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Dancing with Autism Spectrum Disorder: A Mixed Methods Investigation

By

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ABSTRACT

Autism spectrum disorder (ASD) is the most commonly diagnosed neurological disorder in children today, affecting an estimated 1 in 150 to 1 in 160 children in Canada (Health Canada, 2013). Children with ASD have reduced communication skills as well as restrictive and repetitive behaviours and interests (APA, 2014). Unfortunately there are few recreational activities available for the autistic population. Past research has shown dance/movement therapy to be beneficial for children on the spectrum, but there is a dearth of literature regarding recreational dance. Dance is a form of physical activity that fosters skill development, provides social opportunities, and can be made accessible for all people. The purpose of this research was to explore the experiences of children with ASD as they participated in recreational dance. This study had two parts, a qualitative component to capture the lived experiences of children with ASD through the perspective of their caregivers, dance instructors, and volunteers; and a quantitative component to measure physical skill development in children with ASD over time.

The participants were as follows: four children with ASD (two sisters), three caregivers, three dance instructors, and three dance volunteers. One child, caregiver, instructor and volunteer were recruited from Studio 2, and the rest were recruited from studio 1. Caregivers, instructors, and volunteers completed a background questionnaire and one-on-one semi-structured interview. Interviews were transcribed verbatim, supplemented with the researcher’s field notes, and then sent back to the participants in the form of a member check. Two salient themes emerged upon analysis of the qualitative data, which were creating dance programs for all abilities and what it means to be a dancer. All participants felt that these two programs were beneficial, not only for the children with ASD, but also the caregivers, instructors, and volunteers.

Each participant with ASD completed a battery of motor tests (for balance, endurance, locomotion, flexibility, and body awareness) at four points in time over a five month period. While the participants discussed many benefits in the qualitative component, there were few trends towards improvement in the quantitative component. This is most likely because the motor tests were designed for the neurotypical population and did not account for the high level of variability in ASD. Due to the variability of ASD symptoms in the children of this study, the quantitative results were analysed per case.

This research project has shown that participants benefitted from participating in a recreational dance program based on the perspectives of their caregivers, instructors, and volunteers. Future research should work towards finding sound testing measures for children with ASD. Additionally, further research regarding children and adolescents with ASD and other disabilities is warranted.

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CHAPTER 1

Autism Spectrum Disorder

Introduction

Autism Spectrum Disorder (ASD) is the most common neurological disorder diagnosed in children today (Autism Society Canada, 2012). ASD was first identified by Dr. Leo Kanner in 1943 (Autism Speaks Canada, 2014; Kanner, 1943) and is estimated to affect between 1 in 150 to 160 children in Canada (Health Canada, 2013), with four males diagnosed for each female (American Psychiatric Association (APA), 2014). There is limited knowledge about the etiology of ASD and medical researchers have yet to discover a cure (Centre for Disease Control (CDC), 2014). Unfortunately the prevalence of ASD has risen dramatically – nearly tenfold in the past 40 years (CDC, 2014) – making research about treatment especially important.

This chapter focusses on the characteristics, diagnosis and treatment of ASD. The principle treatment that will be explored is dance/movement therapy, followed by a review of the literature about recreational dance programs for children with ASD. Chapter two focusses on the social component of the research, including a literature review about the social impact of dance for children with ASD and a description of the qualitative research methods. Chapter three focusses on the motor and cognitive components of the research, including a literature review about the motor and cognitive impact of dance for children with ASD and a description of the quantitative research methods.

Characteristics

Two core characteristics are present in children with ASD: "(1) deficits in social communication and social interaction and (2) restricted repetitive behaviours, interests and activities (RRBs)" (APA, 2013, p. 2). Under the first domain, the child presents deficits in understanding nonverbal communication, emotions, and social relationships. These difficulties manifest in abilities to maintain a conversation, show facial expression and create friendships (Autism Canada Foundation, 2014). In regards to the second domain, children display stereotyped repetitive movements or vocalizations; insistence on sameness; restricted and/or abnormal interests; altered sensitivity to sensory input; or fascination with stimulating the sensory system (Autism Canada Foundation, 2014). Children who display these characteristics may constantly line up their toys, have an extreme reliance on schedules, be preoccupied with spinning the wheels on a toy car, and/ or have a very high pain tolerance. All three deficits listed under the first domain and at least two deficits from the second domain are present in children diagnosed with ASD (APA, 2014).

Not only does ASD affect social abilities and behavioural patterns, but it also impacts physical health. For example, children with ASD may experience gastrointestinal diseases, seizure disorders, and sleep dysfunction (Autism Speaks Canada, 2014). Tubbs (2008) believes that children with ASD are exposed to excess stress due to internal factors, such as reduced immune function, or external factors such as stigmatization. Experiencing stressors may reduce neurological development and function, deepening the disadvantages faced by those with ASD.

Children with ASD may also display motor impairments, primarily in regards to sensory-motor integration (Gowen & Hamilton, 2012). For example, impairments such as affordance perception and high order motor planning were found in individuals with ASD (Linkenauger, Lerner, Raamenzoni, & Proffitt, 2012), which may be related to social and communication deficits. These findings were supported by Whyatt and Craig (2011), who found that children with ASD display issues in hand-eye coordination and static balance, two skills that require the integration of motor and perceptual information. Reduced skills in these areas negatively affect one’s ability to participate in leisure activities, such as team sports and personal hobbies (Todd, 2012), which may contribute to physical inactivity.

Diagnosis

For most children, the signs and symptoms associated with ASD appear between ages two and three (Autism Speaks Canada, 2014), leading to a formal diagnosis of ASD within the next few years (CDC, 2014). Some researchers contend that the disorder is detectable at 18 months or earlier, but the diagnosis may not be reliable until later in life (CDC, 2014). While parents may be reluctant to accept an early diagnosis of the disorder, research has shown that early intervention is most beneficial (Autism Speaks Canada, 2014). ASD is diagnosed by a clinician who analyses the behaviour of the child rather than conducting medical tests. The Diagnostic and Statistical Manual of Mental Disorders (DSM), created by the American Psychiatric Association (APA), outlines the behavioural characteristics that must be present in order for a child to be diagnosed with ASD (APA, 2014). The DSM IV-TR was recently revised in May of 2013, which significantly affected the diagnosis of ASD. Previously, ASD was composed of five sub-disorders including Autistic Disorder, Asperger’s Syndrome, Childhood Disintegrative Disorder, Pervasive Developmental Disorder Not Otherwise Specified, and Rett Syndrome (APA, 2013). In the newest revision – the DSM 5 (see appendix) – all of these disorders have been collapsed into a single condition except for Rett Syndrome, which was removed from the DSM altogether due to the discovery of its etiology as a genetic disorder (DeWeerdt, 2011).

