

CONNECTING MIND AND BODY: ART THERAPY EXPLORING THE PSYCHOLOGICAL  
DOMAIN ON CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

DAKOTA LEHMAN

A Research Paper  
in  
The Department  
of  
Creative Arts Therapies

Presented in Partial Fulfillment of the Requirements  
for the Degree of Master of Arts  
Concordia University  
Montreal, Quebec, Canada

April 2020

© DAKOTA LEHMAN 2020

# CONCORDIA UNIVERSITY

School of Graduate Studies

This research paper prepared

By: Dakota Lehman

Entitled: Connecting Mind and Body: Art Therapy Exploring the Psychological Domain on  
Children with Developmental Coordination Disorder

and submitted in partial fulfilment of the requirements for the degree of

**Master of Arts (Creative Arts Therapies; Art Therapy Option)**

complies with the regulations of the University and meets the accepted standards with respect to originality and quality as approved by the research advisor.

Research Advisor:

*Melissa Tan, MA, RP, MTA, NMT-F*

Department Chair:

*Guylaine Vaillancourt, PhD, MTA*

*April 2020*

## ABSTRACT

### CONNECTING MIND AND BODY: ART THERAPY EXPLORING THE PSYCHOLOGICAL DOMAIN ON CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

DAKOTA LEHMAN

Developmental Coordination Disorder (DCD) impacts a child's motor coordination and perceptual skills. Signs of the disorder are often noticed early in a child's school career when teachers observe the child struggling with tasks such as handwriting, scissor use and shoe tying. Children with DCD are most commonly referred to Occupational Therapy or Physical Therapy to improve the physical symptoms, leaving the psychological and emotional effects unattended. If the psychological needs of these children are not met, the consequences can be lifelong, causing turmoil throughout teen years and into adulthood. The aim of this study is to consider how Art Therapy can be used to fill the gap in treatment and look at the psychological effects of the disorder. This study uses theoretical framework, based on previous literature. The data is compiled and systematically analyzed based on emergent themes. Due to the nature of the psychological symptoms and comorbidities of DCD, this qualitative inquiry has outlined how Art Therapy appears to be a particularly beneficial option for addressing the needs of this population. The research that supports the use of art making with the use of different material for motor skills is promising. Currently, little research exists examining the efficacy of Creative Arts Therapies and their treatment of DCD and no literature was found for Art Therapy specifically. However, the findings of this research point to a need for further study of this particular topic.

## **ACKNOWLEDGEMENTS**

I wish to express my sincere appreciation to my research supervisor, Melissa Tan, for her guidance and feedback throughout this process, especially her patience when replying to my endless emails consisting of questions and concerns. A wholehearted thanks to my amazing program cohort for their constant inspiration and encouragement. Lastly, I could not have done this without the love and encouragement of my family, my mother, Jen and my father, Ken and my dear friends Miranda and Victoria. A special thank you to you all.

## Table of Contents

Chapter 1. Introduction.....	1
Chapter 2. Methodology.....	2
Theoretical Framework.....	3
Procedure.....	4
Ethical Considerations.....	5
Validity and Reliability.....	6
Chapter 3. Literature Review.....	7
Developmental Coordination Disorder.....	7
Academic Implications.....	9
ADHD.....	9
Mental Health.....	10
Social Consequences.....	11
Physical Health.....	11
Treatment.....	13
Art Therapy and Clinical Practices.....	14
Chapter 4. Discussion.....	20
Limitations.....	24
Implications, Recommendations, and Considerations.....	25
Chapter 5. Conclusion.....	26

## **Introduction**

The pages that follow will outline the diagnostic criteria for Developmental Coordination Disorder (DCD) and both the physical and psychological implications of the disorder. It will take a closer look at the psychosocial and emotional effects of DCD in children. These aspects will be considered in relation to Art Therapy as a form of treatment for the mental health concerns of the disorder. The compiled articles will gather information to better understand what the symptoms of DCD are and how Art Therapy can be used in treatment.

The researcher was unable to find previous literature specifically addressing the topic of Art Therapy with the treatment of DCD. However, Art Therapy has been used with similar populations with motor difficulties (Cucca et al., 2018; Gabriels, 2003; Kim, Kim, Lee, & Chang, 2008; Safron, 2003). Thus, the present research study has combined the literature on DCD and Art Therapy research with similar populations. As well, there was one article found that discusses the use of Drama Therapy techniques, another Creative Arts Therapies modality, for clients with DCD (Roy & Dock, 2014). Much of the previous work and literature is focused on support and treatment of the physiological symptoms of the disorder but neglects to include psychological symptoms. Literature on the topic has been gathered and analyzed in an effort to bridge the gap between physiological and psychological treatment for children with DCD with the use of Art Therapy. The paper will discuss the role of Art Therapy in the treatment of DCD and how it can be used to meet the needs of the population.

Children with DCD often experience a loop of symptoms as a result of the physical limitations that are elicited from their reduced motor ability, as compared to peers of their same age. The research indicates that once children with this diagnosis begin school, signs are noticed in academic tasks such as handwriting (Prunty, Barnett, Wilmut, & Plumb, 2016). They are compared to their peers' developmentally appropriate motor skills and find that they fall short in these areas. This leads to decreased participation in endeavors and tasks that require skills such as balance, coordination, and nimbleness (Chen & Cohn, 2017). Children with DCD often begin to pull away from sports and other social activities due to peer mocking (Chen & Cohn, 2017) and perceived lack of ability which can aid in the development of low self-efficacy (Lange, 2018). Subsequently, this can lead to social isolation, depression, and anxiety causing long-term psychological consequences into adolescence and even through adulthood. Thus, there is an

importance to begin to address the psychological domain of this disorder in childhood in an effort to disrupt the negative feedback loop (Chen & Cohn, 2017; Lange, 2018).

The researcher's curiosity for this specific topic of research arose after a discussion with a friend sparked an interest on how Art Therapy might be beneficial in addressing both physiological and psychological domains of children struggling with motor skills in an academic setting. As the beginning stages of the research unfolded, the desire to understand if it is possible to incorporate the treatment of physical needs of children in an ethical manner within the scope of practice of Art Therapy became the main drive in the development and formation of the research question at hand. Once the topic was narrowed down, it became evident that there was a significant area of treatment potential for Art Therapy within the realm of coordination difficulties in children. As an Art Therapy intern, the researcher has seen first-hand how Art Therapy and creating art intuitively provides an opportunity for prominent improvement of motor skills, in addition to giving children space to create something meaningful through an expressive medium. It was inspiring to begin to learn about the potential to offer a new perspective and a more holistic approach to interventions that connect the mind and body of children with DCD.

The paper will begin with the Methodology section, addressing the theoretical framework, the research process, the ethical considerations of the researcher, as well as validity and reliability. Following the Methodology will be the Literature Review. The Literature Review will highlight articles and text related to DCD, comorbidities, clinical practices, and the use of Art Therapy with similar populations. The following section will be a Discussion addressing limitations, implications, recommendations based on the literature, and future considerations. Finally, the paper will end with a Conclusion to consolidate any final points.

### **Methodology**

This section explores the rationale for a theoretical inquiry and outlines the application of this method in addressing the research question: How can Art Therapy be used to address the psychological repercussions associated with DCD, while taking into consideration the physical needs and limitations of the population? The theoretical inquiry offers a foundation for applications in the fields and contributes to the development of interventions and future research for children struggling with both psychological and physical attributes of DCD. The motivation behind this research project is to contribute to the seemingly small pool of literature discussing

Art Therapy and to advocate for a more holistic approach to treatment for children who are affected by this multifaceted disorder. As there was no previous literature found discussing Art Therapy as part of treatment for DCD, a theoretical framework has been chosen as the most appropriate method to address the research question. More specifically, bibliographical research methodology has been used to gather information and build a foundation to gain further insight and inspire future, related research (Concordia University Department of Creative Arts Therapies, 2015).

Data has been collected by reviewing the previous research and literature related to art, movement, and DCD. The research looks at the common symptoms and implications associated with DCD and identifies where Art Therapy and Creative Arts Therapies have been indicated to help in previous research. In addition, a variety of art techniques and materials to better understand the most advantageous options for the population have been gathered. Once the information was collected and analyzed, the benefits and limitations of Art Therapy were discussed.

