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Dance/Movement Therapy as an Intervention for Children with Autism Spectrum Disorders

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Abstract Autism Spectrum Disorder (ASD) is one of the most common forms of developmental disabilities of childhood, rooted in atypical language and social development, in conjunction with repetitive and patterned behaviors. It is also suggested that gross and fine motor impairments are a core feature of ASD, are more prevalent in comparison to the general population, and may be further exaggerated due to reduced participation in physical activity. As awareness for ASD has increased, so have the number of therapeutic approaches; however, no single intervention has proven beneficial in alleviating the cardinal symptoms of ASD. Therefore the most effective treatment or combination of treatments remains inconclusive. Creative movement and dance is a practical and feasible option for children with ASD. However, there exists a dearth of literature evaluating dance/movement therapy (DMT) for children with ASD, despite providing both physical and psychological benefits for children with ASD. This article aims to perform a narrative review of the literature.

Keywords Autism Spectrum Disorder · Children · Dance/movement therapy

Introduction

In 1911, Eugen Bleuler coined the term *autism* from the Greek word *autos*, meaning *self*. The term originally referred to a basic disturbance in schizophrenia, in short,

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"detaching oneself from outer reality along with a relative or absolute predominance of inner life" (Bleuler, 1911/1950, p. 304). It was not until 1943 that Leo Kanner identified infantile autism as a unique syndrome during a case study of eleven children who shared numerous common characteristics, possessing, from birth, what he called an *extreme autistic aloneness* and an *insistence on sameness* (Folstein & Rosen-Sheidley, 2001; Kanner, 1943). The following year, in a separate case study of children, Hans Asperger used *autistic psychopathy* to describe similar observations. Overall, both Kanner and Asperger believed that the children suffered from a fundamental disturbance that gave rise to highly characteristic problems (Folstein & Rosen-Sheidley, 2001).

Autism Spectrum Disorder (ASD) is one of the most common neurodevelopmental disabilities of childhood. Prevalence rates are estimated at 60–70/10,000 (Fombonne, 2009), and recent reports suggest one in every 68 children is diagnosed (Baio, 2014). A pervasive developmental disorder by origin, the abilities of children with ASD are rooted in atypical language and social development, in conjunction with patterned and repetitive behaviors (American Psychiatric Association, 2000, 2013; Rinehart, Bradshaw, Brereton, & Tonge, 2002).

Diagnosis and Etiology

Autism Spectrum Disorder is typically diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000, 2013) or the International Classification of Diseases (ICD) (World Health Organization, 1993). However, measures such as the Behavior Rating Instrument for Autistic and Other Atypical Children (BRIAAC) (Ruttenberg, Dratman, Fraknoi, & Wenar, 1966; Ruttenberg, Kalish, Wenar, & Wolf, 1974; Ruttenberg, Wolf-Schein, & Wenar, 1991), Childhood Autism Rating Scale (CARS; Schopler, Reichler, DeVellis, & Daly, 1980; Schopler, Reichler, & Renner, 1988) and Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000; Lord, Rutter, DiLavore, & Risi, 1999) among other assessments are also used, particularly in research (Lord et al., 2005). The BRIAAC (Ruttenberg et al., 1991) is "one of the earliest measures of autism" (Butler & Lord, 2013, p. 419), which uses direct observation to assess children of all ages with ASD, in terms of: relationship to an adult, communication, drive for mastery, vocalization and expressive speed, sound and speech reception, social responsiveness and psychobiological development. In comparison, the CARS (Schopler et al., 1988) rates children on a scale from 1 (age appropriate) to 4 (severely abnormal) based on observations of relationships with people, body awareness, relation to nonhuman objects, affect, verbal and nonverbal communication and adaptation to change. Finally, the ADOS (Lord et al., 1999, 2000) is a "semistructured assessment of social interaction, communication, play and imaginative use of materials" (Lord et al., 2000, p. 205).

Since Autism was first introduced by Kanner (1943, 1944), speculation about the etiology has varied from biological to psychological, with some research (Folstein & Rosen-Sheidley, 2001; Schroeder, Desrocher, Bebko, & Cappadocia, 2010; Szatmari, 2003) suggesting the roots lay in genetics. It is understood that ASD is a

neurodevelopmental disorder that originates in prenatal brain development and continues throughout the lifespan (Amaral, Schumann, & Nordahl, 2008; Brambilla et al., 2003; Chandana et al., 2004; Courchesne, 2002; Folstein & Rosen-Sheidley, 2001; Hooper, Boyd, Hynd, & Rubin, 1993; O'Hearn, Asato, Ordaz & Luna, 2008; Schroeder et al., 2010). Evidence supports normative brain size at birth (Amaral et al., 2008; Courchesne, 2002; O'Hearn et al., 2008); however, macroencephaly has been observed in anywhere from 25 to 70 % of children (Bolton, Roobol, Allsopp, & Pickles, 2001; Courchesne, 2002; Lainhart, 2006). Volume enlargement between ages two and four coincide with the period when characteristic behaviors are identified (Bolton et al., 2001). A pathologic process associated with early overgrowth of neural and dendritic connections and later deficiency of normal neuronal pruning has thus been hypothesized to underlie ASD (Lainhart, 2006; O'Hearn et al., 2008).