According to the APA (2013), the umbrella term of ASD will be more accurate for diagnosing children who display signs and symptoms associated with the disorder. Furthermore, by removing the sub-classifications within the spectrum, children are less likely to be diagnosed with different disorders within the same spectrum (i.e., a child diagnosed with Asperger's by one clinician and autism by another) (APA, 2013). Symptom severity associated with ASD varies for each individual, which is why it is referred to as a spectrum disorder. In the DSM 5, children are diagnosed based on severity within this spectrum, which assists clinicians in determining which treatments would be most beneficial, and which would be redundant. The updated diagnostic criteria are stricter than the criteria than that of the DSM-IV TR; however, the APA (2013) does not believe that the number of children diagnosed with ASD will change as a result of the new criteria. Instead, they believe that the new criteria will more accurately represent the severity and needs of the children diagnosed.

Treatment

There are numerous treatment options for children with ASD; however, treatment effectiveness varies as the cause is not yet known. According to the Autism Canada Foundation (2011) "each individual [with ASD] will benefit from a holistic or broad-based approach drawing upon various treatments and therapies unique to their symptoms and abilities." (paragraph 1). Treatments may be biomedical, behavioural, social, or sensory in nature. More parents are choosing complementary and alternative medicine (CAM) for their children with ASD due to concerns about safety and side effects of prescribed medications (Hanson, et al., 2007). In 2006, a survey distributed to parents of children with ASD revealed that speech therapy and visual schedules were the most common therapeutic tools utilized for this population, with 70% and 43% using these two therapies respectively (Green, et al., 2006). Other common therapies include sensory integration, applied behaviour analysis, vitamin C, and vitamin B6. Among the CAM treatments for children with ASD is dance/movement therapy (DMT) (Green, et al., 2006).

Dance/Movement Therapy (DMT)

The American Dance Therapy Association (ADTA) defines dance/movement therapy (DMT) “as the psychotherapeutic use of movement to further the emotional, cognitive, physical, and social integration of the individual” (ADTA, 2009, paragraph 1). It is a process-based practice (Erfer, 1995; Payne, 1992) that focusses on the behaviours, expression, and functionality of an individual (Wallock, 1977). Therapists began using dance in the 1940’s, but it was not until the mid-1960’s that dance therapy became recognized as a profession (Levy, 1988). DMT was first used in hospitals for psychiatric patients, and later pioneered for the autistic population by Beth Kalish-Weiss in the mid-1960’s (Levy, 1988). Since then, DMT has been used in several different settings, including schools (Devereaux, 2012), group homes (Torrance, 2003), and specialized therapy facilities (Freundlich, Pike & Schwartz, 1989); for a variety populations, such as people with dementia (Kowarzik, 2006), pregnant women (Celebi, 2006), and children who have experienced trauma (Baudino, 2010). It can take place in large groups, small groups, or one-on-one with a therapist.

Dance may be therapeutic for children because they learn to communicate with other people and feel understood through the use of movement (Tortora, 2006). Payne (1992) described ASD as a “communication disability” (p. 41), as it affects one’s ability to connect with others, express personal needs, tolerate eye contact, and develop relationships. In dance, meaning is communicated physically rather than verbally, making it an appropriate alternative form of communication for children with ASD. Erfer (1995) supports this by stating that “dance/movement therapy is ideally suited for working with the autistic population” (p. 196).

Unfortunately, DMT is only utilized by 2.4% of children with ASD (Green, et al., 2006). Canadian respondents represented only 7% of participants in this survey, but there is little statistical information about the use of DMT in Canada (Green, et al., 2006). This may be due to the shortage of educational opportunities for DMT within Canada (Capello, 2008). There has been some literature pertaining to DMT for individuals with ASD; however, Devereaux (2012) reported that there is little current and robust research in this area. The following sections focuss on non-therapeutic recreational dance, how it differs from DMT and recreational dance for children with ASD.

Recreational Dance

Dance is deeply rooted in human history and impacted by geography, ethnicity, skill, age, and number of participants, among other factors (Malkogeorgos, Zaggelidou, & Georgescu 2011). The use of dance ranges from traditional to modern, recreational to competitive. It can be classified as both art and sport. Malkogeorgos, et al., (2011) comment on the far reaching benefits of dance because it impacts physical fitness, social skills, and mental wellbeing. Lobo and Winsler (2006) feel that dance is an enjoyable form of activity that fosters skill development and provides alternative social opportunities for young children. Furthermore, Olvera (2013) suggests that dance may be a viable option for individuals who "do not respond well to traditional physical activity programs such as running, walking, and playing competitive sports" (p. 353), including children with special needs (Cone & Cone, 2012) such as ASD.

There are many benefits of participating in non-therapeutic dance. Primarily, dance is an alternative form of physical activity that may decrease childhood inactivity and obesity (Olvera, 2013; Pelclová, Frömel, Skalik, & Stratton, 2008). Dance impacts physical health by improving muscular strength, flexibility, bone strength, and balance (Alpert, 2011; Malkogeorgos et al., 2011; Ricotti & Ravaschio, 2011). Dancers may also gain social skills as they learn to create relationships within a group setting (Lobo & Winsler, 2006). Additionally, it affects psychological health by increasing self-confidence, verbal and non-verbal expression, spatial awareness, stress management, motivation, and concentration while reducing behavioural issues (Olvera, 2013; Alpert, 2011; Malkogeorgos, Zaggelidou & Georgeseu, 2011; Frazer, Beattie, Redding, Quin & Butler, 2007; Lobo & Winsler, 2006). Finally, physiological benefits resulting from dance include increased endurance, lung capacity, and aerobic capacity (Frazer, et al., 2007).

Dance for Children with ASD

While children with ASD are faced with difficulties associated with their condition, they may display strengths in memory, reading, drawing, music, and computer skills (Autism Canada Foundation, 2014). Among these strengths are the arts (Tubbs, 2008). Dance is an art form that incorporates social, motor, and cognitive skills, making it beneficial for children with ASD. Unfortunately, there is little literature regarding recreational dance programs for children with ASD. One example was conducted by Gies (2012), who explored the ability of seven children aged 12 to 16 with high functioning ASD to learn a dance sequence from an instructional video. The video sessions were one-on-one, with just one child participating and a researcher observing at a time. The researcher was present to play, pause, and rewind the video whenever the child requested. Each session was no longer than 20 minutes in length, and the children took between 5 and 13 sessions to learn the dance routine. Six of the children successfully learned the routine; however, the researcher feels that the seventh would have also been successful in learning the routine had he been able to attend more dance sessions. Overall, “all seven participants had fun learning the Cupid Shuffle dance, liked learning from the video, and would like to learn other skills from the video… six participants thought the Cupid Shuffle was easy to learn, enjoyed dancing to music, and would do the Cupid Shuffle at a school dance or wedding” (p. 136). In addition, parents felt that this experience was an appropriate skill to teach to children with ASD. The goal of the research was to demonstrate that resources such as dance videos may be viable tools for teaching dance and incorporating physical activity into the curriculum. Gies (2012) also believes that providing these children with skills in dance will increase their participation in social settings.