### **Theoretical Framework**

As previously stated, this research follows a theoretical structure. Randolph (2009), described this type of research as being shaped through the examination, analysis, and synthesis of the presented data. The goal of a theoretical study is to deliver a cohesive narrative, emergent from the collected data, ideally leading to further knowledge on the topic (Cooper, 1988). The data being collected with this method is strictly literature. Therefore, the research only incorporates text and no other forms of data will be used. Based on the theoretical nature of bibliographic research, the only conclusions that can be drawn are strictly at a level of hypothesis. Thus, this research identifies topics in need of clarification and suggests areas for future research (Concordia University Department of Creative Arts Therapies, 2015).

According to Concordia University Department of Creative Arts Therapies (2015), bibliographical research falls under the umbrella of the theoretical framework category. This specific methodology has been used to complete the research project at hand. Bibliographical research has been defined as any research involving information that is collected from published sources (Boon, 2017). Through the structure of the bibliographical methodology, the researcher will:

...determine the extent of the information needed; access the needed information effectively and efficiently; critically evaluate information and its sources; incorporate selected information into one's knowledge base; use information effectively to accomplish a specific purpose; understand the economic, legal, and social issues surrounding the use of the information; and access and use information ethically and legally. The quality of the research project is positively affected when these criteria take precedence over ease of information access. (Boon, 2017, p.92)

### **Procedure**

The data for this research has been collected through library guides, bibliographical databases, and online search engines such as the Concordia library database and google scholar. Library guides provided information that was relevant and focused, offering in print and electronic sources. Bibliographic database included records of previously published material often with full-text availability (Boon, 2017). Keywords that were used when searching for journal articles included: DCD, Art Therapy, psychological symptoms, physical symptoms, children, treatment, movement, motor skills, comorbid, ADHD, and social isolation. Techniques such as footnote chasing, citation searching, and berry picking were utilized by the researcher to identify any potential additional sources that are related to the research topic (Boon, 2017). After the data collection process, the researcher moved into the analysis phase of the research.

Data analysis from a theoretical standpoint is approached in a systematic manner, working through a process. Creswell (2013) outlined how qualitative data should be handled by the researcher which will be used as a guide for the current research project. After the data was collected, it was organized into computer files and identified accordingly for easy location throughout the analysis process. Next, the researcher read the data and made any memos (Creswell, 2013). A memo has been described as "a brief or extended narrative that documents the researcher's reflections and thinking processes about the data" (Miles, Huberman, & Saldana, 2018, p. 88). Memos are used to synthesize the data into systematic levels of themes and implications. They begin as notes-to-self, but they should develop into the important occurrences and facts (Miles, Huberman, & Saldana, 2018). The researcher utilized memoing to record initial ideas and thoughts as a way to process and reflect on the information. The data was then described, classified and deduced into codes based on emergent themes. The process of coding involved combining and grouping the text into smaller themes or categories of information and

from there, allocating a label to the code. Themes, also called categories are broad components of information that encompass multiple codes that were combined to generate a common thread of ideas (Creswell, 2013).

The following step in the data analysis process was the interpretation of the organized and coded data. For the data interpretation, the collected data was “abstracting out beyond the codes and themes to the larger meaning of the data” (Creswell, 2013, p. 187). The process of interpretation involves the consideration of all previous components accompanying the data analysis. Creswell (2013) described the importance of representing and visualizing the data. Thus, this was the final step of the analysis process, as the data is represented throughout this paper as a sort of package of what the researcher discovered in the text.

### **Ethical Considerations**

The following are ethical concerns associated with theoretical research methodology. The researcher’s personal biases may influence the paper, and this should be acknowledged for the consideration of the reader. It should also be noted that the researcher is coming from a Western mindset of medicine and treatment and therefore, the information has been viewed from a specific lens. Another important ethical consideration is the ethics of knowledge. Meaning, the researcher is coming with a certain background thus, influencing the portrayal of information and how the data is observed. There are, however, specific standards and principles of ethics that relate to the ethics of knowledge and how information is portrayed by the researcher.

The Canadian Art Therapy Association (2003-2004) *Standards of Practice* and the American Art Therapy Association (2013) *Ethical Principles for Art Therapists* have been consulted to ensure best research ethics will be followed. According to the Canadian Art Therapy Association (2003-2004), Art Therapists must conduct research ethically and contribute to advancing the ambitions of the Art Therapy field. The researcher must appropriately give credit to contributors of the research paper. As well, it is the responsibility of the researcher to properly cite sources and acknowledge the borrowing of any information and ideas (standard D.2). Standard D.8 highlights the importance of understanding areas of competence in similar fields when using resources and information from them. This will be important to consider as data for this research will be collected from other fields and related professions. Standard E.12 emphasizes the importance of the researcher consulting competent professionals within the Art Therapy field to determine if the research is appropriate. This step has been taken for the

research at hand as it has been approved by the review board of Creative Arts Therapies professionals and a supervisor has been assigned for additional support and feedback.

The American Art Therapy Association principle 6.7 states, “Art therapists accurately represent research findings to avoid distortion or misuse” (p. 8). This important ethical principle was upheld throughout the research process and the information gathered and interoperated from the data be represented in an accurate manner. Principle 8.1 restates the importance for the researcher to uphold scholarly high standards and present the information accurately. The research uses “accurate, current, and scholarly information to foster professional growth” (American Art Therapy Association, 2013, p. 9).

### **Validity and Reliability**

Reliability and validity have been addressed and taken into account in a variety of ways as they are important aspects of research. With theoretical research, it is important to consider where the information and data is being collected from. Therefore, known and reliable databases have been used to search for and collect any data used. Articles considered ideally peer reviewed. However, if a situation arises that the article is not peer reviewed, it will be identified in the text. Books have been used in this paper, generally in the Art Therapy section of the Literature Review. General topics and information have been included from published books. The credentials and background of the editor(s) and/or author(s) were investigated prior to their incorporation to assure that the source of the information was coming from a valid and reliable source. As well, only books with academic publishers have been included.

Another consideration is how the researcher has used and defined terms. Any terms that are used regularly and are not considered to be generally known, have been clearly defined at the near start of this research paper. Subsequently, terms were aimed to be consistent throughout the paper. The researcher was confident in their ability to analyze the data systematically and critically. Furthermore, biases of the researcher that could impact the research process and/or results have been reflected, identified and addressed accordingly, as previously described (see ethical considerations). However, striving to maintain as much objectivity as possible is a crucial element of academic research (Boon, 2017). It was important for the researcher to self-disclose important information that might have influenced validity including beliefs and biases so that any preconceived assumptions and worldviews are known to the audience. As these are all factors that are at risk of impacting the validity of qualitative research. One way that the

researcher has aimed to address and establish credibility with this methodology has been to have a clear and detailed writing and description within the research paper (Creswell & Miller, 2000).

In summary, the research project is a qualitative, theoretical paper with a specific focus on bibliographical methodology. The researcher has followed the outlines for this style of research, which includes data collection, analysis, and interpretation. Literature is the only included data type. The paper has connected and discussed emergent themes from the gathered data. It is projected that the research will deepen the understanding of how Art Therapy can be used with DCD in a way that is within the scope of practice and it can be used not only for mental health but also to meet the physical needs of the population.

### **Literature Review**

This section will outline the diagnostic criteria for DCD and both the physical and psychological implications of the disorder. It will take a closer look at aspects such as the psychosocial and emotional effects in children with DCD. These aspects will be considered in relation to Art Therapy as a form of treatment for the psychological effects of the disorder.

### **Developmental Coordination Disorder**

DCD, also known as Dyspraxia (Kirby, Sugden, Beveridge, & Edwards, 2008), is one of the most common developmental conditions in childhood (Izadi-Najafabadi, Ryan, Ghafooripoor, Gill, & Zwicker, 2019) and affects 5-6% of school-aged children across North America (Brown-Lum & Zwicker, 2017). However, it has been suggested that it may affect an additional 10%, more mildly (Kadesjö & Gillberg, 1999). It is seen at a male:female ratio from 3:1 all the way up to 7:1 (Asonitou & Koutsouki, 2016). DCD is defined as a child having motor coordination that is below expectancy for their chronological age; the child may drop and bump into objects, and may be slow and inaccurate with execution of fine motor skills such as writing, catching, and cutting (American Psychiatric Association, 2013; Missiuna et al., 2014; Harris, Mickelson, & Zwicker, 2015). It is classified as a neurodevelopmental disorder and has a genetic influence (Goulardins et al., 2015). However, DCD does not have a single presentation across the board as it affects both fine and gross motor skills (Izadi-Najafabadi et al., 2019). In previous years, the disorder was frequently referred to by the term “clumsy child syndrome” (Kirby et al., 2008).