Abilities of Children with ASD

Resultant from differences in brain development, the abilities of children with ASD range along a spectrum. Differential language development varies from the complete absence of speech to that which is similar to typically-developing peers (Folstein & Rosen-Sheidley, 2001). Nonetheless, the absence of pragmatics (i.e., the social element of language; Baron-Cohen, 1988; Folstein & Rosen-Sheidley, 2001) is characteristic, regardless of language development. In particular, children with ASD display impairments in coordination of speech with eye contact, showing a genuine interest in the thoughts and opinions of others, and recognizing when to initiate and conclude conversation. Research with joint attention and language development in ASD has established a link between early deficiencies in social development and subsequent atypical language development (Baron-Cohen, 1988; Dawson et al., 2004; Mundy, Sigman, & Kasari, 1990).

Recent studies have implicated the fusiform gyrus and amygdala in atypical social and communication skills characteristic of ASD (Amaral et al., 2008; Baron-Cohen et al., 2000; Dalton et al., 2005; Schultz, 2005) due to the role in facial perceptions of identity and expressions. Typically-developing infants as young as 36 hours show an affinity for faces (Schultz, 2005). In comparison, children later diagnosed with ASD have an observed lack of interest in faces, as evident in the absence of gaze fixation and eye contact (Dalton et al., 2005; Folstein & Rosen-Sheidley, 2001; Schultz, 2005). As a result, children with ASD are described as looking *through* people, rather than *at* people; therefore lacking the interpersonal contact, joint attention, and understanding associated with the development of language pragmatics (Baron-Cohen, 1988; Mundy et al., 1990).

In addition to characteristic language and social impairments, the presence of patterned and repetitive behaviors is a hallmark of ASD. Neuroanatomical studies have implicated regions such as the orbitofrontal cortex and caudate nucleus, where behaviors are seen to overlap with obsessive–compulsive disorder (Amaral et al., 2008; Hollander et al., 2005; Sears et al., 1999). It is also suggested that motor impairments are a *cardinal* feature of ASD (Bhat, Landa, & Galloway, 2011;

Fournier, Hass, Naik, Lodha, & Cauraugh, 2010; Gowen & Hamilton, 2013), are more prevalent in comparison to the general population (Matson, Matson, & Beighley, 2011), and can significantly impact quality of life and social development (Gowen & Hamilton, 2013). Prevalence rates of motor impairments have been reported between 21 and 100 %, therefore it is argued that motor impairments are a core but variable feature of ASD (Ghaziuddin, Bulter, Tsai, & Ghazuiddin, 1994; Gowen & Hamilton, 2013; Green et al., 2002; Manjiviona & Prior 1995; Miyahara et al., 1997; Pan, Tsai, & Chu, 2009).

Motor difficulties associated with ASD are typically characterized by challenges planning, organizing, and coordinating movements (Glazebrook, Elliott, & Szatmari, 2008). These impairments are present as early as infancy, where children with ASD have difficulties sequencing crawling, and subsequently walking (Teitelbaum, Teitelbaum, Nye, Fryman, & Maurer, 1998). With age, motor deficits manifest in basic motor control skills: poor coordination, difficulties with skilled gestures, clumsy gait, postural instability, and low tone (Hallett et al., 1993; Jansiewicz et al., 2006; Mostofsky et al., 2006; Noterdaeme, Mildenberger, Minow, & Amerosa, 2002; Rogers, Bennetto, McEvoy, & Pennington, 1996). A recent review using a computational context indicates that atypical motor skills result from altered sensory input, deficits in organizing motor knowledge and variable motor execution (Gowen & Hamilton, 2013). Recent literature has suggested that motor impairments may be further exaggerated due to reduced participation in physical activity (Lang et al., 2010).