Rosenblatt et al. (2011) studied the effects of a multidimensional program that included yoga, dance, and music therapy at improving the relaxation response of children with ASD. These researchers found that the participants, who were aged 3 to 16, displayed some improvements in behaviour and atypicality; however, participants aged 5 to 12 also displayed improvements in externalization (i.e. outward behaviours, such as aggression), internalization (i.e. inward behaviours, such as anxiety), and depression. These results suggest that the children aged 5 to 12 were more receptive to the program, perhaps due to the developmental processes that occur during this period.

Bahrami, Movahedi, Marandi, and Abedi (2012) explored the impact of martial arts for children with ASD. The participants were assessed for stereotyped behaviours before and after attending a four sessions of kata training per week for 14 weeks as well as 30 days after the intervention had finished. In the martial arts, katas are defined movement routines in which the performer must react to imaginary attackers. Katas range from several seconds to several minutes in length and they may be simple or intricate. Martial artists commit katas to memory by repeating them over and over. The results of this study showed a significant decrease in stereotypy for the kata participants as compared to the control group and this improvement was maintained during the 30 day washout period. Katas are similar to dance choreography, as both are composed of predetermined movement sequences. Martial arts classes are similar to dance classes in that both are a structured form of physical activity in a social setting that require the participants to listen and respond to instruction. In this way, it is hypothesized that dance training, specifically training choreographed routines, may illicit similar results as kata training. Both the relaxation and kata programs reduced stereotyped behaviour associated with ASD, and because they contain aspects of dance, then perhaps this outcome may also be found after participating in a recreational dance program.

Comparing DMT to Recreational Dance

Past literature has shown that children with ASD benefit from DMT; however, the purpose of this research is to determine if there are benefits of recreational dance. It is important to examine the differences and similarities between the two before associating one with the other. There are several aspects of recreational dance that differ from DMT, most notably, a recreational dance instructor is not a therapist and does not tailor the dance program to the therapeutic advancement of the participants (Batko, 2012). The recreational dance instructor may alter the program based on the abilities of the children who participate, but the end goal is not necessarily based on improving the development of the children involved. The goals of recreational dance may be to increase physical activity, create new social ties, learn a new skill, or simply for fun and enjoyment. Some recreational dancers work towards performances, competitions, examinations, or other dance related ambitions. In this way, recreational dance may be product-based, unlike DMT, which is process-based (Erfer, 1995). Recreational dance often focusses on performing choreography in an aesthetic manner, whereas DMT is often improvisational in nature with a focus on physical and verbal emotional resolution (Batko, 2012). Due to the similarities and differences in these forms of dance, it is difficult to determine whether DMT and recreational dance elicit similar outcomes.

Conversely, recreational dance is similar to DMT in various aspects. First and foremost, both incorporate music and motion to create dance. Music affects memory, attention, forward thinking, and vocabulary development (Alpert, 2011) and may be responsible for many of the benefits from both DMT and recreational dance. Dance (Batko, 2012) and music (Alpert, 2011) both elicit an emotional response, which is therapeutic regardless of the setting. Instructors and therapists may use music to stimulate a feeling or mood that is then portrayed through dance, increasing the ability of self-expression (Lobo & Winsler, 2006). Dancing is a form of physical activity, which is necessary in a healthy lifestyle and results in the production of endorphins leading to feelings of wellbeing (Alpert, 2011). Furthermore, both DMT and recreational dance involve social contact, whether this is with the instructor, therapist, or other participants (Devereaux, 2012; Lobo & Winsler, 2006). This contact provides participants with the opportunity to create social ties in a different setting from school, day care, or the home. Based on the similarities between recreational dance and DMT, there is reason to believe that children with ASD may benefit from recreational dance in a similar way to DMT; however, there are key differences between these two programs. Children with ASD benefitted from dancing with an instructional video, kata training, and a relaxation program that incorporated dance. Therefore, it is hypothesized that recreational dance programs may be beneficial for children with ASD.

Summary

ASD affects the development and functionality in children who have the disorder. Children who display social impairments and RRB's are diagnosed by a clinician based on the behavioural symptoms outlined in the DSM-5 (APA, 2013). Once a formal diagnosis has been made, early intervention is crucial in the treatment of children with ASD (Autism Canada Foundation, 2014). Treatment plans vary according to the needs of the child, but there is consistency in the belief that treatments should be holistic in nature, addressing each area of impaired development (Autism Canada Foundation, 2014). DMT is a form of complementary and alternative medicine that is particularly beneficial for children with ASD (Erfer, 1995); however, it is underutilized in North America and especially Canada (Green, Pituch, Itchon, Choi, O'Reilly & Sigafoos, 2006). Non-therapeutic recreational dance may be beneficial for children with ASD based on previous research about dance related programs (Bahrami, Movahedi, Marandi, & Abedi, 2012; Gies, 2012; Rosenblatt et al., 2011).

The purpose of this research is to determine whether recreational dance programs are beneficial for children with ASD in the areas of social, physical and mental wellbeing. This study will utilize a mixed methods design incorporating both qualitative and quantitative perspectives. These types of methods complement each other because quantitative research is useful for measuring the effectiveness of an intervention and qualitative research is useful for capturing the voice of participants. As stated in the introduction, there is little literature about recreational dance classes for children with autism. The following chapters discuss two areas of study. The first is qualitative in nature and will explore the social influence of dance on the lives of children with ASD. The second is quantitative in nature and will measure the influence of dance on the cognitive and motor functioning of children with ASD.

CHAPTER 2

Study 1: Exploring the Social Impact of a Recreational Dance Class for Children with ASD

Introduction

Social impairments related to ASD are a key predictor in parental stress of children with ASD (Firth & Dryer, 2013), making socialization an important consideration for therapeutic interventions. Devereaux (2012) summarised the social goals of DMT for children with ASD as "recognizing and responding to another person, increasing eye contact, participating in shared experiences and engaging in shared focus, breaking through isolation, decreasing the interpersonal distance that is part of the socialization and developing trust" (p. 337). In DMT, children build relationships with an adult (i.e. the therapist) and the other children attending the sessions (Baudino, 2010; Cole 1982; Devereaux, 2012; Freundlish, Pike & Schwartz, 1989; Loman 1995; Mateos-Moreno & Atencia-Doña, 2013; Torrance 2003). In fact, the therapist-child relationship is central to success in DMT, without which the child cannot progress (Erfer, 1995; Levy, 1998; Parteli, 1995). In order to build this relationship, the therapist utilizes techniques such as mirroring, touch, props and music to connect with the child in a non-intrusive way (Erfer, 1995). These methods allow the therapist to interact with the child indirectly, until a point in which the child trusts the therapist and will tolerate more direct means of interface such as eye contact (Devereaux, 2012; Duggan, 1978). Hartshorn, et al. (2001) found promising results from a group of 38 children with ASD who participated in DMT for 30 minutes bi-weekly for 2 months. The first and last DMT sessions were video recorded and coded by the researchers for behavioural outcomes. Children in the test group showed significantly decreased negative responses to touch and time resisting their school teacher as compared to the control group (Hartshorn, et al., 2001). In addition, Torrance (2003) found that adolescent males with ASD displayed increased turn taking, healthy conflict resolution and fewer violent outbursts after participating in DMT. These skills allow children to interact more freely with the “real world” (Freundlish, Pike & Schwartz, 1989; p. 50; Siegel, 1973, p. 148) and may lead to increased participation in social activities such as organized sports (Samaritter & Payne, 2013). For children with ASD, the inability to interact with others and their environment prevents the child from learning, which subsequently hinders cognitive functioning (Duggan, 1978). By increasing sociability, the therapist may actually be improving learning capabilities and therefore cognitive functioning may also be enhanced (Duggan, 1978).