The child may have been behind in motor milestones such as crawling and walking when given appropriate opportunity for the skills to be learned and practiced. Difficulties of fine and/or

gross motor movements are noteworthy and persistent interference with activities in the child's daily life and impacts academic performance. The child does not have these challenges due to another medical condition or disease (American Psychiatric Association, 2013; Harris et al., 2015). DCD is one of the most prevalent childhood movement disorders (Goulardins et al., 2015) and has been shown to affect individuals through adolescence and even into adulthood (Lange, 2018; Missiuna et al., 2014). Despite its pervasiveness, it is one of the least understood and least recognized developmental conditions in educational and medical settings (Harrowell, Hollén, Lingam, & Emond, 2018).

The visual, vestibular, and kinesthetic systems are the primary sensory systems that are associated with movement control. It has been identified that children with DCD show perceptual discrepancies in both the visual and kinesthetic systems (Piek & Dyck, 2004). Children with DCD often struggle with visual deficits. Studies have shown that children with DCD suffer from poor visuospatial processing, a weakness in working memory. Thus, leading to issues with visuospatial working memory, implying that they have certain difficulty with information processing and storage which can be connected to poor movement planning and control related to the area of the brain that performs working memory tasks with spatial delay components. DCD is linked to low-level perceptual functions. These include deficiencies with visual memory, visual spatial memory, and visuospatial relationships (Tsai, Chang, Hung, Tseng, & Chen, 2012).

According to a hypothesis referred to as internal modeling deficit (IMD), children with DCD experience a lower aptitude to use predictive motor control (Adams, Ferguson, Lust, Steenbergen, & Smits-Engelsman, 2016; Adams, Lust, Wilson, & Steenbergen, 2014). Therefore, "when implementing action planning tasks, the predictive motor control is needed to anticipate the end state of a movement" (Adams et al., 2016, p. 197). Action planning tasks are defined as the child's capability to take into consideration the demands of the movement and the end goal of that movement. Within this theory, predictive motor control is influenced by the child's internal working model that they have developed over the course of their life (Adams et al., 2016).

Decreased participation is associated with delays in motor learning that result in poor performance. In comparison with typically developing children, children with DCD have been

shown to participate less frequently and in less diverse activities including daily life activities, school and out of school activities, as well as social participation (Izadi-Najafabadi et al., 2019).

### **Academic Implications**

Caregivers frequently notice physical symptoms in young childhood but often the child is not referred for assessment until they begin school as they often begin to fall behind in academic tasks (Missiuna et al., 2014). Children with DCD are often referred to Occupational Therapy (OT) for assessment and treatment, most commonly as a result of difficulties with handwriting in school (Prunty et al., 2016). Studies have shown that developmental challenges have been reported in children with motor impairments. It has been indicated that children with motor delays present with substantial challenges with oral language, reading/reading comprehension mathematics, and visual perceptual skills (Dewey, Kaplan, Crawford, & Wilson, 2002). Commonly, DCD comorbidities include speech and language impairments and specific learning disabilities (Karras, Morin, Gill, Izadi-Najafabadi, & Zwicker, 2019), particularly dyslexia (Harrowell et al., 2018).

Children with DCD are not frequently offered an opportunity to demonstrate their academic ability. Thus, their schoolwork does not reflect their true ability in academia as a result of their limited performance due to the symptoms of their disorder. DCD can limit educational achievement if the children are unable to meet the expected standard and can consequently impact future life perspectives. In academic settings, the severity and consequences of the disorder are not always taken seriously, and it can be categorized as a hidden disability. According to Harrowell et al. (2018), approximately 37% of children do not receive the additional teacher support essential to succeed. It is also implied that the additional physical, social, and mental obstacles these children deal with on a daily basis impacts their learning and school performance (Harrowell et al., 2018).

### **ADHD**

DCD is comorbid with attention-deficit/hyperactivity disorder (ADHD), at about half of children with DCD also presenting with symptoms of ADHD (Dewey et al., 2002). Lange (2018) conceptualized ADHD as a phenotype of DCD. ADHD “is characterized by developmentally inappropriate activity levels, impulsivity, and inattention” (Goulardins et al., 2015, p. 485) and is outlined in the DSM-5 (American Psychiatric Association, 2013). The diagnosis of ADHD is seen as a neurologically based disorder. It has an effect on behavior and learning which

commonly influences school performance negatively. Children with ADHD are often mislabeled as lazy or stubborn (Safron, 2003). The co-occurrence of ADHD with DCD, marked by specific hyperactivity has been seen more in boys (Kirby et al., 2008).

Children with both ADHD and DCD have more mental health concerns than children with just one diagnosis. The presence of both disorders are initial indicators of potential mental health concerns in the future (Lange, 2018; Missiuna et al., 2014). “Children with ADHD with DCD face dual hurdles to peer acceptance; specifically, children with ADHD frequently manifest executive deficits that impair social skill development, flexibility in responding to changes in social environments, and poor behavioral and affective self-regulation resulting in peer rejection, compounding the effects of perceptual-motor impairment on participation in activities that promote social integration” (Lange, 2018, p. 32).

### **Mental Health**

Children with DCD are at high risk of anxiety, depression (Lange, 2018), and low self-esteem along with other emotional and psychological issues (Missiuna et al., 2014; Harris et al., 2015). Research has indicated that symptoms of anxiety and depression in children with DCD are elevated compared to their typically developing peers. (Draghi, Cavalcante Neto, & Tudella, 2019; Omer, Jijon, & Leonard, 2019). Further, the psychological effects of DCD have been identified as comparable, if not greater, than a range of other chronic conditions that influence physical health (Pinquart & Shen as cited in Omer et al., 2019). Children’s perception of physical competence is reflected in low self-worth. There has been a link in perception and levels of anxiety. It has been indicated that levels of anxiety in children with DCD increases with age, as they develop the ability to notice and compare their competence to those around them (Missiuna et al., 2014).

Adults that have reflected back on childhood experiences with DCD have described high levels of anxiousness they felt during physical activities such as gym class, recess, and sports. It has been noted that this often leads to anxiety and stress around attending school and social interactions, severe enough to cause somatic responses like heart palpitations. Individuals with DCD are more likely to drop out of high school and seek help for mental health concerns as adults (Missiuna et al., 2014).

## **Social Consequences**

Social consequences of DCD are risk factors for depression and anxiety as they are more socially isolated. The lack of motor functioning is associated with lower peer acceptance and thus, fewer friendships and situations for social interaction, often leading to poor social skills (McWilliams, 2005; Missiuna et al., 2014). Previous research has identified the importance of understanding the co-occurring problems associated with DCD as lack of social communication skills as well as hyperactivity/inattention can have a profound impact on psychological outcomes and long-term mental health concerns (Harrowell et al., 2018), as previously stated. This population has a greater chance of being socially excluded and bullied (Missiuna et al., 2014). Additionally, children with DCD are often excluded from group play activities (Karras et al., 2019). The sensory-motor deficits of children with DCD might offer insight into some of the social strains seen in this population (Piek & Dyck, 2004).

A study by Izadi-Najafabadi et al. (2019) examined the participation of children with DCD in different environments including school, home, and community in relation to their typically developing peers. They found that children a significantly higher percentage of children with DCD have never socially interacted through the use of technology. It has been indicated that children with DCD do not engage with peers through texting or social media, a large cultural element of today's younger generations. Thus, the findings are concerning for the social consequence of this population (Izadi-Najafabadi et al., 2019).

## **Physical Health**

Participation in everyday activities, especially active ones, and a diverse exposure to life situations is an integral part of childhood development. These activities positively influence health, quality of life, and future life outcomes (Fong et al., 2011). "Children with coordination difficulties may be excluded from such games and, given the importance of movement play for this age group, this may eventually lead to a more general exclusion" (Smyth & Anderson as cited in McWilliams, 2005, p. 394). Children with DCD often withdraw from physical activities due to their motor skill challenges, perceived lack of ability, and peer teasing, leading to the child being over a healthy weight (Lee, Psotta, & Vagaja, 2016). There is a high-risk factor for health concerns such as obesity, cardiovascular disease, and type-2 diabetes later in life (Lange, 2018; Missiuna et al., 2014). For this population, low levels of physical activity are consistent into and throughout adulthood (Izadi-Najafabadi et al., 2019).

