ASD) (Scharoun et al., 2014; Arzoglou et al., 2013). ASD is one of the most common developmental disabilities found in children, which can

refer to any deficit acquired during adolescence (the developmental period) that can affect multiple realms of development, such as learning, behavior, movement, or speech. ASD refers to a spectrum disorder that impacts people to varying degrees and most commonly impacts the individual's social and communication skills, including both verbal and non-verbal communication. Arzoglou et al. (2013) studied the effects of a traditional dance program on the neuromuscular coordination of students between the ages of 15 and 17 with ASD and found significant improvements across multiple measures of coordination. More specifically, after an eight-week training program, the students improved from their pre-test scores in balance, walking backwards, jumping over an obstacle on one foot, lateral jumps, and lateral repositioning. Improving this population's coordination skills through rhythmic movement could potentially translate into improved body language, thus assisting their social skills and total quality of life.

Summary

Dance has served as an influential means of nonverbal communication and connecting the body, spirit, and mind for thousands of years across world cultures. In the mid 1900's, modern dance pioneers such as Marian Chace and Mary Whitehouse initiated the usage of dance and movement in therapeutic settings, and its benefits are still being researched today as a means of therapy for a variety of populations. Interestingly, rhythm has a temporal component to it that, when used in therapeutic settings, may strengthen cognitive skills such as working memory (Thaut et al., 2015). Pairing rhythm with movement also assists an individual with coordination and body awareness. Additionally, dance has been shown to improve self-esteem in children and adolescence, which can enhance their social interactions and confidence in succeeding at challenging activities (Maraz et al., 2015). This is significant because children with learning

disabilities frequently have challenges with developmental gross motor milestones and skills (Woodard, 2001). They also have difficulties with multiple executive functioning skills, such as attention, memory, and problem solving in both academic and social settings (Watson et al., 2016). As a result of some of these challenges in various areas of their life, it is common for individuals with learning disabilities to struggle with their self confidence and self-esteem, as they tend to set low expectations for themselves (Cortiella & Horowitz, 2014). Adapted dance programs have already been researched to provide social-emotional and motor skill benefits for typically developing children, as well as individuals with Down Syndrome, Autism Spectrum Disorder, and Parkinson's Disease, but there is a need for more research on the benefits of rhythmic movement for children with learning disabilities (Reinders et al., 2011; Arzoglou et al., 2013; Thaut et al., 2015). Ultimately, learning disabilities manifest themselves physically, cognitively, mentally, and socially in a child, and early intervention outside of the classroom, such as with rhythmic movement, may enhance their overall quality of life.

Method

The participants include level 2-3 students from the Starpoint school, which is a school completely dedicated to helping children with Learning Disabilities succeed. Unlike other elementary schools which use age as the determiner for grade level, the Starpoint school's "levels" correspond with students' academic abilities (. Participants must be literate in English and physically able to participate in their physical education class. Upon agreement to participate in the study, participants completed a demographic questionnaire (Appendix A) including information on their physical activity history and music preference. Prior to the first rhythmic session, participants completed the body awareness questionnaire (Appendix B) with the assistance of their parent/guardian as needed. At the beginning of each week, all participants completed a questionnaire asking their level of confidence pertaining to dance and how well they think they will perform during the session (Appendix C); at the end of the week, each participant will complete the same questionnaire. Additionally, the physical educator will complete a modified body awareness questionnaire on each participant at the beginning and end of the week. The session itself will be taught by the researcher with the supervision of the Starpoint School Physical Education teacher, Mary Knudsen. Each of the sessions will include the following format:

1. Complete pre-confidence questionnaire (first session of each week only) (5 mins)
2. Engaging warm up to music/stretch (8 mins)
3. Group rhythm to music, working on mirroring skills- students follow my movements, then follow and copy a partner's movements (15 mins)
4. Weekly activity focus (25 mins)
5. Cool down, closure (7 mins)

6. Complete post-confidence questionnaire (last session of each week only) (5 mins)

Sessions were held three days per week (Tuesday, Wednesday, and Thursday mornings) over four weeks for a total of 12 sessions. Each session will be one hour, and will take place during the time of the students' typical Physical Education class. Each week will also feature a different theme inspired by current children's movies to keep the students interested and to offer various opportunities to interact with varying task constraints and materials. The schedule was as follows:

