

# Cognitive Drumming: Using Rhythm as a Therapeutic Technique with Individuals Diagnosed with Learning Disabilities

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## Abstract

Current clinical research indicates that cognitive drumming accelerates physical healing, boosts the immune system, and produces feelings of well-being through the release of emotional trauma. Therefore, the purpose of this study was to explore how cognitive drumming and specific teaching methods could help children adolescents, and adults with learning disabilities to develop improved coordination, retention, fine motor skills, and physical and cognitive functioning. The authors completed a practical action research study that evaluated the methods and techniques of cognitive drumming in order to examine the effects on the development of coordination, retention, social skills, and physical and cognitive functioning on children and adolescents. The authors completed three different studies with the first study aiming to evaluate the effects of cognitive drumming on two teenage boys with various extended disabilities, the second study aimed to develop coordination, retention, physical and cognitive functioning, and social skill interaction amongst four male adults who were between the ages of 30 and 55 and were introduced to the modalities of cognitive drumming in a recreation center located in New Jersey for 30 minutes per week for four consecutive weeks. The third and final study focused on cognitive drumming and its specific teaching methods that could help children with dyslexia and Attention Deficit Disorder (ADD) to better develop coordination, retention, fine motor skills, while improving physical and cognitive functioning. The results of the study were extremely promising for the use of cognitive drumming. As an appropriate alternative therapy for the treatment of dyslexia and ADD and has proven beneficial for mentally challenged individuals in both pediatric and adult populations. Implications and recommendations for future studies are also discussed.

**Keywords:** Rhythm• Therapeutic technique• Trauma• Parkinson's disease

**Abbreviations:** PTSD: PostTraumatic Stress Disorder; PDD: Pervasive Developmental Disorders; ADD: Attention Deficit Disorder.

## Introduction

Drumming has been used as an important pathway to rituals, ceremonies, rites of passages, and celebrations, while also being used as a powerful healing agent [1-3], the simple act of drumming has proven to have therapeutic effects due to its natural power of rhythm [4]. The practice of cognitive drumming as a healing art is a truly holistic, alternative medical approach that has been proven to decrease social barriers while promoting freedom of expression, unity, and cooperation [5]. Cognitive drumming approaches are a successful tool in assisting people with major medical issues. For example, research has concluded that drumming helps retrain the brain after a stroke, while also helping people with Parkinson's Disease move more steadily, and supporting Alzheimer's patients to connect better with their loved ones [6-8]. Current clinical research indicates that cognitive drumming accelerates physical healing, boosts the immune system, and produces feelings of well-being through the release of emotional trauma [1,2]. Additionally, clinical studies have proven that cognitive drumming has calming, focusing, and healing effects on individuals including children diagnosed with autism [9], combat veterans [10], emotionally disturbed teens [11], recovering addicts [12], trauma patients [13], prisoners [14], and homeless individuals [15]. Cognitive drumming has also proven beneficial in the treatment of many medical conditions such as stress, fatigue, anxiety, addiction, hypertension, asthma, chronic pain, arthritis,

heart disease, mental illness, and emotional disorders [6-8]. Therefore, the purpose of this study was to explore how cognitive drumming and specific teaching methods could help children adolescents, and adults with learning disabilities to develop improved coordination, retention, fine motor skills, and physical and cognitive functioning.

## Background

Cognitive drumming is a form of drum therapy that utilizes rhythm that can promote both healing and self-expression, and has also been linked to the management of certain medical conditions such as that of Alzheimer's, Post-Traumatic Stress Disorder (PTSD), and Autism [9,13]. Other benefits of cognitive drumming have also assisted patients in managing medical conditions such as that of stress, fatigue, anxiety, addiction, hypertension, asthma, chronic pain, arthritis, heart disease, mental illness, and emotional disorders [6-8]. Coordination and retention disabilities affect both males and females. It is estimated that 20% of the United States (US) population suffers from learning disabilities and this condition occurs in males two times more often than in females (US Centers for Disease Control and Prevention, 2010).