As previously described, children with DCD exhibit poor body balance as well as reduced hand-eye coordination. These deficits complicate upper and lower limb movement. Specifically, Ma et al. (2018) stated that poor body balance affects 73-87% of children with DCD. Due to this, they are at high risk of falling during daily life activities, potentially leading to injury which is a major concern. It has also been noted that the skeletal development of children with DCD is often compromised. The hindrance to the skeletal development of these children is reflected by bone age. It has been indicated that skeletal immaturity is linked with lower bone mineral mass and bone mineral density (Ma et al., 2018). Thus, these factors and the risk or fear of injury may create a sedentary lifestyle for children with DCD. Therefore, has been suggested that it is important to implement a form of treatment that is active, stimulating skeletal development and bone health (Ma et al., 2018).

The motor impairments that children with DCD experience create a cycle of other symptoms including physical and mental health. Lange (2018) described this relationship as a negative feedback loop that challenges further development of each component of the cycle. The perceptual-motor impairments, emotional and social health, participation and physical health and fitness are some of the main elements that make up this loop. Lange (2018) furthers this explanation by detailing the relationship of each factor:

Self- efficacy is a motivational construct, and on average, children with DCD express less hope for success in, and put less effort into, motor-dependent activities, deriving less enjoyment from them. Often, this results in avoidant coping, reduced participation in group activities such as team sports, and fewer opportunities to develop social interaction skills. Children with DCD typically spend greater time than typically developing peers in sedentary, solitary activities, and report more peer rejection, bullying, teasing, and less-perceived social support than typically developing children. Parents report that children with DCD are more frequently sad, lonely, anxious, frustrated, and angry than their peers. They derive less enjoyment from daily activities and are at higher risk for depressive and anxiety disorders in late childhood and adolescence, persisting into adulthood, and this risk may be mediated by the quality of their interpersonal relationships emphasizing the importance of diagnosis and treatment that improves participation in social, leisure, and athletic activities that provide opportunities to develop social skills. (p. 32)

In sports and other motor dependent group activities, children compare themselves to their peers. When there is a realization that their skills are not equal to those around them, they may begin to feel hopeless and frustrated and do not feel excitement around participation in such activities. As children begin to pull away due to anxiety, they are losing the opportunity to develop healthy social skills as they become more isolated, leading to depression and feelings of loneliness (Lange, 2018). Thus, everything is connected, one thing leading to the next, leading to the next, and so on and so forth.

### **Treatment**

The psychological effects of DCD are not always treated as a priority, as children with DCD are often referred to treatment for physical symptoms and functional goals. The most common referrals for children with DCD are to Occupational Therapy or Physical Therapy to assist in the development of motor skills and movement with the aim to improve tasks of everyday living (Kirby et al., 2008; Prunty et al., 2016; Watemberg, Waiserberg, Zuk, & Lerman-Sagie, 2007). “The rationale for physical therapy intervention in children with DCD is based on the assumption that muscle strengthening, improving trunk control, and repeated training with increasing degrees of difficulty improve motor control and performance, and the ability to cope with different motor tasks” (Watemberg et al., 2007, p. 921). Even so, children still have difficulty accessing physical interventions such as these, as it has been suggested that this disorder has been underdiagnosed by physicians (Watemberg et al., 2007).

Lange (2018), highlighted the important role that psychologists can play in the treatment of DCD by implementing interventions that focus on meeting the psychological needs. These psychological needs are referred to as secondary symptoms. The interventions could explore themes of self-efficacy, social relationships and isolation, and symptoms of depression and anxiety. It has been encouraged that schools should work to assimilate students with DCD into academics, extracurriculars, and play with a suggestion for schools to aid these children in finding an interest and role that incorporates both physical and social aspects (Lange, 2018).

Karras et al. (2019) found that children and their primary caregiver(s) reported significantly low quality of life in areas such as “physical well-being, psychological well-being, moods and emotions, self-perception, autonomy, parent relations and home life, social support and peers, school environment, and bullying” (Karras et al., 2019, p. 93). They suggested that as a result of high psychosocial concerns in children with DCD, treatment and interventions should

be developed and not only look at motor skills but extend and strive to improve mental health implications and the child's overall quality of life.

### **Art Therapy and Clinical Practices**

Currently, no research was found on Art Therapy and the treatment of DCD. However, Art Therapy has been shown to be beneficial in the treatment of some of the symptoms and comorbidities common to DCD including mood and depression (Deboys, Holttum, & Wright, 2017; Rahmani et al., 2016; Skov, 2015), anxiety (Curry & Kasser, 2005), and ADHD (Safron, 2003). Further, Art therapy has been used for the treatment of diagnoses that have similar motor deficits to DCD such as Parkinson's Disease (Cucca et al., 2018) and Autism Spectrum Disorder (Gabriels, 2003). It has also been used to support children suffering from social isolation, bullying, and learning difficulties that affect academic outcomes. Art processes can improve emotional well-being, develop cognitive skills, and enhance social interactions and relationships. Art Therapy engages actions of repetition, control, and coordination and may activate attention. Attentional sequences that are frequently involved in the creative and art making processes may be generalized to daily living activities (Carr & Hass-Cohen, 2008).

Throughout Western history, there has been a mind/body split in thinking and approaches to medicine. This occurrence, or split, has been reflected in health services for many years with consequential problems. Physical issues are treated with a focus on the physical body while emotional responses and psychological adjustment are not addressed with the same priority (Liebmann & Weston, 2015). However, "after being established for many years in the mental health and learning disability sectors, there is a renowned intersect in Art Therapy for people with physical conditions as the emotional components of physical illness become more recognized" (Liebmann & Weston, 2015, p. 13). The extent of Art Therapy has expanded over the years and will continue as the benefits of more holistic approaches to health services and the mental health field are better understood and valued. Further, Liebmann & Weston (2015) stated that a government report from 2014 emphasized a need for more holistic approaches to physical and mental health disorders and diagnoses (Government Response to the House of Commons Health Select Committee Report into Long-Term Conditions, 2014 as cited in Liebmann & Weston, 2015)

Art Therapy is a complex field made up of many different parts. The unique field is a combination between more traditional approaches to therapy and the world of art. It has aspects

of talk or verbal therapy but includes a strong focus on client artwork and artistic tasks. Art therapy utilizes the creative process of forming art to develop and strengthen emotional, mental, and physical prosperity of individuals of all ages, that does not rely solely on verbal communication (Rubin, 2011). The field of Art Therapy “enriches the lives of individuals, families, and communities through active art making, creative process, applied psychological theory, and human experience within a psychotherapeutic relationship” (About Art Therapy, 2017). Using art in therapy sets a foundation that allows for growth and exploration of clients underlying thoughts, feelings, and emotions. Art can be used as a tool to evoke and analyze issues through symbolism and overcome boundaries even if they are there unconscious; it is a process that comes from within (Malchiodi, 2003).

According to the American Art Therapy Association, “Art Therapy is used to improve cognitive and sensory-motor functions, foster self-esteem and self-awareness, cultivate emotional resilience, promote insight, enhance social skills, reduce and resolve conflicts and distress, and advance societal and ecological change” (About Art Therapy, 2017). It engages the mind, body, and soul through integrative methods. It involves kinesthetic, sensory, symbolic, and perceptual approaches for clients to express and communicate. Art therapy can be beneficial in a variety of settings and circumstances, with diverse populations, and approached in many ways. Art can be used to open doors, start conversations, and begin asking questions. With the guidance and support of a therapist, the floor is opened for the client to interpret their own artwork, reflecting and processing the symbolism or meanings associated with the art and how it applies to life experiences (About Art Therapy, 2017).

Art has been demonstrated to be a helpful tool for clients to organize and calm anxiety (Curry & Kasser, 2005) and improve mood (Skov, 2015). One study found that the simple act of coloring preprinted mandalas reduced client’s anxiety (Curry & Kasser, 2005). Skov (2015) stated “Research on Art Therapy in relation to depression and quality of life in general show a positive influence” (p. 103).