Physical Activity for Children with ASD

Involvement in physical activity is often challenging for children with ASD due to poor motor functioning (Koegel, Koegel, & McNerney, 2001; Reid, O'Connor, & Lloyd, 2003; Todd & Reid, 2006), atypical social development (Todd & Reid, 2006), and other behavioral manifestations. Therefore, youth with ASD are at higher risk of inactivity (Pan & Frey, 2006) and are less physically active than their neurotypical counterparts (Pan & Frey, 2006; Trost et al., 2002). Children with ASD are thus more likely to be obese (Curtin, Anderson, Must, & Bandini, 2010) and experience other health problems associated with a sedentary lifestyle (Lang et al., 2010).

The literature on physical activity interventions with ASD is limited (Lang et al., 2010; Pan & Frey, 2006); however, interventions have been observed to improve behavior—for example, decreased repetitive behaviors (Prupas & Reid, 2001) and increased social interaction (Berkeley, Zittel, Pitney, & Nichols, 2001)—in addition to overall physical fitness (Lang et al., 2010). It is suggested that the most effective intervention includes intense support early in life (Dempsey & Foreman, 2001). However, no single intervention has proven beneficial in alleviating the cardinal symptoms of ASD (Sandler, Brazdziunas, & Cooley, 2001); therefore what treatment or combinations are best remains inconclusive (Hanson et al., 2007). Parents thus utilize a wide variety of treatment modalities, where the most commonly used interventions have varying degrees of theoretical and empirical support (Green et al., 2006; Heflin & Simpson, 1998a, b; Jordan & Jones, 1999).

Creative Movement and Dance for ASD

Creative movement and dance are a practical and feasible option for children with ASD (Behrends, Müller, & Dziobek, 2012; Cornman, 1997; Dale, Hyatt, & Hollerman, 2007; Dempsey & Foreman, 2001; Vincent et al., 2007). For some, dance may paint a picture of a principal ballerina who has mastered his/her art; therefore is able to move in a manner, which appears to defy gravity (Koff, 2000). However, dance is not limited to performance as a goal. On the contrary, dance promotes an inclusive environment (Lorenzo-Lasa, Ideishi, & Ideishi, 2007), which "enables every child, regardless of physical capabilities, to be expressive in a nonverbal manner—to explore and incorporate the physical self as a functioning part of the whole social being" (Koff, 2000, p. 27). Movement and dancing are innate means of communication (Boris, 2001; Koff, 2000), thus provide a nonverbal means of expression for children who have difficulties communicating (Freundlich, Pike, & Schwartz, 1989). Dance provides "layered learning experiences that deepen their repertoire of behavior and response to the world" (Lorenzo-Lasa et al., 2007, p. 25).

Dance is a creative process that involves movement of the body within time and space (Ingram, 1978; Kaeppler, 1978). In comparison, the discipline of dance/movement therapy (DMT) (American Dance Therapy Association, 2009) is built on the foundation that "human reception, processing and response inextricably link the mind and body into a functional whole" (Fitt, 1988, p. 278). This association between mind and body was first recognized over 2000 years ago by Hippocrates, the father of modern medicine. Since then, the idea of dance as a therapeutic modality has been met with some skepticism (Berrol, 1992); however, dance and creative movement are used around the world (Capello, 2008; Dale et al., 2007; Willke, 2007) as an important component of healing rituals of numerous cultures (Chaiklin, 2009). Dance/movement therapy epitomizes the perfect marriage between art and science (Boris, 2001). Dance/movement therapy actively engages the brain via the body, by means of a process that influences physical and psychological functions (Berrol, 2006; Homann, 2010; Thobaben, 2004).

Founded in 1966, the American Dance Therapy Association (ADTA) defines DMT "as the psychotherapeutic use of movement to further the emotional, cognitive, physical and social integration of the individual" (American Dance Therapy Association, 2009). Dance/movement therapy is a holistic form of therapy, providing physical, social, and cognitive benefits to participants. More specifically, the physical benefits of dance include increased balance, flexibility, muscular tone and strength, endurance and spatial awareness. Socially, dance fosters the development of relationships. Finally, from a cognitive perspective, dance contributes to vocabulary development and aids with integration of the sensory-motor systems.

For these reasons, among others, DMT can contribute to the treatment of neurological disorders (Dale et al., 2007), such as ASD (Cornman, 1997; Dale et al., 2007; Dempsey & Foreman, 2001; Freundlich et al., 1989; Vincent et al., 2007). As such, it is not surprising that dance/movement therapists have been working with children with ASD for years (Wengrower, 2010). Nevertheless, an online survey

reports only 2.4 % of children with ASD are participating in DMT in comparison to other interventions. Dance/movement therapy was 55th on a list of treatments implemented by parents (Green et al., 2006). Currently, there exists a dearth of literature evaluating DMT interventions for children with ASD (Rosenblatt et al., 2011) as most reports are anecdotal (Hartshorn et al., 2001). Behrends et al. (2012) report that, "relatively few treatment outcome studies have been published and there exists few diagnosis-specific conceptualizations" (p. 108). It is important to study the impact of DMT as a therapeutic intervention because it may tap into neurological processes in a more integrated way than other therapies. In this review, we highlight the effects of DMT and benefits for children with ASDs as documented in the current literature.