To demonstrate how cognitive drumming can be beneficial to individuals who suffer from a variety of mental health ailments, Litchke, et al. discussed how drumming techniques can assist individuals with PTSD and ADHD

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[2]. Completing a study that focused on the social and emotional benefits of different drumming rhythms, the authors found that the participant who experienced symptoms of PTSD demonstrated an improvement on his perceived-stress scale by 22.7%, and his anxiety decreased by 37.5%. Additionally, the participant who displayed symptoms of ADHD demonstrated an improvement in mood, as they moved from feeling nervous and unsocial to that of excited and delighted, as depicted on a Likert self-rating scale. This study was useful, as the authors reported that many benefits can come out of utilizing different drumming techniques and would be useful to utilize in an educational setting with individuals who display both mental health ailments and learning disabilities.

Focusing specifically on children diagnosed with Autism, Willemin, et al. [9] similarly provided participants of their study with different cognitive drumming techniques to determine different social and emotional effects. The authors completed their study on 14 children who were attending a summer camp and ranged from the ages of 5 to 14 years of age. Completing the cognitive drumming techniques over a period of four weeks and completing eight one-hour sessions. The results of the study concluded that the children's fun and enjoyment levels increased, as well as that of social and personal skills, although social and personal skills were not elicited a statistically significant change. However, the results did demonstrate positive changes in children that were diagnosed with autism, calling for further studies.

To demonstrate the effectiveness of drumming in general, other studies have been completed that have shown the benefits of drumming outside of cognitive drumming techniques. For example, Lowry, et al. [16], was able to determine that rock drumming enhanced the motor and psychosocial skills of children who had been diagnosed with emotional and behavioral disorders. Mainly working with children who had been diagnosed on the Autism spectrum, the authors recruited six child participants where they provided them with two 30-minute rock drumming lessons per week over the course of five weeks. The authors also recruited six other individuals who did not have any emotional or behavioral disorders and provided them with the same rock drumming lessons. The results of the study concluded that the individuals who were diagnosed on the Autism spectrum, experienced greater benefits in the reduction of hyperactivity and difficulties, as well as different social benefits that included a positive change in the students' attitudes and behaviors while in the school setting. This study continued to provide support that drumming techniques- even outside of cognitive drumming techniques, provided positive benefits to children with emotional and behavioral disorders.

Outside of specific mental health and intellectual disabilities, Hill, et al. [17], worked with individuals who were addicted to drugs and provided them with an alternative therapy to treatment that included aspects of cognitive drumming techniques. The authors reported that current behavior modifications are ineffective when working with the addiction community; therefore, they utilized an alternative treatment strategy that was infused with social and emotional coping strategies using percussion as an instrument to make change and work through issues. The results of the study highlighted how the participants were able to use percussion and cognitive drumming techniques to express, recognize, articulate, and evaluate themselves when it comes to the different emotional coping strategies, which in turn increased peer connectivity.

Ekins, et al. discussed how cognitive drumming techniques can aid students in improving outcomes in motor skill deficits that have been diagnosed with learning disabilities [18]. The authors reported that this is one of the main characteristics or symptoms found in students with learning disabilities. Completing a cognitive drumming intervention, the authors aimed to determine the physiological, symptom specific, and cognitive effects on students who were approximately 13 years old. Completing the intervention over a seven-week period, the authors divided students

into two groups- an intervention or control group- with the intervention group being exposed to the cognitive drumming program. The results of the study highlighted that there were many benefits for the students who completed the cognitive drumming intervention; improvements were noted in the participants' aerobic performance, coordination, and strength, as well as significant improvements compared to the control group. This study is important to the field, especially since this cognitive drumming program encompassed endurance, strength training, and highly coordinated movements in conjunction with emotional elements of the study.

## Methodology and Research Design

The authors completed a practical action research study that evaluated the methods and techniques of cognitive drumming in order to examine the effects on the development of coordination, retention, social skills, and physical and cognitive functioning on children and adolescents. The authors completed three different studies with the first study aiming to evaluate the effects of cognitive drumming on two teenage boys with various extended disabilities. In the first study, the authors investigated how cognitive drumming developed coordination, improved retention and social skill interactions, as well as improved physical and cognitive functioning.