While the majority of literature suggests that participating in DMT offers great social benefits, not all research is congruent. In one study, Mateos-Moreno and Atencia-Doña (2013) tested eight young adults with ASD after participating in a music/dance therapy program twice a week for one hour. After 17 weeks, these authors found no effect in the areas of contact (i.e. Seeking social isolation) or communication (i.e. Inappropriate vocalizations, facial expressions and gestures) in the treatment group as compared to the control group. In a second study, Hartshorn and colleagues (2001) tested 36 children with ASD after participating in 30 minutes of movement therapy biweekly for two months. The treatment group showed no significant change in eye contact or social-relatedness towards the teacher as compared to the control group. While there is more research to support the positive results, there are aspects of DMT that are not as beneficial as they appear. The studies by Mateos-Moreno and Atencia-Doña (2013) and Hartshorn and colleagues (2001) are more robust than the other literature in this area as they compare a test group to a control group. As Devereaux (2012) noted, there are few empirical studies in DMT literature about children with ASD, and it is necessary to consider all results, whether significant or insignificant in order to produce evidence-based literature in the future.

Based on the existing literature about the social implications associated with DMT, one has reason to believe that recreational dance may impact social skills as well. In the study by Gies (2012), where children with ASD learned the Cupid Shuffle, the author contended that learning dance allowed these children to participate in social settings. If children with ASD are able to create social ties within the dance setting similarly to typically developing children (Lobo & Winsler, 2006), and are also able to apply this skill in other settings (Gies, 2012), then perhaps participating in recreational dance would contribute to social development for children with ASD.

Purpose

The objective of this study is to explore the lived experiences of individuals with ASD who participate in recreational dance classes through the perspectives of their primary caregivers, and the perspectives of their dance instructors. Specifically, the social aspect of participating in a recreational dance class will be examined, in addition to other perceived benefits.

Methodology

Participants

Purposeful sampling and criterion sampling was utilized for participant recruitment in this study. In purposeful sampling "cases (e.g., People, organizations, communities, cultures, events, critical incidences) are selected because they are 'information rich' and illuminative, that is, they offer useful manifestations of the phenomenon of interest" (Patton, 2002, p. 40). The 'information rich' population that the principle researcher sought was children with ASD who participated in community-based recreational dance classes. These classes were composed of individuals with special needs within a similar age group or developmental level. Special needs included Down Syndrome, Cerebral Palsy, attention deficit hyperactivity disorder, and ASD. In the present study, the participants were 8 to 15 years old and had a diagnosis somewhere along the autism spectrum. The dance classes were both accessible to the community and non-therapeutic in nature. The group of participants was composed of children enrolled in these classes, their primary caregivers, their dance instructors, and their volunteer helpers. The goal was to recruit participants from several different facilities that offered these classes in order to gain different perspectives from individuals who were involved. These participants must "have *directly* experienced the phenomenon of interest" (Patton, 2002, p. 104), which was the recreational dance class in this research. Each participant experienced the class slightly differently. For example, the instructors, who spent time with the children in the classroom, had a different experience from the caregivers, who spent time with the children before and after the class.

The volunteers attended each dance class and met with their dancer before class began. Each volunteer had a different roll depending on the needs of the child they worked with, and they discussed these needs with the caregivers and dance instructors within the first weeks of the program. Some volunteers provided social support by keeping the dancer engaged in the class, while others provided physical support to help a dancer move their body (i.e., a child with Cerebral Palsy who has difficulty moving his or her legs). The goal for all volunteers was to ensure that the dancers had a positive experience in the class.

The principle researcher sought dance studios that offered recreational classes that allowed children with ASD to participate and received permission to recruit children, parents, volunteers, and instructors from the facility. Once permission was granted, the researcher distributed recruitment letters to all students with ASD participating in the classes as well as the dance instructors of these classes and their assistants. Those who choose to participate contacted the researcher via telephone, e-mail, or in person.

Research Tools and Procedure

The Qualitative Method

Patton (2002) described the benefits of qualitative data as: "while one cannot generalize from a single case or very small sample, one can learn from them – and learn a great deal, often opening up new territory for further research" (p. 46). Therefore, qualitative methods were used in order to explore the experience of participating in a recreational dance class and to capture the voice of those who had direct involvement with this phenomenon. Since there is little research about the social impacts of recreational dance for children with ASD, it is important to capture the voice of these participants. The primary method of data collection was semi-structured one-on-one interviews. In these interviews, participants were asked to discuss topics such as the structure of the dance class, the social interactions that occurred within the class, and how the program could be improved. Semi-structured interviews were deemed most appropriate because they directed the conversation toward the purpose of the study; however, participants were able to provide additional information that was not included on the interview guide (see the appendix for the interview guide). Background questionnaires, member checks, and field notes were also used to collect data for this study.

Ethics

All research procedures were approved by the Wilfrid Laurier University Research Ethics board (see Appendix 4). All participants read an information letter that outlined the methods of the research and signed a consent form if they agreed to participate. Primary caregivers were also required to provide consent for their children who wished to participate in the study. All participants were provided the opportunity to ask the researcher questions about the study and were allowed to withdraw from the research at any point without penalty.

Background Questionnaires

Before participating in the interview, dance instructors, assistants, and primary caregivers completed a background questionnaire to provide the researcher with contextual information. Caregivers were asked questions about the number of children they have and about their children's dance class, while instructors and assistants were asked questions about their role in the class and their dance background. Data from the questionnaire was used to probe the participants to discuss their experiences in depth during the one-on-one interview with the researcher. For example, caregivers were asked to provide information about the recreational programs in which their children with ASD participated. The researcher then used this information to probe the caregivers in their interviews (i.e., how often does your child attend these programs? Why did you enrol your child in these programs?). The questionnaires were also used to create individual participant profiles (see tables 1 to 3).