Individuals with Autism Spectrum Disorder may exhibit similar motor challenges to those of children with DCD. Some motor difficulties often seen with Autism are poor motor imitation and motor planning (Gabriels, 2003). As previously discussed, a common trait of DCD is the inability to consider the end goal of a movement or motor task, which can be defined as motor planning (Adams et al., 2016). Thus, for both populations, it can be difficult to bring the

end results of movement into awareness. Research on Autism and motor skills has suggested that motor planning complications are minimized when an individual is offered opportunities to practice motor movements and when more multifaceted motor tasks are broken down into smaller steps and combined with a series of visual cues (Rogers as cited by Gabriels, 2003).

Gabriels (2003) stated:

Art therapy can provide an arena for the child with autism to practice motor coordination and imitation skills through a variety of activities such as cutting, gluing, drawing, and painting. It is important to first have the child master these skills during one-on-one instruction before expecting the child to participate in a multistep art project and/or a group activity setting. Teaching basic tool use and drawing imitation skills has implications for later writing skills. (p. 197)

Gabriels (2003) emphasizes the importance of allowing children to advance their motor skills individually, in a safe and supportive environment before taking moving on to a bigger task with potentially more people. Working in this way, one step at a time, might make a group activity seem more approachable, as the basic skills were practiced prior.

Safron (2003), highlighted a few specific advantages of Art Therapy as a form of treatment for children with ADHD: (1) it is an age appropriate activity for children, (2) it utilizes visual learning skills, (3) it provides structure to therapy sessions, and (4) it offers children a method of expression. The product or artwork created in art therapy, provides children with a direct and visual record of the feelings or ideas expressed or discovered. Individuals with ADHD frequently have trouble remembering what has been learned, the artwork acts as a way to reencounter feelings or thoughts, consequently establishing a new format for learning and making the learning easier. Group therapy might be a more successful form of treatment for children with ADHD than individual therapy. Group Art Therapy can be beneficial in normalizing experiences and concerns related to living with the disorder, sharing universal issues, and learning social skills (Safron, 2003).

Art expression is preverbal and does not rely solely on words to be created or shared. Children with insufficient vocabulary to express deep feelings and emotions, might benefit from nonverbal communications in therapy to explain and process them. For some children, art may become the primary form of communication in therapy. Art can be used as a tool to aid others in understanding the experiences of individuals with ADHD, that cannot be explained with words

alone (Safron, 2003). It has been emphasized the importance of working alongside other professionals, especially school resources when working with children who have a myriad of challenges that impact numerous areas of their daily living (Ellison as cited in Safron, 2003).

Hinz (2009), discussed how incorporating the kinesthetic art process can be particularly helpful in accessing preverbal material. Kinesthetic movement is viewed as a basic level of expression. There has been evidence that kinesthetic activity enhances academic functioning. Some individuals might be uncomfortable with the kinesthetic element and may even have an aversion to them. This could be a result of the body-kinesthetic sense not being well developed as the cognitive forms of information processing. Some kinesthetic activities offer increased memory functioning and foster life satisfaction (Hinz, 2009).

When working with children that struggle with motor skills, it has been suggested that Art Therapists should reduce the emphasis on the art product because lack of fine motor control can make the product less pleasing than the child may have liked. Instead, the focus should be put on what the child has learned as a result of engaging in the art making process. Art Therapists should introduce slow and careful contemplation of the structure of forms, cause and effect thinking, and control over actions as the child begins to gain more cognitive regulation of their behavior or movements when working with kinesthetic art making processes (Hinz, 2009).

A case report by Kim, Kim, Lee, & Chun (2008) used Art Therapy as rehabilitation for a client who had suffered from a stroke. The results as indicated by several estimation tools, indicated that the client had improved cognitive function, visual-perception capability, and motor function improvement after 10 weeks of twice a week session. Art therapy was also beneficial in that it lowered the clients stress levels. It was reported that there was improvement of limb functioning and occupational capability. "In this respect, art therapy shows very similar results to those of typical occupational therapy" (Kim et al., 2008, p. 133). The report described the use of clay in a kinesthetic manner to have therapeutic effects on the clients sensory and motor function. Further, it has been stated that Art Therapy allows for the possibility to observe improvements of motor function (Kim et al., 2008).

An Art Therapy article by Cucca et al. (2018) highlighted the importance of considering a holistic, multidisciplinary approach to treatment to combat both physical/motor symptoms and psychological symptoms when referring to Parkinson's disease (PD) which has similar aspects to DCD. The psychological symptoms that were discussed are similar to those of individuals with

DCD such as negative influence on mood, self-efficacy, and overall life and negative influences on daily activities. This population also has high rates of depression and anxiety. As with DCD, the primary physical symptoms of PD are motor impairments. It has been explained, "... complementary therapeutic strategies may hold therapeutic potential, striving towards the restoration of functional independence and maintenance of quality of life" (Cucca et al., 2018, p. 1). It has been indicated that ideally there should be physical and occupational therapy psychological support and counseling, potentially for the whole family or affected unit if needed (Cucca et al., 2018). Another study suggested that children with coordination difficulties have an impact on the entire family system specifically, prenatal stress. The article also emphasized the importance and need for a wider variety of treatments and supports (Takahashi et al., 2017).

Art Therapy provides a safe space for individuals to express strong feelings and emotions such as depression, as the art acts as a third space without having to verbally engage. Subsequently, Music Therapy has also been suggested to help with states of both depression and anxiety due to its cognitive nature, improving mood and increasing communication (Rahmani, Saeed, & Aghili, 2016). A study by Rahmani et al. (2016), indicated that depression rates in youth can be reduced by implementing Art and Music Therapies. Another study by Deboys et al. (2017), stated that Art Therapy among school-aged children enabled expression and therefore, improved mood, confidence, communication, and understanding. Further, it suggested that this led to stronger resilience and better learning. The importance of Art Therapy to support children's social and emotional health was highlighted (Deboys et al., 2017).

A school-based Art Therapy program in Israel focused on emotional exploration and awareness-insight. The goal of the program was to contribute to the social, academic and emotional adjustment of children with a learning disability. The results were favorable and suggested that the once a week art therapy increased the children's adjustment in all areas after 22 weeks of one hour per week treatment. (Freilich & Shechtman, 2010).

Lastly, A study by Kaimal & Ray (2017) that looked at the effectiveness of open studio Art Therapy, offered to healthy male and female adults, reported results indicate an increase in self-efficacy after free art making. Another study conducted by Kaimal, Ray, & Muniz (2016) tested participants cortisol levels of healthy adults after a 45-minute art session. The results indicated significantly lower cortisol levels after the art making. Further, participants reported

that they learned about themselves, experienced a process of initial struggle followed by resolution, and they were immersed in a flow state during the art making process.

As there was no literature found on Art Therapy and DCD, other modalities within Creative Arts Therapy were explored but the information and resources were still limited. However, an article by Roy & Dock (2014) was found on the topic of Drama Therapy and mask making for clients with DCD. They demonstrated how Drama Therapy and more specifically, mask working within the context of Drama Therapy, could be used with this population. Working on developing skills in a setting like Drama Therapy allows the child to apply them in a way that is empowering where they do not feel targeted. The skills, especially motor skills, are then able to be applied, as they are learned, to everyday life tasks. The therapy setting is non-competitive and therefore, ideally, non-threatening. “With the freedom and challenge that drama offers, and by developing the fundamental core skills, the general capabilities and key competencies, children can be nurtured to their fullest potential. Creativity is core to higher-order thinking and educational success” (Roy & Dock, 2014, p. 372). They argue that mask work gives the client an opportunity to work on gross and fine motor skills, speech sensory integration, and emotional and social elements. The masks are both an art and drama element, meeting many of the needs of a child with DCD.

The treatment of DCD has primarily focused on physical needs and support for daily life tasks. There was very little literature found that addressed treatment for psychological aspects of the disorder and even less for both psychological and physical. However, the research discussed does highlight a need for a more awareness around the psychological symptoms of the disorder. Currently, no treatment was found that is bridging the gap between psychological the physical needs and functional goals of this population. Therefore, as psychological needs are not being addressed at the same rate, children with DCD are experiencing difficulty understanding the importance of physical interventions and how it contributes to their overall quality of life. As outlined, Art Therapy has been used with similar diagnoses and disorders as well as comorbidities of DCD. The next session will connect these points and discuss the potential for the use of Art therapy to address the psychological domain of DCD while taking into consideration the physical needs and abilities of the child.