Why Dance/Movement Therapy for Children with ASD?

Pioneering Work

In the mid 1960s, Beth Kalish-Weiss began her pioneering work as a dance/movement therapist for children with ASD (Levy, 1988). With the belief that non-verbal methods were the most appropriate approach, Kalish-Weiss developed the Body Movement Scale of the Behavior Rating Instrument for Autistic and Other Atypical Children to provide a quantitative assessment "which could be learned and applied by anyone on a regular basis, in a clinical setting, for use with non-verbal, 'untestable' psychotic children" (Kalish, 1977, p. 126). The Body Movement Scale thus introduced a means for dance/movement therapists to assess children with ASD based on non-verbal communication and body movements, and subsequently used this information to tailor an individual program to the suit child's developmental level.

> Although the goals of the movement therapists are similar to other psychotherapies using body contact, the methodology is slightly different in that the movement therapist uses her own body movements, sounds, rhythms, as well as touch, to gain the child's attention, establish and emotional relationship, and offer pleasurable opportunities for reciprocal interaction. (Kalish, 1977, p. 91)

Kalish-Weiss stressed that interventions must begin in the early symbiotic phase (Levy, 1988; Mahler, 1968), where therapist mirrors and imitates the child's movements to establish a level of comfort. These movements gradually progress to the point where therapist is recognized as a separate entity, enabling the child's increasing awareness of his/her own body image and movements in space (Dratman, 1967; Kalish, 1968; Levy, 1988).

The Synchronous Movement Profile

Costonis (1978) is another early pioneer in this area, who developed the Synchronous Movement Profile (SMP) to assess changes in synchronous movements through intervention. The SMP divides the body into five areas of

observation: head, torso, hands, arms, and legs, where movements are scored based on the presence/absence of synchronous movements. For example, two points are assigned for synchronous movement, when the participant's "angles of rotational or plan movement of any of these body parts are virtually identical to those angles of the dance/movement therapist's" (p. 8). In contrast, participants do not receive any points for asynchronous movements, when the participant's "and dance/movement therapist's angles of movement are differentiated by more than forty-five degrees" (Costonis, 1978, p. 8).

Siegel (1973) also facilitated dance/movement therapy. A psychoanalytic perspective was incorporated, where evaluations address specific behavioral manifestations, and the primary emphasis was on improving functioning. This method involves two means of intervention. Motor skills assessed through the Oseretsky Test for Motor Proficiency, are first addressed in weekly sessions. Outcome goals are matched with specific movements, to address need of the group. For example, "if the goal is socialization, a movement prescription might be a folk dance" (Levy, 1988, p. 226). In the second method, children experience individual sessions twice a week, in conjunction with group therapy. These sessions enable therapist to focus on the unique needs of the child. Similar to Kalish-Weiss's (1977) perspective, these sessions are meant to assist children in transition from the early symbiotic phase of development to individuation.

In another example, Loman (1995) described successful utility of the Kestenberg Movement Profile (KMP), a Laban-influenced system used by dance/movement therapists to observe, describe and interpret nonverbal behavior (Loman & Merman, 1996). The Kestenberg Movement Profile includes nine categories of movement patterns divided into two major subsystems. System I (i.e., Tension-flow-Effort System) outlines the progression of movement from fetal and newborn patterns, over the course of development, with respect to egocentric development: "inner needs, feelings and affects" (Loman & Merman, 1996, p. 30). The aforementioned provides a foundation for System II (i.e., Shape-flow Shaping System), which outlines development of relationships to people and things (Loman & Merman, 1996).

Kalish-Weiss, Costonis, Siegel and Loman's methods of DMT are unique in nature; however, the roots of intervention overlap, as each aims to assess movement in children with ASD, and incorporate an intervention that is suited to the child's needs. Each approach stresses the importance of starting at the child's developmental level and progressing at the child's pace, as he/she becomes more comfortable with the therapist establishing a therapeutic relationship. Eventually the child acquires an image of his/her own independent body moving in space. Erfer (1995) stated that "dance/movement therapy is ideally suited for working with the autistic population" (p. 196). Dance/movement therapy is unique, such that therapists are able to tailor an intervention to meet the needs of the child. Considering individuals with ASD are often distracted with off-task behaviors (Hartshorn et al., 2001) and feel uncomfortable in new and unpredictable situations, interventions are personalized to help children with ASD feel comfortable and safe, while also promoting children to be attentive and on-task.