Interviews

Caregivers and instructors participated in two one-on-one semi-structured interviews with the researcher, one within the first two weeks dance program and another two months into the program, while the assistants were only interviewed at the two month time point. The researcher also interviewed one child who wished to share her personal experiences in the dance program. Caregivers were asked to discuss their child's involvement in the dance program, whether they felt it was beneficial, what they liked about the program, and what they felt should be changed about the program. The instructors and assistants were asked to discuss their teaching experience, the social interactions of the children in the class, whether aspects of the program should be changed in the future, and whether they felt the program is beneficial. It was necessary to interview the participants a second time two months after the dance program has begun in order to comment on their experiences regarding the class. The caregivers and instructors were asked to comment on the organization of the program and whether or not they felt the program affected the children’s social skills. The interviews ranged from 30 to 60 minutes in length. All interviews were audiotaped and transcribed verbatim.

Field Notes

Before, during, and after each interview, the researcher recorded field notes about the setting, atmosphere, participant, and any other notable information that was not audible. Additionally, the researcher observed at least two dance classes (i.e. one at the beginning of the program and one at the end) at each facility and recorded field notes about these observations. The purpose of attending the dance class was to witness the relationships between the dancers and instructors, record the organization of the class, study the teaching methods that the instructors utilize and determine whether the dancers progress over time. In addition, the researcher observed the emotional responses of the participants with ASD as an indicator of their enjoyment of a particular activity. For example, a child who smiles and jumps with his or her volunteer helper at the start of an activity was believed to be excited about said activity. On the other hand, a child who left the group to pace in front of the mirror was believed to be inattentive to the activity. As a dancer and instructor, the researcher has extensive experience in observing and analysing dance with neurotypical children. It is important to note however, that children with ASD express their feelings differently than neurotypical children, and therefore the researchers observations are only an interpretation of the children’s true feelings. The field notes collected from the interviews and dance classes enriched the data about the lived experience explored within this study. These notes also provided the researcher with an opportunity to record "feelings, reactions to the experience, and reflections" (Patton, 2002, p. 303) during the research process.

Member Checks

After each interview, the researcher combined all data from the questionnaire, field notes, and interview into a complete transcript, and then sent the transcript to the participant in the form of a member check. This process allowed the researcher to ask the participant clarifying questions that may have arisen after the interview, and also allowed the participant to add or omit information he or she felt was necessary. Conducting member checks improves the credibility of the research (Lincoln & Guba, 1985), as they provide an additional opportunity for participants to voice their experience with the phenomenon.

Credibility

According to Patton (2002), three elements determine a study's credibility: (1) rigorous methods; (2) credibility of the researcher; and (3) philosophical belief in the value of qualitative inquiry. Utilizing triangulation improved the strength of data collection and the credibility of data analysis (Lincoln & Guba, 1985; Patton, 2002). In this study, three forms of triangulation were utilized to ensure data credibility. The first was data triangulation, in which the researcher compared data from several different sources (i.e., children with ASD, their primary caregivers, their dance instructors and the researcher herself) (Lincoln & Guba, 2985). The second form was methodological triangulation, in which the researcher collected data about the phenomenon using several different methods (i.e., background questionnaires, field notes, interviews, and member checks). Last, the principle researcher had several other qualitative researchers, including professors and students, analyze the data to achieve investigator triangulation. All individuals compared their analysis in order to reduce bias that may have been introduced by a single researcher. Triangulation is thought to strengthen research as it increases the amount of data that can be collected about a particular phenomenon and it also reduces the likelihood of missing significant information.

To further enhance credibility, information-rich cases were sought out in order to obtain valuable data, rather than recruiting large numbers of participants. The participants were provided with another opportunity to voice their experience through member checks after their interviews. Additionally, the researcher acted as a tool by collecting field notes and practicing epoché, in which "the researcher looks inside to become aware of personal bias, to eliminate personal involvement with subject material, that is, eliminate or at least gain clarity about, preconceptions" (Patton, 2002, p. 485). The researcher suspended biases about dance programs, but not necessarily about deficits associated with ASD, which may have influenced the data collection. Epoché was accomplished by recording personal thoughts and opinions about the data in a research journal. This journal was also used for recording notes about the research process.

Data Treatment

Qualitative Analysis: Phenomenology

In order to explore the social aspects associated with the dance class, qualitative methods were utilized. Phenomenology was the specific theoretical orientation that guided data collection and analysis. Patton (2002) describes phenomenology as

> …how human beings make sense of experience and transform experience into consciousness, both individually and as shared meaning. This requires methodologically, carefully, and thoroughly capturing and describing how people experience some phenomenon – how they perceive it, describe it, feel about it, judge it, remember it, make sense of it, and talk about it with others. (p.104)

Phenomenology allows the researcher to explore the lived experience of a given phenomenon. In this case, the phenomenon was the recreational dance program and the experience was lived by the child with ASD. Unfortunately, not all children with ASD were able to be interviewed. Therefore, data about the social aspects of participating in a dance class was collected from the primary caregivers, dance instructors, and assistants as well as the researcher's observations of the dance classes. While the caregivers and instructors did not directly live this experience, they were able to comment on their perspective of each child's experience. Caregivers discussed the children's social lives outside the class and instructors and assistants discussed the social setting within the class.

Four methods of data collection were used to capture the participants' experience of the phenomenon in this study. The background questionnaires were the first method utilized, which provided the researcher with contextual information about the participant before conducting the interview. Participants then discussed their experiences in depth during the semi-structured interview. It was important that the interviews were semi-structured in nature, as each participant had their own unique experience that may have provoked the researcher to ask questions that were not on the interview guide (see appendix for the interview guides). Finally, the participants had another opportunity to provide their voice through the member check.

Analysis

The researcher kept a journal and recorded each step of the research process. The journal allowed for early analysis, as the researcher recorded preliminary thoughts and queries about the data. First, the researcher created participant profiles from the background questionnaires in order to better understand the transcripts during analysis. After data from each participant was compiled, the researcher read the transcript two to three times for content and reoccurring topics.

These topics were recorded in the research journal for each transcript and then compiled together after all transcripts were read. The researcher utilized NVivo to categorize the data into the topics that were found in the preliminary analysis. These topics were used as nodes in the NVivo program. The researcher read the transcripts and organized participant quotes into the nodes with which they corresponded. This process was repeated with each transcript to ensure that all pertinent data was placed under the appropriate node.

Once the data was organized, the researcher read the quotes within a node and either organized the data into sub categories or moved quotes out of the node if they did not fit with the patterns within the node. Nodes with few quotes were merged with nodes that were richer with data. For example, a node with only two or three quotes from less than half of the participants was not rich enough to stand alone as a topic and was therefore added as a subtopic to a related node. During this organization process, the researcher referenced to the original transcripts to ensure the quotes were not removed from the context in which they were discussed in the interview. Lastly, the researcher summarised the nodes into their general meaning and placed them into categories. The overarching categories were made into themes and the associated subcategories were made into subthemes.

CHAPTER 3

Study 2: Measuring Motor Abilities of Children with ASD who Participate in Recreational Dance Classes

Introduction

ASD greatly impacts social development, as discussed in chapter two, but the disorder also impairs cognitive and motor functioning, primarily in regards to sensory-motor integration (Autism Speaks Canada, 2014). Study two examined the cognitive and motor abilities of children with ASD and how physical activity, specifically through dance, may have been beneficial. It is important to consider mirroring and awareness, two recurring themes within DMT literature for children with ASD. Both mirroring and awareness require cognitive and motor integration; however, these abilities may be hindered in ASD.