Week 1: Movie inspiration for songs: *Trolls*; Activity Focus: Fundamental dance and locomotor movements

Day 1: Step touch, grapevine, high knees, skipping

Day 2: Jazz squares, galloping, pivot turns, leaps

Day 3: Hopping, jumping, sliding, freeze dance (game)

Week 2: Movie inspiration for songs: *Angry Birds 2*, Activity focus: B.E.S.T. Principle (body, energy, space, time)

Day 1: Body (poses, body awareness): animal interpretation (waddle like a duck, fly like a bird, balance like a flamingo, stomp like an elephant, hop like a frog, etc.)

Day 2: Energy (quality of the movement) & Space (levels, pathways, directions): using floor dots in a given pattern, navigate different ways to weave around the dots using different speeds, locomotor patterns, and directions; interpretive movement to represent various body levels (pretend like they're climbing stairs, climbing a ladder, crawling under a table)

Day 3: Time (rhythm, beats, tempo): step aerobics

Week 3: Movie inspiration for songs: *Toy Story 4*, Material focus: yoga fundamentals for body awareness (mimic shapes, objects, animals)

Day 1: Downward dog (triangle), child's pose (circle), plank (rectangle), resting pose (star), table top (square)

Day 2: Tree pose, chair pose, candle pose, ball pose, reverse bridge (rainbow)

Day 3: Cat/cow pose, butterfly pose, cobra pose, elephant pose, swan dive, crab pose

Week 4: Movie inspiration for songs: *Frozen 2*; Activity focus: popular line dances

Day 1: Cupid Shuffle

Day 2: The Cha Cha Slide

Day 3: Make up own dances and perform for group

Much of the agenda reflected goals that model the five previously described mechanisms of creative arts therapies as well as DMT practices, which include hedonism (non-goal oriented play), aesthetic experience (mind-body unity and synchronization with another person), non-verbal communication (through emotion, body language and social interaction), transitional space (bodily awareness in space and self-efficacy), and creation (improvisation and creativity in movement) (Koch et al., 2019).

Results

Descriptive statistics should be used to analyze the demographic information (Appendix D), and dependent sample t-tests should be used to analyze body awareness (Appendix B and C) and confidence (Appendix A) results. For scoring purposes, Appendix A is scored on a scale of 0-25, with 0 being absolutely no confidence and 25 being complete confidence in their dancing abilities. For Appendix B, negative values should be attributed to answers other than “completely disagree”; for example, an answer of “somewhat disagree” is a -1, while “somewhat agree” is a -2. For Appendix B, a lower score (more negative) indicates a lower level of body awareness from the teacher’s perspective. Appendix C follows the same grading rubric as Appendix B; a lower (more negative) score indicates lower body awareness from the student’s perspective. The composite score for each student is the sum of the three scores from Appendices A, B and C. A higher score indicates greater confidence and body awareness, but appendices should be examined individually as well to analyze confidence and body awareness separately. Recent literature suggests that rhythmic movement would in fact have a therapeutic and beneficial effect on children with learning disabilities, and specifically result in improvements in their body awareness and confidence.

Over the course of the four-week intervention, the students will likely improve their gross motor skills and body awareness, as dance and rhythmic movement has been researched to be beneficial for coordination, mindfulness of the body’s location in space and overall locomotor development (Arzoglou et al., 2013). Additionally, it is likely that the children’s scores on the confidence questionnaire would increase progressively as they became more comfortable with the structure of the program as well as in themselves to succeed at the lesson for the day. As the students improve their gross motor skills and overall body awareness, their confidence in

dancing and other rhythmic-based movement will subsequently increase. Moreover, improvements in motor skills are shown to enhance one's social interactions through more developed personality and emotional expression, which in turn will improve overall quality of life (Arzoglou et al., 2013).