Children with ASD typically have poor body image resultant from poor perceptual-motor integration (i.e., the integration of motor activity with visual or

auditory perceptions). In DMT, movement contributes to increased body image through exploration and process oriented learning, enabling children with ASD to expand their movement repertoire. Dance/movement therapists thus utilize techniques such as props, music, mirroring, and eye contact to improve body image. Props may be especially useful for children who are socially isolated by enabling "the child to tolerate a relationship that might be too threatening if carried on more directly" (Erfer, 1995, p. 201). Music is often incorporated to help increases attention span and aid individuals with ASD with motor planning and execution (see Srinivasan & Bhat, 2013 for review).

Mirroring in DMT

Mirroring—or empathetic imitation of movement—is another key component of dance/movement therapy. Used by Adler (1970) with two girls with ASD in her film *Looking for me*, mirroring has been discussed by many researchers as an important component of DMT (Erfer, 1995; Freundlich et al., 1989; Tortora, 2006). As previously mentioned, the ADTA explains how the mind, spirit, and body are connected, where a neural network called the mirror neuron system functions to connect these components. The mirror neuron system was first recorded by Di Pellegrino, Fadiga, Fogassi, Gallese, and Rizzolatti (1992). The researchers found that neurons in the premotor cortex of monkeys became active in response to viewing an action performed by another. This neuronal response was identical to the neuronal activity present when performing that action. In this way, neurons are thought to mirror the cortical activity that would be occurring if the action were actually performed. Additional research has found that mirror neuron activity is not restricted to physical actions, but also occurs in response to facial expressions (Stern, 1985). Rizzoaltti and Arbib (1998) suggested that the mirror neuron system was present before humans developed speech as a mechanism to recognize expression in others and therefore aided in communication. Research about mirror neurons is closely related to DMT as mirroring is a common technique used by therapists.

Erfer (1995) describes mirroring as "a form of reflecting back but not imitating another's movements, [which] provides a powerful means to understand a child's experience, on a body level" (p. 198). Mirroring allows a child to see the effects of their movements on another person and in that way, explore what his or her own body is capable of accomplishing. Tortora (2006) states that "in mirroring, there is a qualitative emotional connection between the therapist and the person whose actions are being mirrored" (p. 259). Mirroring promotes the development of an emotional, meaningful, and healthy relationship between therapist and child (Sheets-Johnstone, 2010). The child is able to use mirroring as a form of communicating his or her needs to the therapist because they are aware that the therapist is dedicating attention to his or her actions.

Mirroring also helps to establish body image, as movements progress from dysynchronous to synchronous over the course of the intervention (Freundlich et al., 1989). Through mirroring, the child is able to visualize how their body may look while performing a movement as the therapist reflects. May, Wexler, Salkin, and Schoop (1974) describe body image as "the picture of our own body as it is formed

in our minds" (p. 137). Finally, mirroring improves social skills, such as interpreting facial expressions, and establishing relationships with others (Winters, 2008).

A recent paper by Devereaux (2012) summarizes, through personal experiences working as a dance/movement therapist, the benefits of DMT for children with Autism Spectrum Disorder. In her experiences, interventions led to clients having increased "awareness of themselves and others through increased eye contact, increased verbalization, and enhanced identification and awareness of specific body parts" (p. 347). Other positive impacts of DMT included increased tolerance for contact with others, empathy, expression, creativity, spontaneity and joy for movement. Specifically, it was found that DMT helped clients channel their repetitive behaviors into dance, therefore allowing them to communicate through movement more freely. However, Devereaux also noted that, while these results are promising, the existing literature in the area of DMT and ASD is largely qualitative case studies with few empirically based studies. The past research has also taken a developmental and relational focus, neglecting the behavioral effects (Devereaux, 2012).

The remaining sections of this paper will review specific cases where use of DMT was successful for children with ASD in a variety of settings, starting with early case studies of children with ASD, which laid the foundation for more recent group interventions. Finally, studies looking to the future will be highlighted as researchers combine early accounts with recent advancements in our understanding of ASD to formulate interventions.