Children with ASD may experience motor and cognitive difficulties in addition to other symptoms associated with the disorder. Memari et al. (2013) reported that children with ASD display more postural sway than their neurotypical counterparts and that postural sway increases with increasing severity of ASD. The relationship between ASD severity and motor skills has been found in other literature as well. For example, Hilton, Zhang,Whilte, Klohr, and Constantino (2011) found negative relationships between ASD severity and IQ, motor functioning, and social skills. More specifically, these researchers tested fine motor skills, coordination, strength, agility, motor proficiency, and visual motor integration in children with ASD and their neurotypical siblings. In all tests, the children with ASD scored significantly lower than their neurotypical sibling (Hilton, Zhang,Whilte, Klohr & Constantino, 2011). In a recent review, Gowen and Hamilton (2012) found two key deficits in children with ASD: 1) reduced information integration; and 2) increased sensory-motor processing variability. These authors also found that general motor learning was not significantly impaired, but more specific skill acquisition and higher order processing were adversely affected. These findings were similar to that of macneil and Mustofsky (2012) who compared children with ASD to those with ADHD and neurotypical development in a range of motor based assessments. Macneil and Mustofsky (2012) found that children with ASD did not differ from those with ADHD and neurotypical development in regards to basic motor control (e.g. Gait, balance, and coordination); however, children with ASD showed significant deficits in skilled gesture performance and recognition as compared to the other two groups. Specifically, children with ASD scored poorly in the ability to perform skilled gestures, using a tool for example, and postural knowledge, such as determining which tool another person would be using based on their body position (macneil & Mustofsky, 2012). The researchers suggested that children with ASD may learn these skills in a unique way as compared to their neurotypical peers, and may benefit from programs that teach these skills using different instructing techniques. Furthermore, the deficits found in this study may link to the inability for many children with ASD to relate to others. By teaching skilled gestures and posture recognition in a manner more appropriate for ASD (i.e., Allowing more time for repetition when learning a new skill), these children may also learn social and communication skills. There have been promising results about sensory-motor integration within the literature of DMT for children with ASD. The first area is about the mirror neuron system and its role in empathy, and the second is about body image and self-awareness.

Mirroring and Body Awareness

The mirror neuron system (MNS) is responsible for action recognition in the self and others (Fadiga, Fogassi, Pavesi, & Rizzolatti, 1995). It is a neurological process that may be dormant in individuals with ASD (as proposed by Ramachandran & Seckel, 2011), which may hinder their ability to feel empathy (Berrol, 2006). Motor and cognitive abilities are both necessary in the functioning of the MNS, as the individual must integrate internal knowledge about their own body with external information about someone else's body (Rizzolatti & Arbib, 1998). An impaired MNS may be related to decreased self-awareness, awareness of others, and personal body image as in children with ASD. Mirroring is a common technique utilized in DMT for individuals with ASD. In this technique, the therapist stimulates the MNS of the client by mimicking his or her movements, therefore allowing the client to witness his or her movements on another body (Berrol, 2006). Devereaux (2012) and Torrance (2003) utilized mirroring for children with ASD through leading and following activities. These activities fostered development in two areas related to the MNS. First, the children were required to take turns and respect each other for the activity to be successful. In this way, they became conscious of someone else's needs and practiced their skills in empathy. Second, the children learned how to recognize the actions of another person, how to process this information, and how use that knowledge to create a similar movement on their own bodies. This process may have stimulated the MNS through action recognition. While mirroring is not commonly utilized in recreational dance, dancers are required to watch the instructor and reproduce his or her movements, similarly to the leading and following activities in DMT.

Several dance/ movement therapists suggest that the formation of body image, awareness of the self, and awareness of others were important and achievable goals in DMT, both for typically developing individuals (Wallock, 1975) and children with ASD (Behrends, Müller & Dziobek, 2012; Devereaux, 2012; Torrance, 2004; Erfer, 1995; Payne, 1992; Siegel, 1973; Kalish, 1968). Touch may improve body awareness through tactile information. Siegel (1973) worked with four autistic children aged four to six and their special education teacher for nine months utilizing movement therapy. She noticed that they had little concept of their own body and therefore her goal was "body-image building and the formation of separate self" (Siegel, 1973, p. 148). At the beginning of the therapy session, Siegel identified body parts by sitting with each child and using his or her hands to touch and name parts of his or her body and of her own body. Over time the children began to recognize themselves as separate entities from the therapist and teacher, explore new movement patterns with their bodies, and even show excitement in seeing the therapist. From these reports, it appears that DMT may improve awareness and body image in children with ASD. Recreational dance utilizes similar tools as touch and body part awareness. For example, the instructor may say "touch your toes", and so the children would be required to identify where both their toes and fingers are located in order to complete this action. For this reason, recreational dance may impact the participants in a similar way as DMT with regards to self-awareness and body image.

Purpose

The purpose of this study was to determine if there were measureable motor improvements for children with ASD that resulted from participating in recreational dance classes.

Methodology

Participants

The participants of this research were children with ASD between the ages of 8 and 15 who attended a recreational dance class for at least eight weeks. The diagnosis of ASD was self-reported by the primary caregivers of the children who participated in the program. The dance classes were specifically for children with special needs. Children with ASD who enrolled in a recreational dance class were recruited to participate via recruitment letters given to their primary caregiver. Caregivers who consented to their children's participation in the study contacted the researcher in person or via telephone or e-mail. All tests took place at the participant's home (for three of the children) or at the participant's dance studio (for one of the children). Once a testing location was determined, each of the four testing sessions were conducted in that place.

NIH Toolbox

In order to measure the motor outcomes of participating in a recreational dance class, the researcher utilized the NIH Toolbox (2012), which is

> …a multidimensional set of measures assessing cognitive, emotional, motor, and sensory function from ages 3-85, and meets the needs for a standard set of measures that can be used as a 'common currency' across diverse study designs and settings. The NIH Toolbox can be used to monitor neurological and behavioral function over time and measure key constructs across developmental stages. (p. 8)

The measures within the NIH Toolbox were selected by experts within the field of each domain and all have been validated against gold standard tests where possible (NIH Toolbox, 2014). While this tool provides assessments in four domains, only the motor domain was used for the purposes of this study. Within each domain is a test battery for the general population (7-85 years of age) and early childhood population (3-6 years of age). The test battery for ages 7-85 was utilized in this study because the participants fell within this age group. In this way, the results were comparable to standardized scores and the researcher was able to compare the children with ASD to the typically developing population. Participants were tested three times over the first four months of their dance program and again after a three week washout period to determine if there are improvements as a result of their participation.