The second study aimed to develop coordination, retention, physical and cognitive functioning, and social skill interaction amongst four male adults who were between the ages of 30 and 55 and were introduced to the modalities of cognitive drumming in a recreation center located in New Jersey for 30 minutes per week for four consecutive weeks. The third and final study focused on cognitive drumming and its specific teaching methods that could help children with dyslexia and Attention Deficit Disorder (ADD) to better develop coordination, retention, fine motor skills, while improving physical and cognitive functioning. These participants were exposed to different rhythms and patterns of drumming that can assist people with various disabilities to expand physical and cognitive functioning, speed, retention, and coordination. In order to evaluate this third study, three male children between the ages of 9 and 14 were provided percussion exercises and a drum set. All participants were monitored individually for 30 minutes per week for a period of one year. Two of the participants in their study were children who dyslexia and another participant had ADD, which were diagnosed by the New Jersey Board of Education. The three different studies are identified in full below.

### Study one

This study evaluated the effects of cognitive drumming on two teenage boys that had been diagnosed with various extended disabilities. The study was designed to evaluate the effectiveness of cognitive drumming in regards to developing coordination and improving retention, social skill interaction, and physical and cognitive functioning. The investigation of this theory focused on two participants who were 15 year old boys and were introduced to the modalities of cognitive drumming in a school located in Surrey England. Cognitive drumming sessions were conducted for 30 minutes per week for 6 consecutive months. The two participants were overseen by and educator and this one of this study's principal investigators, Christopher Topple, who was originally trained by Pat Gesualdo, this study's author, in his pioneering techniques of cognitive drumming. A teacher assistant was also present throughout the study; however, only for the second participant. The study's investigator independently evaluated any physical or cognitive progress the participants experienced via treatment with the modalities of cognitive drumming.

Study investigator Topple, and Teacher Assistant Martin, who assisted Pat Gesualdo with this study, conducted a pre-study evaluation and additionally conducted each cognitive drumming session. The school's principal observed the overall progression of the students. During the pre-study's evaluation, the authors highlighted the different backgrounds of

each of this first study's participants:

**Participant 1:** Participant 1 suffered from extended difficulties with coordination, physical and cognitive functioning, and mathematical computation.

**Participant 2:** Participant 2 suffered from extended difficulties with Oppositional Defiant Disorder (ODD) and had behavioral and self-esteem issues.

During the first cognitive drumming session, the participants were provided a drum pad and a pair of drumsticks. In the very first meeting, the participants were taught how to hold the drumsticks properly, as well as being provided with random hand patterns that should follow during the cognitive drumming session. Hand patterns were identified as participants being required to hit a drum with either their left (L) or right (R) hands in different successions. For example, in this first study, participants were required to specifically follow the pattern of R-L-R-L-R-L-R-L. They were then provided specific commands and coordination exercises that they were required to follow. At the end of the first meeting, the students were given a review of all the commands and exercises. The authors of this study were able to determine different struggles or obstacles that the participants experienced:

**Participant 1:** Participant 1 struggled with coordination issues and the mathematical approach for adding and equaling beats and patterns.

**Participant 2:** Participant 2 reported from the very start of the session, that he "hated music" and walked out of the class.

### Study one post evaluation

By the end of this first study, Participant 1 was able to easily coordinate right and left hands and apply knowledge of multipliers two to nine in rhythm form with both hands tapping out equations and answers. Additionally, by the end of the investigation, Participant 2 was engaging others in conversation, was polite to others, and developed socially acceptable behaviors. Participant 2's mother commented that she could not believe the change in her son's social skills and attitude.

### Study two

Author Pat Gesualdo conducted a second investigation in the United States in order to determine if cognitive drumming was beneficial for four disabled individuals in Bergen County, New Jersey. The aim of this study was to assist the participants in developing coordination, retention, physical and cognitive functioning, and increased social skill interactions. Therefore, this second study evaluated the effects of cognitive drumming on participants that displayed and were diagnosed with various disabilities in order to expand coordination, retention, social skill interaction, and physical and cognitive functioning. The participants in this second study included four male adults who ranged in ages between 30 and 55. The participants were introduced to the modalities of cognitive drumming in a recreation center located in New Jersey, for 30 minutes per week and lasting for a total of four consecutive weeks.