## Discussion

Although the researcher was unable to find previous literature on DCD and Art Therapy, the research suggests that Art Therapy may be a promising form of treatment for children with DCD. The vast application and potential within the field of Art Therapy has suggested that it is an applicable method of treatment for a variety of diagnoses and disorders. Art Therapy has been used to address many of the secondary symptoms associated with DCD and demonstrated to be beneficial in many instances. Since children with DCD often have trouble with verbal communication and language (Dewey et al., 2002), art is an ideal form of expression, processing, and communication as it is preverbal (Hinz, 2009; Safron, 2003).

Sensory-motor function, a deficit of DCD (Piek & Dyck, 2004) is an area that Art Therapy has been indicated to improve as stated by the American Art Therapy Association (as cited in About Art Therapy, 2017). Children with DCD experience perceptual discrepancies in both the kinesthetic and the visual primary sensory systems (Piek & Dyck, 2004). Kinesthetic expression is a common element that many Art Therapists incorporate into their practice. Working on a kinesthetic processing level might be helpful for this population, although they may be resistant or unsure to the kinesthetic element. Art Therapists should introduce slow and careful contemplation of the structure of forms, cause and effect thinking, and control over actions as the child begins to gain more cognitive regulation of their behavior or movements when working with kinesthetic art making processes (Hinz, 2009).

The right-hemispheric visuospatial perception is activated during the process of art making and linear processing is activated in the left-hemisphere of the brain is engaged during verbal or written responses in Art Therapy (Rubin, 2016). Art has the ability to stimulate visual pathways and motivate self-narratives, as well as facilitate emotional processing and expression, while strengthening accessible and existing language, memory, socialization and visuospatial functions (Carr & Hass-Cohen, 2008). Carr & Hass-Cohen (2008), suggest working with pre-cut shapes and images for interventions such as collaging, to support visuospatial functioning. They state that this material and technique can be used at all levels of impairment. Although collage is often identified as a cognitive task (Hinz, 2009), the elements of cutting and gluing present with the use of the material, may be a media option when working with this population as some of the common struggles seen in school are these tasks (American Psychiatric Association, 2013; Missiuna et al., 2014; Harris et al., 015) and might be a useful form of assessment for the Art

Therapist. Precut images that only require gluing would coincide with Carr & Hass-Cohen's (2008) suggestion of using pre-cut shapes.

Art Therapists should evaluate media choice or material and modify the structure for clients who have limited motor function and motor impairments. This requires flexibility and openness from the Art Therapist to adjust to both the physical and cognitive needs of the client. For example, if the manipulation of plasticine clay is too hard for the client, the therapist could adapt and offer the client a softer clay such as play-dough. The motor skills required for the use of diverse media should be acknowledged by the therapist. Then the therapist should examine the succession of actions required for the specific material to ensure that the intervention and process are appropriate. It is advocated that intentional, consistent arrangements and organization of tools and materials on the work surface should be prepared by the therapist as the spatial order directs the child in the accurate performance sequence. To promote autonomy, it is suggested to facilitate the finding and selecting of materials with maximum independence, the storage and presentation of supplies must be consistent with sensory and motor skills. This allows for a successful experience and builds confidence, facilitates self-efficacy, and encourages participation. Proximity of work surface and storage areas, accessibility of supplies and quantity of materials should be considered. An adaptation suggestion for clients with motor impairments was to attach a broad piece of foam or rubber to the paintbrush handle, allowing for additional grip and increased control of the tool. (Auch-Feldman & Kunkle-Miller, 2016). By considering the client's physical needs by adapting the space to lesson injury, while the intentional and well-organized room also encourages increased autonomy. Hinz (2009) inferred that focus should be put on the process not the product when working with children who struggle with motor skills.

Art Therapy has been used and demonstrated to be adaptable for clients with motor impairments (Cucca et al., 2018; Gabriels, 2003; Kim et al., 2008). In the case of the article by Gabriels (2003), Art Therapy brought movement into awareness for clients with Autism. As discussed, there are commonalities between the motor difficulties seen in individuals with Autism and those with DCD, including motor planning complications. Gabriels (2003) indicated that Art Therapy minimized motor planning complications by implementing motor movement practice opportunities within the sessions as well breaking down motor tasks into steps and assigning them to a visual cue. The article discussed implementing tasks in the therapy context that can be translated to application out of therapy. Further, Gabriels (2003) was able to work on

the physical, motor aspects of Autism while staying within the Art Therapy scope of practice. As this is a very similar impairment across the populations, it denotes promise for the application of Art Therapy with DCD.

Art Therapy has also been used extensively with ADHD and as DCD and ADHD are so highly comorbid, it seems important to note. Safron (2003), articulated the benefits and goals of Art Therapy with ADHD. Many of the points that she made are applicable to children with DCD and align with some of the potential aims of what Art Therapy might look like with this population. Specifically, in the group format, themes of normalizing experiences and concerns related to the disorder, sharing universal issues and learning social skills emerged (Safron, 2003). As Lange (2018) reported, children with DCD experience isolation and struggle with social relationships and need more psychological treatment and support. A group therapy may offer the normalization and social skill practice that seems to be missing from this population.

Since children with DCD are often excluded from group activities, leading to general expulsion and reduced participation, leaving the child feeling isolated (Karras et al., 2019; Lange, 2018; McWilliams, 2005), a group format may be an ideal form of treatment however, there are some factors that should be considered. For example, when working with clients diagnosed with Autism who have motor impairments, Gabriels (2003), encouraged that children master some skills individually before joining a group. There are both pros and cons to both group and individual therapy for children with DCD and therefore, it is suggested that the risks and benefits be assessed or considered on a case to case basis as with clients from any population.

Yalom (2005), stated that those that are a part of a cohesive group are likely to feel a sense of belonging and comfort within the group. Members regularly feel valued, supported, and accepted by the other group members. It is noted that an engaged and cohesive therapeutic alliance or relationship is a crucial part of all therapies, even those that take a more mechanistic stance such as cognitive or behavior approaches. Yalom (2005) discussed that being or feeling accepted by others when sharing the inner workings of the personal world is vital. Cohesive therapy groups should generate a positive and self-reinforcing circle of trust, self-disclosure, empathy, acceptance, and then, back to trust.

Many clients do not have a stable or positive history of being part of a group. Meaning, they have not previously been a valued and integral part of a group. Thus, some members may not know how to interact in a group setting, especially in regard to therapy. For these clients,

“sheer successful negotiation of a group experience may in itself be curative.” (Yalom, 2005, p. 57). Belonging in a cohesive group, contributing to its prosperity, and internalizing the atmosphere, has the potential to increase self-esteem and offers the potential to meet client’s dependency needs in ways that encourage responsibility and increased autonomy. It is often inevitable, to have clients who resist the group for a multitude of reasons, whether it is conscious or unconscious, which can lead to blatantly deviant behavior that attacks the group and in turn, isolates themselves (Yalom, 2005). As many children with DCD have not previously had positive peer interactions and group experiences, this is necessary to note.

Art Therapy in the context of the rehabilitation of motor functioning after a stroke was reported as being successful. As previously described, Art Therapy outcomes and results were similar to those often seen in Occupational Therapy. The art materials and media offered the therapist to observe improvements in motor functioning through the art making processes as treatment progressed (Kim et al., 2008). This highlights another area that indicates Art Therapy may be successful in addressing symptoms of DCD. It offers the Therapist and the client an opportunity to observe progress. The artwork could act as a source to increase this population’s self-esteem and self-efficacy. This may be especially true if the process is the focus and not necessarily the product. By facilitating the child’s ability to succeed in the action of the making and with the materials, it allows for their motivation and participation to be heightened. This was previously discussed specifically in relation to accessibility to art supplies and room set-up as well as the process being the main focus.

Since art is something that can be observed and is often visual and tangible (Kim et al., 2008) it may help children to develop a self-awareness of the body (Roy & Dock, 2014). The art allows the child to see the end result of their movements or actions. Adams et al. (2016) talked about children with DCD having trouble with action planning tasks as they have a hard time visualizing the end goal of their movements. Engaging in an art process allows clients to manipulate materials and observe how the action of doing so creates different outcomes. The product of the artwork is different based on how the child moves.

By engaging with art materials, the children are able to apply fine motor movements and develop the movements that are needed for academic tasks and schoolwork such as handwriting. Promoting the discussion of artwork creates a situation for children with DCD to work on their oral and language within the frame of the therapy session. Ideally, this would reinforce capability

with a positive experience becoming a transformative process that the client is then able to carry over or transition into their everyday life activities. When all of these separate factors are considered in harmony, the opportunities to expand how Art Therapy is considered and applied with more diagnoses and symptoms. It seems that with the nature and innate elements of Art Therapy, that while working on the psychological domain you would simultaneously be stimulating the more physical domains of DCD.