Motor Test Battery

The NIH Toolbox (2012) defines motor functions as “the ability to use and control muscles and movements”. Subdomains that were measured within the motor test battery include balance, endurance, and locomotion. This test battery required approximately 15 minutes to complete.

Balance

The Standing Balance Test was used to measure static standing balance. Participants removed their shoes and stood on a force plate to measure their centre of pressure. They stood arms-length away from an object hanging on the wall at eye level (i.e., a framed picture). The participants were instructed to focus on the object during the test. The researcher instructed the participants to stand with the balls and heals of their feet close together without touching and their arms crossed over their chest. The score was based on the amount of sway while holding a pose for 50 seconds. There are four poses, including eyes open standing on the floor (EOHS), eyes closed standing on the floor (ECHS), eyes open standing on a foam pad (EOFS), and eyes closed standing on a foam pad (ECFS). Balance is an important component of dance. It was hypothesized that sway would increase during the eyes closed poses in comparison to the eyes open conditions. Dancers rarely dance without visual input and therefore balancing with the eyes closed will not be practiced in the dance class. Additionally, balancing on the foam pad will not improve as a result of dancing, because dance rarely takes place on a soft surface. The outcome measure for the standing balance test was the root mean square of centre of pressure velocity in both the anterior-posterior and medial-lateral directions (see Powers, Kalmar, & Cinelli, 2014).

Endurance

The NIH Toolbox uses the 2-Minute Walk Endurance Test, which measured cardiovascular endurance. The researcher measured a 25-foot distance (7.62 meters) with a designated start and end point. Participants walked from start to end and back as many times as possible within two minutes. The researcher counted the number of distances the participant walked and multiplied it by 25 to determine how many feet were travelled. When the allotted time ended, the participant stopped where they were and the researcher measured how far they traveled from the last point they reached. This measure was added to 25 multiplied the number of lengths travelled in order to determine the total distance in feet and inches. Dance classes are often over 30 minutes in length, and therefore require cardiopulmonary endurance. It was hypothesized that endurance would increase after participating in the dance class.

Locomotion

The 4-Meter Walk Gait Speed Test was used to measure locomotion. In this test, participants walked a four-meter course three times in a row; the first as a practice trial and the second and third as timed trials. The outcome measure for this test was recorded in meters per second. Efficient locomotion requires input from several different bodily systems (i.e. Nervous system, musculoskeletal system) and therefore locomotion is a good measure of physical health. Dancers learn atypical gait patterns, such as skipping or galloping, which may improve locomotion. It was hypothesized that participants will have faster locomotion after participating in dance as dancers practice locomotion while in class.

Other Tools

The NIH Toolbox does not include a test for flexibility, which is a component of well-being that may be enhanced after participating in a dance class. The sit and reach test is a validated tool for measuring flexibility (Ayala, de Baranda, Croix, & Santonja, 2012). In this test, the participants sat on the ground with their legs extended and their feet flat against a stool. They then reached as far as they could towards their toes with one hand over the other and palms facing downward. The researcher measured the distance between the tips of the fingers and the tips of the toes (which were at the 0 cm mark). A measure above 0 indicated that the participant reached further than his or her toes, and a measure below 0 indicated that the participant did not reach further than his or her toes. This test measures hamstring and lower back flexibility, which are often targeted within the stretching component of a dance class.

The Upper Body Imitation Test was used to assess body-awareness. In this test, the participant stood in front of a large protractor on the wall. The researcher placed the participant's arms at a point in space that could be measured by the protractor. The arm positions were as follows: 1) both arms straight up overhead, 2) both arms straight out to the sides, 3) left arm straight up with right arm straight out, 4) and right arm straight up with left arm straight out. The children were then asked to place their arms at their sides and replace their arms in the same position that the researcher originally placed them. Degrees of error between the researcher's arm placement and the participant's replacement was the outcome measure. This test measures the children's ability to perceive where their upper limbs are in space based on previous proprioceptive sensory information. It was hypothesized that body-awareness would improve after participating in the dance class, as the children will be exploring their bodily movements in the class.

CHAPTER 4

Results

Studio 2nd Participant Summary

Two dance studios in Ontario participated in this research project from September 2014 to January 2015. To ensure confidentiality, all participants' names have been replaced by pseudonyms and no identifying information is reported. Three dance participants recruited from Studio 1 and one dance participant was recruited from Studio 2. The special needs dance class at studio 1 was created by Ashley and Katie, who are both Occupational Therapists and certified dance instructors. At the time of this study, they ran five dance classes for children with special needs, four of which were a mixture of ballet, jazz, and hip hop, and one dedicated solely to tap. Class size ranged from 6 to 12 students along with volunteer buddies who work one-on-one or two-on-one with the dancers. Dancer buddy dyads and triads were assigned by Ashley and Katie based on the needs of the dancer. For example, several of their older and higher functioning students have been dancing with the program for five years and do not require one-on-one assistance. On the other hand, a new dancer with higher needs would be assigned with a buddy who would work with him or her for the season. Students enrol for the entire dance season, which runs from September to May, and then they participate in a recital at the end of the year.

Kayla was 10 years old at the time of this study and has danced for one full year at studio 1. She initially started by taking one mixed style class per week, but has also been taking tap since January 2014. Kayla was diagnosed with PPD-NOS with secondary diagnoses of developmental coordination disorder and attention deficit hyperactive disorder, all at six years of age. Difficulties associated with Kayla's diagnoses are communication, violent outbursts, controlling her mood, and controlling her movements. Kayla is at the same academic level as her typically developing peers, but requires assistive devices on occasion, such as when writing a test. Aside from dance and school, Kayla takes violin lessons, participates in Girl Guides, and sings in the children's choir at her school. She is not currently undergoing any therapy.

Sadie was eight years old and had been dancing for one full year at studio 1 in the mixed style class. Sadie was diagnosed with ASD at two years of age. She has a potential secondary diagnosis of attention deficit hyperactivity disorder. Her autism primarily affects her communication, restrictive and repetitive behaviours, mood, and movement. She is also often overwhelmed by sensory input, seeks pressure (i.e., from a tight hug), and struggles with academics. She is currently in the junior life skills class at her school with a one-on-one educational assistant. Sadie receives speech therapy and dance therapy once a week, in addition to attending dance class.

Colin was eight years old at the time of this study and had been dancing for one full year at studio 1, first in an all-boys hip-hop class, and now in a co-ed mixed style class. He was diagnosed with ASD at 17 months of age and has a secondary diagnosis of apraxia. Colin is non-verbal, has difficulties with self-regulation, and often experiences feelings of anxiety. He goes to a private school for children with autism and is at the grade two level for language, math, and science. In addition to dance, Colin participates in gymnastics once a week and swimming lessons twice a week.