The same participants were tested again four months later for 30 minutes per week, for three consecutive weeks, in order for the authors to evaluate if these participants made any physical or cognitive progress via treatment with the modalities of cognitive therapy. The four participants that were included in this study were diagnosed as severe ODD, Pervasive Developmental Disorders (PDD), and mental retardation by medical doctors licensed by the state of New Jersey. The recreation center's director, and author Pat Gesualdo were both present for the pre-study evaluation, whereas the only the recreation center's director and authors Pat Gesualdo and David Ciauro were present in the post-study evaluation.

### Pre-study evaluation-study two

During the first meeting of the second study, the participants were provided a drum pad and a pair of drumsticks. In the very first meeting,

the participants were taught how to hold the drumsticks correctly and they were then provided with cognitive drumming techniques that taught them to hit the drum using a combination of left (L) and right (R) hands. The participants were then given random hand patterns, specifically following R-L-R-L-R-L-R-L. All participants were then provided specific commands and coordination exercises that followed. At the end of the first meeting, the participants were given a review of all the commands and exercises that were required of them. After this first meeting, no physical or cognitive improvement was noted.

The second meeting began with the exact same commands and coordination exercises as the participants were taught during the first meeting. All study participants experienced difficulty remembering the commands and exercises. Coordination, retention, and behavior were identical to that of the first meeting. All study participants experienced difficulty following and executing all commands and coordination exercises. The same commands and exercises were used for the final two meetings; however, in the third meeting, the authors noted a small increase with the participants' retention and coordination of the exercises. Behavior remained the same as noted during the first and second sessions.

In the fourth and final meeting, recall and execution of the commands and exercises increased, while behavior had also improved. Participant 1, who had been diagnosed with ODD verbally rejected and continued to refuse to participate in exercises and commands. Participant 2, who had been diagnosed with severe retardation was able to count along with patterns while alternating with his hands and feet. Participant 3, who was diagnosed with PDD was able to alternate hand patterns slightly. All participants in this second study had the same retention and coordination as the third meeting. However, Participant 2 showed improvement with counting and coordination, especially between all four limbs, but was unable to alternate between hands and feet. Participant 3 was able to alternate hands and sticking patterns and Participant 2 slightly alternated his hands for the patterns but did not want to follow directions.

### Post-study evaluation-study two

Four months later, the participants were re-introduced to the same commands and exercises. In the first meeting of the post-study, recall and execution of the commands and exercises increased. Behavior had also improved. Participant 1 who had been diagnosed with ODD took part in commands and exercises without verbal rejection or refusal. Participant 2 was able to count along with patterns and alternate hands; Participant 3 was able to alternate hand patterns slightly; Participant 2 immediately started counting out loud and marching in place as soon as he saw the study's author, Pat Gesualdo.

In the second meeting of the post-study, recall and execution of the commands and exercises further improved. All participants had improved physical and cognitive functioning. All participants were interacting more with the study's authors, employees of the center, and people within their group. For all study participants, physical and cognitive functioning was equal to first post-study meeting.

In the third meeting of the post-study, Participant 1 was joining in the group and answering questions; however, he would not discuss anything further. Participant 2 was able to coordinate both hands and both legs, together and separately, as well as reversing foot patterns to hand patterns, on command. Participant 3 was able to execute commands and exercises, especially between both feet, separately. Participant 4 was able to coordinate both hands and feet; he would also engage in discussion and ask what time the following week he would be completing cognitive drumming exercises.

### Study three

The purpose of this third study was to evaluate how cognitive drumming and its specific teaching methods could help children with dyslexia and ADD to develop coordination, retention, and fine motor skills, while improving

physical and cognitive functioning. Therefore, this study investigated how cognitive drumming and repeated exposure to rhythms and patterns of drumming, helped individuals with various disabilities to expand physical and cognitive functioning, speed, retention, and coordination. Three male participants between the ages of 9 and 14 were given percussion exercises and a drum set. They were all monitored individually, for 30 minutes per week for a total period of one year. Two participants had dyslexia and one participant had ADD., which were diagnosed by the New Jersey Board of Education.