### **Limitations**

Due to the immense nature of this topic and the limited scope of this theoretical research, certain limitations with respect to the literature and structure of the paper are relevant to the discussion. The sources used in this research paper denote a small portion of the literature available on the topics at hand. Based on the outcome of the searches and the vast quantity of articles from across the world that appeared, the topic of DCD seems to be especially popular in the current academic literature. It was attempted to use a selection of sources from different fields to have a well-informed understanding of the populations needs and gaps in treatment. As this paper outlined only a fraction of the literature available on both DCD and Art Therapy, much is still needed to be reviewed in order to offer an exhaustive analysis of the topics.

Additionally, the literature reviewed is predominantly based on North American and Western European data and authors. This could mean a certain limit in terms of multicultural and diverse perspectives on the topics of development, motor skills, and therapeutic treatment for DCD due in part to limits with regards to language and accessibility of non-European/American publications. A wider and more diverse sample of sources could be valuable in establishing a well-rounded and comprehensive study on the topic of art therapy as a treatment for the psychological symptoms of DCD and the incorporation of appropriate motor skill development within the practice and art materials.

The theoretical nature of this research paper allows only for the synthesis and integration of several concepts and ideas, which should be emphasized. It is not meant to endorse a Specific Art Therapy intervention for children with DCD. Thus, further studies and research could be done grounded on the integration of literature presented to eventually come up with an applicable and appropriate intervention model for the treatment of DCD with Art Therapy. Again, the theoretical nature of this research type allows only for conclusions that are strictly at a level of hypothesis.

## **Implications, Recommendations, and Considerations**

As the previous pages outlined, DCD in many ways is a multifaceted disability. Not only does this disorder impair children's movements and motor functioning, it impacts their everyday lives and participation, leading to long-term mental health concerns. This disorder, that is often seen as physical, can have lasting psychological consequences. Due to the multitude of symptoms associated with DCD, treatment approaches might seem overwhelming. Thus, future research might look more specifically at how professionals can work together to address the disorder in a more practical and well-rounded way.

Based on previous research on Art Therapy and similar disorders and what is known about DCD in regard to both the physical and psychological symptoms Art Therapy seems like a promising field for future treatment of DCD. The articles discussed highlight how Art Therapy has been used and how it can be implemented to support children with this disorder in the psychological domain while also considering and stimulating the physical domain. It is suggested that if Art Therapists work with clients that have DCD that they consult with an Occupational or Physical Therapist upon the beginning of treatment. This may support the Art Therapist in best practice and ensure that they are well informed about the child's history and health concerns. It is recommended that the Therapist also gather information from the child's school to have an idea of what their academic strengths and struggles are as well as their interactions with peers. Parent reports of the child's everyday life and mental health concerns can be a crucial element of the case formulation and aid for the development of therapy goals. This information can also offer the therapist information on whether to see the child in a group format or individually based on their initial needs.

Art Therapy can work to facilitate and support children in times of assimilation whether in school or the community. Group Art Therapy is suggested as an outlet to allow children to find commonality among other peers. The group could be implemented in a school district or city so children from all around within a certain age range could participate, acting as a way to address the isolation that is often experienced while working on art that emphasizes both fine and gross motor skills. To emphasize the integration of these motor skills and help clients with DCD to be successful, it is recommended that the Art Therapist consider the materials being used, the room setup and accessibility, and make accommodations for the children as needed. Working

with clients that have both physical and psychological needs requires the therapist to be especially thoughtful and flexible in the practice.

### **Conclusion**

A significant concern has been outlined for children with DCD in regard to above average mental health issues and psychological distress. This highlights the importance and need for more holistic treatment that not only includes the physical but the psychological needs as well. As Art Therapy is a field that has experience with and knowledge about working with some of the specific psychological symptoms, it can be used to fill the gap between body and mind in the treatment of children with DCD. Due to the nature of the psychological symptoms and comorbidities of DCD, Art Therapy appears to be a particularly beneficial options for addressing the needs of the population. The research that supports the use of art making and with the use of different material for motor skills is promising. While there is currently little research linked between Art Therapy and DCD, more work is needed on this specific topic. Future research might look further into how Art Therapy interventions can be used in the treatment of children with DCD, as no current research was found on the topic. Other professions to refer to when considering future research are school counselors and school psychologists as schools are often the first place that DCD is formally identified, before being referred to an Occupational Therapist. Overall, it is important for the research to continue, as there is a need for a more holistic approach in the treatment of DCD. The physiological, social, and emotional implications should have just as much support as the physical symptoms.

## References

- About Art Therapy*. (2017). American Art Therapy Association. Retrieved January 15, 2019, from [www.arttherapy.org/aboutart.htm](http://www.arttherapy.org/aboutart.htm)
- Adams, I. L. J., Ferguson, G. D., Lust, J. M., Steenbergen, B., & Smits-Engelsman, B. C. M. (2016). Action planning and position sense in children with Developmental Coordination Disorder. *Human Movement Science, 46*(1), 196–208. <https://doi.org/10.1016/j.humov.2016.01.006>
- Adams, I. L. J., Lust, J. M., Wilson, P. H., & Steenbergen, B. (2014). Compromised motor control in children with DCD: A deficit in the internal model? – A systematic review. *Neuroscience and Biobehavioral Reviews, 47*(1), 225–244. <http://dx.doi.org/10.1016/j.neubiorev.2014.08.011>.
- Asonitou, K., & Koutsouki, D. (2016). Cognitive process-based subtypes of developmental coordination disorder (DCD). *Human Movement Science, 47*(1), 121–134. <https://doi.org/10.1016/j.humov.2016.01.002>
- Auch-Feldman, S., & Kunkle-Miller, C. (2016). Developmental art therapy. In R. Judith (Ed.), *Approaches to art therapy: Theory and technique* (3rd ed., pp. 435–451). New York, NY: Routledge.
- Brown-Lum, M., & Zwicker, J. G. (2017). Neuroimaging and occupational therapy: Bridging the gap to advance rehabilitation in Developmental Coordination Disorder. *Journal of Motor Behavior, 49*(1), 98–110. <https://doi.org/10.1080/00222895.2016.1271295>
- Carr, R., & Hass-Cohen, N. (2008). *Art therapy and clinical neuroscience*. London: Jessica Kingsley Publishers.
- Chen, H., & Cohn, E. (2017). Social participation for children with Developmental Coordination Disorder: Conceptual, evaluation and intervention considerations. *Physical & Occupational Therapy in Pediatrics, 23*(4), 61–78. <https://doi.org/10.1080/J006v23n04>
- Cucca, A., Acosta, I., Berberian, M., Lemen, A. C., Rizzo, J. R., Ghilardi, M. F., Biagioni, M. C. (2018). Visuospatial exploration and art therapy intervention in patients with Parkinson's disease: an exploratory therapeutic protocol. *Complementary Therapies in Medicine, 40*(1), 70–76. <https://doi.org/10.1016/j.ctim.2018.07.011>
- Curry, N. A., & Kasser, T. (2005). Can coloring mandalas reduce anxiety? *Art Therapy, 22*(2), 81–85. <https://doi.org/10.1080/07421656.2005.10129441>