Evidence of Successful Dance/Movement Therapy Interventions

Case studies of DMT in ASD

Early accounts of DMT in the literature primarily report anecdotal evidence and case studies outlining successful one-on-one sessions of child and therapist. Several of these accounts appear in Costonis's book, *Therapy in Motion* (1978). In this book, Costonis shares her experience of working one-on-one with Patricia, a 5-year-old girl with Autism Spectrum Disorder. Using the SMP, Patricia's progress was tracked and evaluated over the course of participating in a DMT program. After four months together, Patricia exhibited a 60.5 % increase in synchronous movement with the therapist and a 40 % decrease in time to establish synchrony. Patricia demonstrated vast improvement in all areas of movement and behavior, enabling her transfer from a special education center, where the DMT program was housed, for integration into a community school.

Costonis (1978) also describes Boettinger's (1978) experience with a 4-year-old girl with Autism Spectrum Disorder. Child and therapist met for 30 minutes, three times a week for 8 weeks. At the end of the intervention, the child had a notable increase in tolerance for physical touch and eye contact, moved in synchrony with the therapist and presented fewer behaviors characteristic of ASD. More specifically, the child's movement repertoire progressed from that which would be expected in a typically-developing 9 month-old infant, exploring the body of the

therapists as is seen in early infant-mother interactions, and progressing to the expected next phase of development, in which she explored her own body. By the end of the intervention, the child expanded her abilities further and began to imitate the therapist's movements and behaviors (Boettinger, 1978). Positive results with these two children led dance/movement therapists and researchers to suggest that the rhythm, touch, and joy of dance may contribute to a child's unconscious ability to learn (Boettinger 1978; Costonis, 1978).

Cole (1979) described her experiences of providing DMT for a 7-year-old boy with ASD for 30 minutes a day, 5 days a week for 8 weeks. She outlined the initial struggle to balance her own needs as a therapist with those of the child and the movement activities that resulted from their interaction together. The majority of the sessions were made up of Cole pushing the boy around in a chair, catching him as he fell from a table, and carrying him around the room. However, towards the end of the therapy sessions, the child more freely accepted physical contact, which indicated to Cole that he felt a need for physical interaction (Cole, 1979). Similarly, Levy (1988) highlighted Kalish-Weiss' (1982, unpublished) case study of Ana. After 10 months of therapy, Ana developed physical, social, and auditory skills and learned how to communicate and respond to social cues (Kalish, 1982). Overall, DMT was observed to contribute to improve social behaviors and decrease emotional instabilities.

In another example Loman (1995) described successful utility of the KMP with a 4-year-old boy with ASD. Through the use of KMP, Loman (1995) discovered that Warren was functioning at the developmental stage of an 18-month-old infant. With this knowledge, the use of DMT enabled Warren to progress through the phases of movement development from at his own pace. Paralleling Chace's (1975) work with a child with autism, Loman (1995) took Warren "… back through the developmental pattern in a rhythmic movement session…back completely to the infantile developmental stages, working through them as the child is ready and capable of doing so…" (Chace, 1975, p. 221). After participating in DMT, Warren advanced one developmental phase (i.e., from the developmental phase of a 2-year-old to that of a 3-year-old), exemplifying how beneficial KMP may be as a tool for dance/movement therapists working with children with Autism Spectrum Disorder (Loman, 1995).

Overall, similar observations from varying one-on-one interventions highlight the utility of DMT with children with Autism Spectrum Disorder. As summarized by Levy (1988), the aim of DMT is to build body image and other underdeveloped psychomotor skills in children with ASD, based on the fact that the mind and body are inseparable. Duggan (1978) thus suggests that therapists should work one-on-one with children with autism in order to establish a safe relationship before working with other children, highlighting that props are an important component because they act as a "bridge for contact" between the therapist and child. Overall, each study clearly describes that dance/movement therapists have many goals when working with children with special needs, including "making emotional contact with removed and/or autistic children; building the body image of the child; facilitating cognitive aspects of development; developing self-control and physical mastery as well as meaningful self-expression; and facilitating social interaction" (Levy, 1988, p. 232). An important component of DMT is recognizing what

methods are successful for the individual, in order to promote movement development and encourage social skills.

DMT for Those Who Have Not Been Formally Diagnosed with ASD

There is also evidence to suggest that DMT is useful for people who display behavioral characteristics of ASD, but have not received a formal diagnosis. For example, Baudino (2010) describes a 6-year-old girl, referred to as Lisa, who had a history of neglect, abuse, and abandonment from her parents and caregivers. This history led Lisa to develop behaviors characteristics of ASD, including self-injury, lack of interest in forming relationships with others and repetitive movements. As a result of her behaviors, Lisa was diagnosed with ASD—a diagnosis that may have prevented her and her caregivers from addressing the root cause of her conduct. Lisa participated in 90 minutes of DMT per week while also taking medications for inattention and sleeplessness. After working with her, the author reported positive changes after 9 months of intervention, in which "she was able to communicate her story, change her patterns, and develop a growing interest in connecting with others" (p. 127).