**Developmental stage:** The students in the third study were provided a drum pad, a pair of drumsticks, and a manuscript book. The very first meeting outlined basic music theory, such as note values, measures, and bar lines. The participants were then taught how to hold the drumsticks appropriately. The three participants were then given rudiments (hand patterns), specifically a single stroke roll using hand patterns that reflected left (L) and right (R) hand movement. In this particular instance, the single stroke roll had participants use hand patterns of R-L-R-L-R-L-L, whereas the double stroke roll used hand patterns of R-R-L-L-R-R-L-L. The single stroke roll was practiced first, for approximately five minutes, then the participants were given the instruction for the double stroke roll. At the end of the first meeting, the participants were told to play these rudiments and review all the information for 15 minutes a day for one week.

The second meeting started with a complete review of the first meeting. The three participants were asked to identify measures and bar lines; all of the participants had trouble remembering these items. The participants were then asked to play the rudiments, where it was noted that coordination was the same rate of speed as identified during the first meeting. The authors then proceeded with an in-depth explanation of a basic rhythm. The hi-hat cymbal was on all four beats of the measure, with the bass drum on beats one and three. The snare drum was on beats two and four. This rhythm was described in detail and performed at a very low rate of speed. The participants were then asked to perform this rhythm with the authors noting much difficulty. The participants were then instructed to play one line at a time, first the hi-hat, then the bass drum, and finally the snare. After the participants reviewed the exercises in this manner, they were able to play the rhythms much easier with perfect retention.

This method of specifically isolating each part of the rhythm was used throughout this entire study. The process of isolating sections of a rhythm and allowing the participants to focus on one specific section at a time, aided in developing reading comprehension, eye-hand coordination, and hand-foot coordination. It appeared much easier for participants with dyslexia and ADD to develop retention and coordination by studying in this manner than it was for other students with dyslexia and ADD who did not study with the specific isolation approach. Isolating specific parts of a measure enabled these participants to actually see how each specific part related to another, which helped to develop coordination and comprehension during the task.

In the third meeting, the participants were asked to warm up with the rudiments and there appeared to be a noticeable but small increase in speed and coordination. Additionally, retention was also observed as being improved. The participants were then asked to play the rhythms on the drum set. Physical execution was steady in the 14 year old participant; however, the younger participant, who was 9 years old, appeared to have more difficulty. Additionally, practicing was extremely difficult for the 9 year old participant too. The participant who had been diagnosed with ADD continued to have trouble concentrating. Up to six months later, the participants were able to play 12 and 16 measures in a row. They were provided other rudiments over the same time frame, specifically that followed these cognitive drumming patterns:

Single Paradiddle- R-L-R-R-L-R-L-L

Double Paradiddle- R-L-R-L-R-R—L-R-L-R-L-L

Triple Paradiddle- R-L-R-L-R-L-R-R—L-R-L-R-L-R-L-L

Single Ratamacue- R-R-L—R-L-R, L-L-R—L-R-L

Double Ratamacue- R-R-L—R-R-L—R-L-R, L-L-R—L-L-R—L-R-L

Triple Ratamacue- R-R-L—R-R-L—R-R-L—R-L-R, L-L-R—L-L-R—L-L-R—L-R-L

Five Stroke Roll- R-R-L-L-R—L-L-R-R-L

Seven Stroke Roll- L-L-R-R-L-L-R—L-L-R-R-L-L-R

Nine Stroke Roll- R-R-L-L-R-R-L-L-R—L-L-R-R-L-L-R-R-L

## Results

To accurately assess an increase in speed, the rudiments were measured with a metronome. The participants measured below the lowest setting of the metronome (e.g., 40) at the beginning of the study; therefore, their rate of speed was measured at zero. The rate of speed for the first participant increased from zero before the study, to 72 for the single stroke roll, 100 for the double roll, and 54 for the five stroke roll at the conclusion of the study. The rate of speed for the second student increased from zero before the study, to 116 for the single stroke roll, 84 for the double stroke roll, and 84 for the five stroke roll. The rate of speed for the third participant increased from zero before the study, to 126 for the single paradiddle, 88 for the triple paradiddle, and 63 for the single ratamacue, at the conclusion of the study.