- Deboys, R., Holttum, S., & Wright, K. (2017). Processes of change in school-based art therapy with children: A systematic qualitative study. *International Journal of Art Therapy: Inscape*, 22(3), 118–131. <https://doi.org/10.1080/17454832.2016.1262882>
- Dewey, D., Kaplan, B. J., Crawford, S. G., & Wilson, B. N. (2002). Developmental coordination disorder: Associated problems in attention, learning, and psychosocial adjustment. *Human Movement Science*, 21(5–6), 905–918. [https://doi.org/10.1016/S0167-9457\(02\)00163-X](https://doi.org/10.1016/S0167-9457(02)00163-X)
- Draghi, T. T. G., Cavalcante Neto, J. L., & Tudella, E. (2019). Symptoms of anxiety and depression in schoolchildren with and without developmental coordination disorder. *Journal of Health Psychology*. <https://doi.org/10.1177/1359105319878253>
- Fong, S. S. M., Lee, V. Y. L., Chan, N. N. C., Chan, R. S. H., Chak, W. K., & Pang, M. Y. C. (2011). Motor ability and weight status are determinants of out-of-school activity participation for children with developmental coordination disorder. *Research in Developmental Disabilities*, 32(6), 2614–2623. <https://doi.org/10.1016/j.ridd.2011.06.013>
- Freilich, R., & Shechtman, Z. (2010). The contribution of art therapy to the social, emotional, and academic adjustment of children with learning disabilities. *Arts in Psychotherapy*, 37(2), 97–105. <https://doi.org/10.1016/j.aip.2010.02.003>
- Gabriels, R. (2003). Art therapy with children who have Autism and their families. In C. Malchiodi (Ed.), *Handbook of art therapy* (pp. 193–206). New York, NY: Guilford Press.
- Goulardins, J. B., Rigoli, D., Licari, M., Piek, J. P., Hasue, R. H., Oosterlaan, J., & Oliveira, J. A. (2015). Attention deficit hyperactivity disorder and developmental coordination disorder: Two separate disorders or do they share a common etiology. *Behavioural Brain Research*, 292(1), 484–492. <https://doi.org/10.1016/j.bbr.2015.07.009>
- Harris, S. R., Mickelson, E. C. R., & Zwicker, J. G. (2015). Diagnosis and management of developmental coordination disorder. *CMAJ*, 187(9), 659–665. <https://doi.org/10.1503/cmaj.140994>
- Harrowell, I., Hollén, L., Lingam, R., & Emond, A. (2018). The impact of developmental coordination disorder on educational achievement in secondary school. *Research in Developmental Disabilities*, 72(1), 13–22. <https://doi.org/10.1016/j.ridd.2017.10.014>
- Hinz, L. D. (2009). *Expressive therapies continuum: A framework for using art in therapy*. New York, NY: Routledge.

- Izadi-Najafabadi, S., Ryan, N., Ghafooripoor, G., Gill, K., & Zwicker, J. G. (2019). Participation of children with developmental coordination disorder. *Research in Developmental Disabilities, 84*(1), 75–84. <https://doi.org/10.1016/j.ridd.2018.05.011>
- Kadesjö, B., & Gillberg, C. (1999). Developmental coordination disorder in Swedish 7-year-old children. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*(7), 820–828. <https://doi.org/10.1097/00004583-199907000-00011>
- Kaimal, G., & Ray, K. (2017). Free art-making in an art therapy open studio: Changes in affect and self-efficacy. *Arts and Health, 9*(2), 154–166. <https://doi.org/10.1080/17533015.2016.1217248>
- Kaimal, G., Ray, K., & Muniz, J. (2016). Reduction of cortisol levels and participants' responses following art making. *Art Therapy, 33*(2), 74–80. <https://doi.org/10.1080/07421656.2016.1166832>
- Karras, H. C., Morin, D. N., Gill, K., Izadi-Najafabadi, S., & Zwicker, J. G. (2019). Health-related quality of life of children with Developmental Coordination Disorder. *Research in Developmental Disabilities, 84*(1), 85–95. <https://doi.org/10.1016/j.ridd.2018.05.012>
- Kim, S. H., Kim, M. Y., Lee, J. H., & Chun, S. (2008). Art therapy outcomes in the rehabilitation treatment of a stroke patient: A case report. *Art Therapy, 25*(3), 129–133. <https://doi.org/10.1080/07421656.2008.10129593>
- Kirby, A., Sugden, D., Beveridge, S., & Edwards, L. (2008). Developmental co-ordination disorder (DCD) in adolescents and adults in further and higher education. *Journal of Research in Special Educational Needs, 8*(3), 120–131. <https://doi.org/10.1111/j.1471-3802.2008.00111.x>
- Lange, S. M. (2018). ADHD and Comorbid Developmental Coordination Disorder: Implications and recommendations for school psychologists. *Contemporary School Psychology, 22*(1), 30–39. <https://doi.org/10.1007/s40688-017-0122-5>
- Lee, D., Psotta, R., & Vagaja, M. (2016). Motor skills interventions in children with developmental coordination disorder: A review study. *European Journal of Adapted Physical Activity, 9*(2), 20–29. <https://doi.org/10.5507/euj.2016.007>
- Liebmann, M., & Weston, S. (2015). Introduction. In M. Liebmann & S. Weston (Eds.), *Art Therapy with Physical Conditions* (pp. 13–29). London, UK: Jessica Kingsley Publishers.

- Ma, A. W. W., Fong, S. S. M., Guo, X., Liu, K. P. Y., Fong, D. Y. T., Bae, Y. H., Tsang, W. W. N. (2018). Adapted taekwondo training for prepubertal children with Developmental Coordination Disorder: A randomized, controlled trial. *Scientific Reports*, 8(1), 1–9. <https://doi.org/10.1038/s41598-018-28738-7>
- Malchiodi, C. A. (Ed.) (2003). *Handbook of art therapy*. New York, NY: Guilford Press.
- McWilliams, S. (2005). Developmental coordination disorder and self-esteem: Do occupational therapy groups have a positive effect? *British Journal of Occupational Therapy*, 68(9), 393–400. <https://doi.org/10.1177/030802260506800903>
- Missiuna, C., Cairney, J., Pollock, N., Campbell, W., Russell, D. J., Macdonald, K., Cousins, M. (2014). Psychological distress in children with developmental coordination disorder and attention-deficit hyperactivity disorder. *Research in Developmental Disabilities*, 35(5), 1198–1207. <https://doi.org/10.1016/j.ridd.2014.01.007>
- Omer, S., Jijon, A. M., & Leonard, H. C. (2019). Research Review: Internalising symptoms in developmental coordination disorder: a systematic review and meta-analysis. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 60(6), 606–621. <https://doi.org/10.1111/jcpp.13001>
- Piek, J. P., & Dyck, M. J. (2004). Sensory-motor deficits in children with developmental coordination disorder, attention deficit hyperactivity disorder and autistic disorder. *Human Movement Science*, 23(3-4), 475–488. <https://doi.org/10.1016/j.humov.2004.08.019>
- Prunty, M., Barnett, A. L., Wilmut, K., & Plumb, M. (2016). Visual perceptual and handwriting skills in children with Developmental Coordination Disorder. *Human Movement Science*, 49(1), 54–65. <https://doi.org/10.1016/j.humov.2016.06.003>
- Rahmani, M., Saeed, B. B., & Aghili, M. (2016). Integrating effect of art and music therapy on depression in adolescents. *Journal of Educational Sciences & Psychology*, 6(2), 78–87.
- Roy, D. and Dock, C. (2014), Dyspraxia, drama and masks: Applying the school curriculum as therapy, *Journal of Applied Arts & Health*, 5(3), 369-375. <https://doi.org/10.1386/jaah.5.3.369>
- Rubin, J. A. (Ed.). (2016). *Approaches to art therapy: Theory and technique* (3rd ed.). New York: Routledge.
- Rubin, J. A. (2011). *The Art of art therapy* (2nd ed.) New York: Routledge.

- Safran, D. (2003). An art therapy approach to attention-deficit/hyperactivity disorder. In C. Malchiodi (Ed.), *Handbook of art therapy* (pp. 181–192). New York, NY: Guilford Press.
- Smyth M. M., & Anderson H. I. (2000). Coping with clumsiness in the school playground: Social and physical play in children with coordination impairments. *British Journal of Developmental Psychology*, *18*(1), 389-413.
- Takahashi, M., Adachi, M., Takayanagi, N., Yasuda, S., Tanaka, M., Osato-Kaneda, A., Nakamura, K. (2017). Coordination difficulties in preschool-aged children are associated with maternal parenting stress: A community-based cross-sectional study. *Research in Developmental Disabilities*, *70*(1), 11–21. <https://doi.org/10.1016/j.ridd.2017.08.002>
- Tsai, C. L., Chang, Y. K., Hung, T. M., Tseng, Y. T., & Chen, T. C. (2012). The neurophysiological performance of visuospatial working memory in children with developmental coordination disorder. *Developmental Medicine and Child Neurology*, *54*(12), 1114–1120. <https://doi.org/10.1111/j.1469-8749.2012.04408.x>
- Waternberg, N., Waiserberg, N., Zuk, L., & Lerman-Sagie, T. (2007). Developmental coordination disorder in children with attention-deficit-hyperactivity disorder and physical therapy intervention. *Developmental Medicine and Child Neurology*, *49*(12), 920–925. <https://doi.org/10.1111/j.1469-8749.2007.00920.x>