I would also expect results to be similar to those of Reinders, Bryden and Fletcher (2015), who examined the benefits of dance through a case study for an adolescent with Down Syndrome. At the end of the research period, which incorporated a 45-minute dance class once a week for 10 weeks, the participant benefitted psychologically as indicated by his mother's and dance instructor's observations of his self-esteem, cognitive capabilities to remember and perform a dance, confidence, and body awareness (Reinders, Bryden & Fletcher, 2015). Over the weeks, he was encouraged by his peers and became more confident in his ability to successfully remember and execute different movements, and was more aware of where his body was in space and was able to adapt his body movements when spaces were limited (Reinders, Bryden & Fletcher, 2015). Likewise, students with learning disabilities' confidence may also benefit from group rhythmic movement sessions through the social encouragement from peers and the instructor, as well as seeing themselves able to successfully learn and reproduce a taught movement or routine. Their body awareness may also improve when converting thoughts into movement expression, such as practicing imitating different shapes, as well as moving with awareness of objects and people in their surroundings. Researchers such as Giguere (2011) suggest that rhythmic movement and physical symbol-making/imitation aid in the development of cognition and body awareness when one is translating their mental processes into movement or physical expression.

Strengthening cognitive, physical and social skills together will not only be more efficient, but may produce more significant improvements due to the mind-body connection and the impact of each on the others. In fact, Westendorp et al. (2011) notes the importance of utilizing interventions that strengthen both cognitive skills and motor skills due to the inherent connection between the two. Thus, interventions that aim to strengthen multiple abilities, including cognition, social skills, physical skills/body awareness, and confidence, may be more beneficial at improving the overall quality of life for children with learning disabilities. Practitioners and teachers typically focus on cognitive skills for this population, but it may actually be more effective to aim to improve their body awareness, social skills and confidence through interventions like rhythmic movement sessions, since improving these areas of their life may in turn directly or indirectly positively impact their scholastic performance in the classroom.

Discussion

The present study examines the effects of a stimulated four-week rhythmic movement intervention on body awareness and perceived confidence in children with learning disabilities. It is hypothesized that physical education sessions that incorporate rhythm will improve body awareness and confidence. If rhythmic movements are able to improve the deficits in said skills, there could be improvements in overall quality of life for these individuals in terms of their family and social relationships, expressing themselves, and their confidence and mood. Furthermore, this research could also be used to guide alternative therapy methods that are inviting and cost-effective; one challenge in the realm of physical therapy, and especially in pediatric physical therapy, is appealing to the interest and motivation of the patient to complete therapy. Typical pediatric physical therapy sessions are often repetitive, making it difficult for many children with disabilities to remain engaged and thus benefit from their therapy sessions. Instead, providing group rhythmic movement sessions emphasize different skills may be more beneficial to improve multiple realms of one's disability. After all, even though learning disabilities present themselves primarily through cognitive capabilities, existing literature indicates that this population is also affected outside the classroom, such as through their gross motor skills, social interaction and confidence. Research also suggests that there is a strong mind-body connection and that one's mental capacity is not completely separate or uninfluenced by their physical, social or emotional skills. Therefore, devising an intervention such as rhythmic movement sessions that aim to challenge and strengthen multiple areas, such as physical, social-emotional and mental skills, may be more efficient and effective for children with learning disabilities rather than solely focusing on their cognitive skills in the academic setting. In addition to therapy settings, incorporating rhythmic movement sessions into physical education

programs in schools could provide benefits to both typically developing children and those with varying disabilities, as it may augment physical, social and emotional development for all children.

Rhythmic movement intertwines the benefits of physical activity with rhythm to produce a profound mind-body connection that can enhance body awareness and self confidence. Students with learning disabilities in particular is one population that is not heavily researched and may benefit from rhythmic training interventions, and this research may increase awareness for the need for research among this population as well as the benefits of rhythmic movement. While there is generally a focus on these students' academic achievements, this population also presents with less developed locomotor skills in comparison to their typically developing peers. These individuals also seem to struggle socially, which could be a direct or indirect result of their scholastic capabilities and/or their body awareness with regards to gross motor skills. This indicates that there may be a connection between cognitive and motor skills, and strengthening the mind and body together as a unit may be more beneficial than focusing solely on just cognitive or physical skills for this population.