It was found that the rate of speed for coordination development needed to be developed mentally more than physically. In combination with this finding, an extremely interesting event occurred; the participants often played the rhythms on the drum set and they also played these rhythms on the drum set with the use of a gum rubber drum pad on the snare, while their foot played the (live) bass drum. Whenever the participants practiced silently on the gum rubber pad, their coordination, retention and speed developed almost immediately. These two types of practice routines were tested with many students that were not involved in the study. A similar increase occurred when the students, who were not involved with the study, practiced silently on the drum pad. This additional investigation revealed that practicing on the loud drum set without the drum pad actually interfered with the development of coordination, retention and speed. However, silent practice on the drum set with the drum pad had an immediate development of coordination, retention, and speed in both dyslexic and ADD students. As a result, it was found that the cerebral cortex that is responsible for processing thought was being distracted by the primary auditory cortex that is responsible for processing sound.

## Discussion

The majority of individuals with disabilities can fully understand a total concept and the manner in which to perform specific functions. However, it can be extremely difficult and frustrating for these individuals to understand how specific parts work together to make up a whole. For example, a child knows how to ride a bicycle; he understands that he must pedal in order to make the bike move. However, someone tried to explain how the pedals were attached to a sprocket, which is then chain driven in order to make the tires move, an individual suffering from dyslexia may become confused on how the bike actually works. Once many individuals with disabilities see the physical how and why things work the way they do, the process becomes clearer. These individuals will also repeat the task in the same exact manner which allowed them to originally comprehend the process. Dyslexic individuals may also find improvisation difficult, especially when learning an instrument such as the drums. For this reason, the specific isolated instruction teaching method is important. This specialized teaching method enables individuals with disabilities to comprehend the physical workings of an instrument, the processes, or mechanical devices first, and then they can find it easier to apply what they have learned. This should be completed

instead of teaching solely by explanation. Specific isolated instruction reinforces the complete and specific details required for comprehension, coordination, and development for speed. This is especially helpful for understanding methods and instructions.

Many studies have focused on children in order to better understand the difficulties that they experience when performing tasks in the school setting. Some children that have been diagnosed with dyslexia even have difficulty understanding why certain things are done in specific ways. This lack of comprehension and ability, in conjunction with the reversal of words, letters, patterns, and objects, can make learning extremely difficult. This difficulty is particularly apparent in classroom situations, where lessons move from one section to another quite rapidly. Therefore, a child may not be able to comprehend the first part of a lesson, or several lessons combined or presented thereafter; therefore, attempting to successfully accomplish more than one lesson at a time is an exercise in futility. It may take days or weeks for children with disabilities to understand and fully recall the first section or lesson alone.

It is extremely important to detect learning disabilities in children as early as possible. The use of specific isolated instruction seems to indicate that its use can be beneficial for children with learning disabilities. It can aid in reinforcing a solid and complete understanding of an instrument or subject right from the early conception of instruction. Children with learning disabilities need to learn at slower paces that are suitable to their own comprehension levels, and not at the level of their peers. Using specific isolated instruction for teaching music, math, reading, spelling, or for any other subject or task that requires comprehension, would provide a child with a disability the ability to learn with full comprehension and retention.

Dyslexia is one of the most common learning disabilities and effects coordination and reading ability; as a result, this disability can have profound effects on the mechanics of cognitive drumming. Orton defined dyslexia in his known dominance failure theory, where he believed that in order for a child to learn, one hemisphere of the brain has to dominate the other. If this does not occur, it can give way to delay and confusion. Orton's theory also suggested that there should be evidence of cross-lateral laterality in individuals with dyslexia. For example, a person will write with one hand and throw a ball with the other. There was no evidence of cross-lateral laterality in this current study. All of the participants in this study started the rudiments, rhythms, and patterns with their dominant hand and foot. This was completed subconsciously and consistently. Any cross-lateral movements would have shown and been repeated, due to the fact that each limb played a different part of the drum set.