There are many children who have experienced trauma in their lives and cope by performing repetitive movements and avoiding relationships. Baudino (2010) highlighted that "dance/movement therapy focuses on the whole person, rather than the symptoms alone" (p. 118), which may have helped the therapist to discover that Lisa was not autistic at all. It is important to realize that an inaccurate diagnosis of ASD may hinder the healing and growth of these children because they are not receiving the help that they need. Overall, DMT could be an effective intervention for both children with and without ASD (Baudino, 2010).

Group Dance/Movement Therapy Interventions for ASD

Where the aforementioned studies focused on one-on-one DMT interventions, others have incorporated group interventions and observed similar results. Siegel (1973) described work with four children with ASD between the ages of 4- to 6-year-olds at the nursery school of a "special school setting" (p. 141). A nine month intervention of DMT, that incorporated both music and body contact to promote body-image building and formation of a sense of 'self' was described. Siegel (1973) concluded by acknowledging positive responses from the children. The author highlighted the use of verbal and non-verbal communication to promote mirroring and decline in aggressive behaviors. Boettinger (1978) investigated mirroring in 3- to 9-year-old females with ASD. Results revealed an increase in synchronous movement, communicative gestures, and a decrease in tuning out behaviors and aversion to touch.

In comparison to Siegel (1973) and Boettinger (1978), Parteli (1995) implemented the KMP (similar to Loman, 1995) for the analysis and observation of movement with two boys with ASD (aged 6 and 7) as they participated in dance/movement therapy. These children also gained motor and psychosocial skills that they would not have attained otherwise. Observations of one-on-one studies were echoed by Parteli (1995)

who suggested that children who are engaged in symbolic play (a component of DMT) are reorganizing past experiences, integrating their mind and body, and learning how to use words for communication. As such, the author stressed the importance of understanding movement in non-verbal children, stating that "in dance/movement therapy, repetitive actions and motor distortions are accepted and listened to as forms of communication, although unintentional and unconscious" (p. 246). In this way, the therapist gains understanding of the child's needs by observing how they respond with his or her body to a stimulus such as music.

Hartshorn et al. (2001) implemented 30-minute movement sessions twice per week for 2 months for 38 children with ASD (mean age = 5 years). Sessions included performing different movements with hoops, an obstacle course and moving to the sound of a tambourine. Characteristic behaviors (i.e., stereotypical, wandering, resisting the teacher, etc.) were recorded during the first and last session, by means of recording the percentage of time each behavior occurred within six randomly distributed 1-min periods. Results revealed a significant increase in attentive behaviors and subsequent decrease in stress behaviors. On-task passive behavior was also observed to increase. The authors reported that, at the end of intervention children were still lacking full engagement; however, suggested that levels of engagement did improve significantly, considering children had been previously observed wandering and/or resisting the instructor (Hartshorn et al., 2001). Observations of increased on-task behaviors paralleled findings from other means of therapy (e.g., touch/massage therapy) (Escalona, Field, Singer-Strunch, Cullen, & Hartshorn, 2001; Field et al., 1997), which have also resulted in improved attention. Although mechanisms underlying these behavioral improvements have yet to be delineated, Escalona et al. (2001) highlighted that parasympathetic (vagal) activity, which is related to attention (Porges, 1997), has been observed to increase as a result of massage therapy (Field, 1998).

Torrance (2003) described a group of four 16- to 18-year-old males with ASD as they participated in dance/movement therapy. These participants had been rejected by mainstream schools due to aggressive behavior and therefore completed their schooling at a special education center. They attended 45 minute long DMT sessions once a week for 9 months. At the end of the therapy, there was increased group cohesion, respect for one another, turn-taking, and fewer violent outbursts. The therapist reported that other staff members at the special education center also noticed a positive change in these participants over 10 months of their therapy.

A very recent study (Mateos-Moreno & Atencia-Dona, 2013) combined music therapy with DMT to investigate the effectiveness of intervention on scores from the Revised Clinical Scale for the Evaluation of Autistic Behavior (ECA-R; Barthélémy & Lelord, 2003). In comparison to the aforementioned interventions with individuals with ASD, the authors focused their work on eight adult participants with severe ASD during 36 one hour sessions over 17 weeks. Adopting a plurisensory approach, participants completed approximately eight activities per session, including "dance, instrumental practice, singing and observation/mimicking of movement" (Mateos-Moreno & Atencia-Dona, 2013, p. 7). Results revealed a positive impact of intervention of regulation/behavioral variability (i.e., self-adaptive behaviors), imitation (i.e., sharing emotion and imitating), instinct (i.e.,

alterations in instinctive behaviors, such as feeding, sleeping, etc.), and emotion (i.e., mood, anxiety, resistance to change, etc.). The greatest effect was observed in regulation/behavioral variability.