Although there is existing research on individuals with learning disabilities as well as the benefits of DMT and rhythmic movement on various populations, there are few studies regarding the benefits of rhythmic movement for students with learning disabilities. In the future, performing this study for more than four weeks would provide more precise results. Additionally, should the students present with enhanced body awareness and confidence after engaging in rhythmic movement for several weeks, future research could focus on improvements in various academic subjects, such as reading and mathematics, to further analyze the connections between rhythmic movement and cognitive capabilities.

Unfortunately with the restrictions surrounding COVID-19, this research could not take place. I had intended on leading a class with students at The Starpoint School three mornings per week over four weeks for a total of 12 sessions during the time of the students' typical Physical Education class. Each week incorporated different movement goals, such as yoga fundamentals that mimic animals to work towards body awareness, to offer various opportunities to interact with varying task constraints and materials. I am aware that pediatric physical therapists must be creative in regards to their treatment plans to keep children present and engaged in therapy, which inspired me to craft a diverse schedule of activities that would keep the students interested and excited for each novel session.

The field of physical therapy is an ever-growing profession that requires continuous research to keep improving and modernizing techniques and practices. As a future physical therapist who is potentially specializing in pediatrics, I am committed to expanding the existing body of research to benefit the physical therapy community and to maximize its potential and effect for numerous populations. In my profession, I hope to not only assist patients' objective locomotor capacities, but to improve their life experiences and overall quality of life; the latter is immensely affected by one's relationships, confidence and self-esteem, so focusing on methods to improve these psychosocial realms may contribute to their progression inside and outside of therapy. In order to provide effective, meaningful and worthwhile care for children with learning disabilities as well as children with other developmental disabilities, methods should be comprehensive in nature and aim to improve more than their physical or cognitive abilities, but rather to equip them with skills that benefit their overall life experiences.

Appendix A
Confidence Questionnaire

Directions: Circle the answer that best describes how you feel right now.

1. I feel confident and sure about dancing.

Very True

Pretty True

Not sure

Not Very True

Not true at all!



2. I feel like I have the physical ability to dance well.

Very True

Pretty True

Not sure

Not Very True

Not true at all!



3. I feel motivated and determined to perform well while dancing.

Very True

Pretty True

Not sure

Not Very True

Not true at all!



4. I feel positive!

Very True

Pretty True

Not sure

Not Very True

Not true at all!



5. I feel full of energy!

Very True

Pretty True

Not sure

Not Very True

Not true at all!



Appendix B

Body Awareness Questionnaire (Teacher)

Directions: Circle the answer that best describes how the student usually appears.

1. The student is often tense

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

2. The student's body language is affected by their mood

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

3. The student DOES NOT pay attention to the way that they move

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

4. The student struggles to relax

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

5. The student does not show how they are feeling

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

6. The student moves around spontaneously

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

7. The student pays little attention to their body movements

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

Appendix C

Body Awareness Questionnaire (Student)

Directions: Circle the answer that best describes how you usually feel.

1. I am often tense

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

2. My body language and movements are affected by my mood

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

3. I am not aware of the way I breathe

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

4. I don't pay attention to the way that I move

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

5. I struggle to relax

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

6. I try not to show how I am feeling

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

7. My emotions affect how hungry I feel

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

8. I have a hard time feeling comfortable when I lay down

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

9. I move around without thinking about it

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

10. I avoid paying attention to my body

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

11. I don't like to be touched

Completely Disagree Somewhat Disagree Somewhat Agree Completely Agree

Appendix D

Demographic Questionnaire

Please fill out this demographic questionnaire for the study “Rhythmic movement for body awareness and confidence in children with learning disabilities”. All of your answers will be kept anonymous and confidential, and will be used solely in analyzing results of the study.

1. Age: _____
2. Gender: _____
3. Level in school: _____
4. Do you have any dance experience?

Circle: **Yes / No**

If yes, please describe your experience in the space below:

5. Please list any participation in activities/sports outside of school, and how long you have been participating (i.e. soccer, piano lessons, karate, etc.):

6. Please list any other disabilities/conditions you may have (i.e. ADHD, Autism Spectrum Disorder, etc.):

7. What are your favorite movies and songs right now?

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