On average, boys outnumber girls on a two to one ratio for all types of learning disabilities. Fifty students were taught at the same time this study was conducted, but were not included due to a lack of a diagnosed learning disability. Four of the students who were not included in this study, were girls between the ages of 13 to 15 years. Their coordination appeared almost flawless and seemed to be naturally advanced. All rhythms, patterns, and rudiments were played to perfection almost immediately. Their rate of speed for reverse patterns (e.g., dominant hand against opposite foot) was extremely above average.

Cognitive drumming combines the principals of physical and cognitive functioning and the art of drumming. Cognitive drumming techniques are used as an intervention that provides the special needs community with the opportunity to participate in creative, verbal, and non-verbal expressions. Psychologists, neuroscientists, school systems, occupational therapists, physical therapists, behavioral therapists, and teachers throughout the world have used this author's pioneering techniques of cognitive drumming. Cognitive drumming techniques help children and adults with both physical and developmental disabilities; these techniques are a valuable diagnostic tool in expanding physical, mental, emotional, social, and cognitive development. They combine visual, rhythmic, auditory, and verbal approaches to help mainstream special needs participants to meet the goals and objectives for improvement in fine motor skills and physical and

cognitive functioning. Participants grow both cognitively and emotionally and appear to gain self-esteem through the creative process of cognitive drumming.

In addition, cognitive drumming helps participants learn problem-solving strategies, improve patience and perseverance, and develop coordination and retention. Therefore, cognitive drumming nurtures social skills, sensitivity, cooperation, and conflict resolution. The population targeted for these services are special needs children and adults whose disability has affected, impacted, or reduced their physical and cognitive capabilities. The non-threatening, enjoyable nature of cognitive drumming makes it appealing to all age groups. Participants' music abilities and works are not graded and program modalities are specifically tailored to meet the specific needs of all participants.

Participants in cognitive drumming sessions might have experienced failure in previous school classes and social settings, either due to behavioral problems or a combination of their specific disability with a behavioral problem. As a result, these participants need to experience success, and can find success with cognitive drumming. As demonstrated in this current study, as physical and cognitive abilities grow, participants can become anxious to return to cognitive drumming sessions as a trusting relationship is built between each participant and the cognitive drumming therapist. This trusting relationship opens the door to communication which becomes the foundation that allows for behavior modification and emotional healing to begin.

Study 2 focused on individuals who suffered from dyslexia, ADD, ADHD, and other disabilities. Individuals suffering from these conditions may find it extremely difficult to engage in activities that require extended periods of coordination, retention, and concentration. Cognitive drumming instruction is no exception. While the results of these three studies are extremely promising in regards to the use of cognitive drumming and specific isolated instruction, it is recognized by the authors that further evaluation of these forms of therapy and a greater number of study subjects would be required to evaluate whether or not this form of therapy is beneficial for entire populations. However, these results are extremely promising for the use of cognitive drumming. As an appropriate alternative therapy for the treatment of dyslexia and ADD and has proven beneficial for mentally challenged individuals in both pediatric and adult populations.

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## Implications

There are some implications that need to be discussed based upon the results of the study. This research impacts many facets within the field of mental health, especially focusing on learning disabilities and emotional and behavioral disorders. One main impact is that the results of this study could allow individuals who suffer from learning disabilities new ways to assist in managing their diagnosis. For example, the results of this study demonstrated many positive effects from cognitive drumming sessions which could additionally aid the participants in assisting them with educational aspects of their lives. For example, motivation level, social and emotional skills increase, all of which can positively be utilized within educational environments. Because some of the participants in this study were at a school, teachers and other school personnel could introduce cognitive drumming session in order to assist their students with learning disabilities alternative ways to learn and manage their symptoms.

This study could also impact the parents of children that suffer from the effects of learning disabilities, simply because regular cognitive drumming sessions could assist individuals within their home lives, as well as social lives when interacting or meeting peers. Parents could be better supported when assisting their children, especially if their loved ones have been diagnosed with Autism.