DMT in Special Education Curriculums

The previous studies highlight group interventions outside of traditional education settings; however, DMT interventions have also extended to the public school system and some special education curriculums (Vincent et al., 2007). For example, in Franklin Square, New York, DMT was implemented to support of the needs of children with ASD and other developmental disorders. What commenced as monthly sessions in 2006 have expanded to weekly sessions, which are partially funded by the school district. Movements and dances are consistently regimented, to provide children with a predictable routine. For children with ASD, this is of utmost importance, as an "insistence on sameness" is typically displayed, such that a child may demonstrate a resistance to change in the environment (Rutter, 1978). That said, as children become more comfortable with the movement repertoire, the environment also becomes more comfortable, enabling sessions to gradually advance to facilitate a more open means of movement (Vincent et al., 2007).

Looking to the Future: Suggestions for New Intervention

In 2006, Tortora described her method of working with children with disabilities, specifically ASD, called the *Ways of Seeing* approach. The goal of this approach is to link movement with emotional development based on Piaget's theory of sensory-motor development. Tortora states that "The body provides a spontaneous interactive structure with endless possibilities to stimulate qualitative variations through changes in affect, muscle tone, physical shape, touch, breath, and movement" (2006, p. 290). Tortora also suggests that a moving body is a form of non-verbal communication that observers are able to react to with their own movements. This action-reaction relationship forms the foundation for a relationship between the child and the therapist, which may also result in the child forming relationships with other people. All people wish to be understood and accepted, "finding meaning and connection through movement and dance can be a very empowering experience that enables children to feel understood in a profound way" (p. 110). The shortcoming to Tortora's work is that there is not yet any evidence of the effectiveness of this program on children with special needs.

In a brief correspondence, Ramachandran and Seckel (2011) outlined the basis of synchronized DMT to simulate mirror neurons, asking, "on the assumption that the [mirror neuron system] is not completely missing but "dormant," could they be revived?" (p. 151). The authors described children with ASD looking into a room of mirrors, all located at varying angles to facilitate numerous allocentric views. Three neurotypical volunteers would join the participant in the room and dance in synchrony, with the intention that the child with ASD would also dance. The authors highlighted deviation from traditional DMT, as the primary focus would be

imitation and the presence of mirror reflections to stimulate activity of the mirror neuron system. More specifically, Ramachandran and Seckel (2011) state, "this is different from conventional dance therapy in ASD in that our treatment specifically emphasizes synchronous dance movements mimicking others" (p. 151). Furthermore, the authors acknowledge that the intervention would start with basic rhythms and gradually progressive, while participants can be assessed based on behavioral scores, which enable application to movement and social domains.

Finally, a recent study also proposes a theoretically based DMT intervention that possesses the ability to enhance empathy in ASD (Behrends et al., 2012), which can affect cognitive processes and body perception, dimension, and coordination. More specifically, the intervention includes 90 minute sessions of DMT per week for 10 weeks. Information surrounding the number of students, age of students, duration of the program, and specific outcome measures were not included. However, the authors do explain that classes aim to focus on imitating another person, moving in synchrony with two or more people and moving in a coordinated fashion with two or more people in order to fulfill a specified goal. The hope is that DMT will affect the mirror neuron system and help those with ASD to feel more empathy, be able to express their emotions and communicate with others (Behrends et al., 2012). As children with ASD may have a poor or skewed body image, DMT has the potential to increase one's awareness of his or her own body and in this way, the child with ASD may improve their overall body image. As indicated by Behrends et al. (2012), pilot sessions have revealed that the proposed movement and dance intervention is feasible with this population; however, to our knowledge, results have not yet been published.

Summary and Conclusion

As seen throughout the literature, DMT interventions are successful in both individual and group settings, where suggested programs have implications for future research-based interventions. That said, tremendous variability exists in ASD (Howlin, 1998); therefore it is suggested that, when evaluating interventions, there is a need to use standard reliable and valid tools along with DMT sessions. Target behaviors should be the aim, as a general focus may be uninterruptable (Lord et al., 2005). Overall, DMT has the ability to provide both physical and psychological benefits for children with ASD; however, the need to connect research with policy, training, and advocacy is essential for effective, evidence-based treatment (Lord et al., 2005; Simpson, 2003).

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