This research also could impact policy making in terms of treatment aspects. Because cognitive drumming or any aspects of drum therapy are

considered alternative approaches to therapeutic interventions, this study could impact the way that mental health and other treatment agencies approach learning disabilities, emotional and behavioral disorders, or coordination disorders. Because researchers have reported that some behavioral interventions are not effective, making way for the importance of utilizing cognitive drumming exercises [17]. Therefore, as research continues in this field that supports the use of alternative therapies, improved treatment conditions can be experienced, allowing for individuals with learning disabilities and emotional and behavioral disorders to flourish within their environments.

## Recommendations for Future Research

This study did experience some limitations in such that small group sizes can limit the generalization of the results to that of other populations and geographical areas. Because the three studies focused on different populations, the results of the study may be transferable to other populations; however, may not necessarily be generalized. Therefore, future research should be focused on expanding these studies to include larger groups of individuals both inside and outside of school environments. Additionally, it is recommended that future studies could also focus on other learning disabilities not mentioned in this study.

Another area that is required for future research can include studies that focus on the specific isolated instruction teaching method. This specialized teaching method enables individuals with disabilities to comprehend the physical workings of an instrument, the processes, or mechanical devices first, and then they can find it easier to apply what they have learned. This should be completed instead of teaching solely by explanation. Specific isolated instruction reinforces the complete and specific details required for comprehension, coordination, and development for speed. This is especially helpful for understanding methods and instructions. Therefore, using the specific isolated instruction should be examined in future research, especially with individuals who are diagnosed with dyslexia.

## Conclusion

The practice of cognitive drumming as a healing art is a truly holistic, alternative medical approach that has been proven to decrease social barriers while promoting freedom of expression, unity, and cooperation. Current clinical research indicates that cognitive drumming accelerates physical healing, boosts the immune system, and produces feelings of well-being through the release of emotional trauma. Additionally, clinical studies have proven that cognitive drumming has calming, focusing, and healing effects on individuals including children diagnosed with autism, combat veterans, emotionally disturbed teens, recovering addicts, trauma patients, prisoners, and homeless individuals. Therefore, the purpose of this study was to explore how cognitive drumming and specific teaching methods could help children adolescents, and adults with learning disabilities to develop improved coordination, retention, fine motor skills, and physical and cognitive functioning.

The authors completed a practical action research study that evaluated the methods and techniques of cognitive drumming in order to examine the effects on the development of coordination, retention, social skills, and physical and cognitive functioning on children and adolescents. The authors completed three different studies with the first study aiming to evaluate the effects of cognitive drumming on two teenage boys with various extended disabilities. In the first study, the authors investigated how cognitive drumming developed coordination, improved retention and social skill interactions, as well as improved physical and cognitive functioning.

The second study aimed to develop coordination, retention, physical and cognitive functioning, and social skill interaction amongst four male adults who were between the ages of 30 and 55 and were introduced to the modalities of cognitive drumming in a recreation center located in New

Jersey for 30 minutes per week for four consecutive weeks. The third and final study focused on cognitive drumming and its specific teaching methods that could help children with dyslexia and Attention Deficit Disorder (ADD) to better develop coordination, retention, fine motor skills, while improving physical and cognitive functioning. These participants were exposed to different rhythms and patterns of drumming that can assist people with various disabilities to expand physical and cognitive functioning, speed, retention, and coordination. In order to evaluate this third study, three male children between the ages of 9 and 14 were provided percussion exercises and a drum set. All participants were monitored individually for 30 minutes per week for a period of one year. Two of the participants in their study were children who dyslexia and another participant had ADD, which were diagnosed by the New Jersey Board of Education.

The results of these three studies were extremely promising in regards to the use of cognitive drumming and specific isolated instruction. It is recognized by the authors that further evaluation of these forms of therapy and a greater number of study subjects would be required to evaluate whether or not this form of therapy is beneficial for entire populations. However, these results are extremely promising for the use of cognitive drumming. As an appropriate alternative therapy for the treatment of dyslexia and ADD and has proven beneficial for mentally challenged individuals in both pediatric and adult populations.

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