The special needs dance class at studio 2 was created in the 1990's by a local university. There are currently two dance classes for children with special needs: one for adolescents and one for teenagers and young adults. Both classes were taught by Tricia, a certified dance instructor, who focused on creative movement as well as ballet and jazz technique. Class size ranged from 8 to 10 students per class throughout the year, as dancers enrolled for ten weeks at a time. Students may enrol for one, two, or three ten-week sessions throughout the dance season, and those enrolled in the third session participated in the year end recital. There were four volunteer buddies in the adolescent class and two volunteer buddies in the teen and young adult class. Volunteers were recruited based on the needs of the dancers; however, there were more individuals who wished to be volunteers than the class required. Tricia felt that the volunteer experience was beneficial for both volunteers and dancers, and therefore took on more volunteers than necessary. More specifically, there were four volunteers in the younger class, but Tricia felt that she only needed two for the class to run smoothly.

Hannah was 15 years old at the time of this study and had been dancing for two full years at studio 2. Hannah was diagnosed with ASD at the age of two and primarily experiences communication deficits, repetitive behaviours, violent outbursts, and learning difficulties. She is primarily non-verbal, but will speak short sentences when expressing herself or prompted with a question. For example, Hannah said “I love to dance” when I began to interview her mother about her dance experiences. I later asked her about her favourite type of music, for which she responded with “One Direction”. Hannah has been homeschooled for three hours per week for the past three years, when the school board decided that she should not be allowed to attend school due to aggressive behaviours. In addition to dance, Hannah plays basketball, attends a yoga class, takes swimming lessons, participates in a music group, and goes to a creative arts program during the week. She also receives speech therapy and IBI therapy once per week. Tables 1 through 4 summarize demographic information about each of the participants, their primary caregivers, their dance instructors, and their volunteer buddies.

Table 1: Socio-demographic information about the four participants with ASD.

Participants				
	Colin	**Hannah**	**Sadie**	**Kayla**
Caregiver	Laura	Grace	Briana	Briana
Sex	Male	Female	Female	Female
Age	8	15	8	10
Primary diagnosis	ASD	ASD	ASD	PDD-NOS, ADHD
Secondary diagnosis	Apraxia	Scoliosis	Possible ADHD	Developmental Coordination Disorder
Age of Diagnosis	17 months	30 months	26 months	6 years
Signs and symptoms	Non-verbal, self-regulation, anxiety	Communication, RRB's, mood, violent outbursts, learning delay	Communication, RRBS, mood, movements, overwhelmed by sensory input, seeks pressure, sitting still, struggles with academics	Communication, mood, movements, violent outbursts
Therapy	None currently	IBI 2hr/week Speech 1hr/2week	Speech therapy, music therapy	None currently
Current activities	Dance, gymnastics, swimming	Dance, swimming, basketball, yoga, music group, theatre group	Dance	Guides, dance, choir, violin

Table 2: Socio-demographic information about the primary caregivers.

Caregivers			
	Grace	**Laura**	**Briana**
Sex	Female	Female	Female
Age	37	40	40
Education	University	Post-graduate	University
Marital status	Married	Married	Married
Career	Unemployed	Stay at home mom	Part time writer
Children (including children with ASD)	1 son, 1 daughter	2 sons	3 daughters

Table 3: Socio-demographic information about the dance instructors.

Instructors			
	Ashley	**Katie**	**Tricia**
Sex	Female	Female	Female
Age	27	25	42
Studio	Studio 1	Studio 1	Studio 2
Certification	Canadian Dance Teachers Association	Canadian Dance Teachers Association	University Dance degree

Table 4: Socio-demographic information about the three dance volunteers.

Volunteers			
	Cara	**Hailey**	**Stephanie**
Sex	Female	Female	Female
Age	15	17	16
Dance experience	13 years	10 years	11 years
Volunteer experience	5 years	2 years	0 years

Qualitative Results

Two salient themes emerged upon analysis of the data regarding the lived experience of children with ASD as they participated in a recreational dance class from the perspectives of their caregivers, dance instructors, and volunteers. The themes included (1) designing an inclusive dance program and (2) the outcomes of being involved in dance. Themes and subthemes are outlined in Table 5. While the purpose of the qualitative research was to explore the social aspects of the class, only a small portion of the data pertained to socializing at dance (see subtheme more than meets the eye).

Table 5: Themes and subthemes that emerged upon analysis of the interviews.

Theme	**Subtheme**
Creating Dance Programs for All Abilities	a) Changing the Class to Fit the Student b) Juggling Everyone's Needs c) Volunteers Make it Possible
What it Means to be a Dancer	a) All the Right Moves b) More Than Meets the Eye c) Everyone is Affected

Creating dance programs for all abilities

Both dance programs were created to be inclusive for children of all ability levels. The three instructors, Ashely, Katie, and Tricia, were capable of identifying the needs of each dancer and were able to address these needs. There were three subthemes within the theme of creating dance programs for all abilities, consisting of the changing the class to fit the student, juggling everyone's needs, and volunteers make it possible. Each will be discussed in turn.

Changing the class to fit the student

The recreational classes at Studio 1 and Studio 2 were capable of including children with all abilities. Ashley, Katie, and Tricia felt that all children should have the opportunity to dance regardless of their abilities and that these inclusive programs should be more readily available in the community. These instructors altered their classes so that dancers with special needs could be successful. In this way, they changed the class to fit the student rather than expecting the student to adjust to a typical dance class. Katie talked about program advertising and recruitment, and stated that any children who were interested in joining the dance program were welcome, no matter what their ability or disability.

> It was, uh, a way for us to offer a dance class for kids of all abilities. So we didn't put any restrictions on it or any labels, it was just whoever wanted to join would join. – *Katie, dance instructor*

Below, Ashley described her goals for the class at studio 1 and how she hoped to influence the community’s attitude toward dance.

> Our goal is to make dance accessible for anyone and I think we're still learning. You know, is it possible for a studio to just open up their doors to anyone and be able to integrate them? … The biggest thing is just a change in attitude and how you perceive what dance is and you know, what are you really trying to get out of the student? Like instead of trying to make the student fit to the class, changing the class to fit the student. *– Ashley, dance instructor*

Interestingly, even though Tricia was from a different dance studio, her views were similar to Ashley’s. Tricia hoped to broaden the view of dance in her community and demonstrate that everyone is capable of using their body to dance.

> I like taking down this boundary of, of sort of, your typical idea of what dance is. I like sort of removing that barrier … Dance is something that anybody can do. Dance can sort of take different forms and look different ways, so I like that aspect of it. – *Tricia, dance instructor*

The caregivers in this study appreciated that their children were welcomed into these programs, that their needs would be accommodated, and that they would be challenged while in the class. Briana, the caregiver of Kayla and Sadie, described why she liked the dance class at studio 1.

> So I felt comfortable with, with Ashley and Katie, that they were kind of ready for anything. Um, and that just, I love their enthusiasm and their welcoming nature… And that th-, there's no stigma… I know there's a big push for integrated programs. I kind of like the ones that aren't integrated, where my kids can, are just free to be themselves and not trying to compare themselves to someone who has different, you know, has an easier time and doesn't have the same challenges. They can just be free to be who they are. Um, so I like that it's the special needs program opposed to a regular dance program with accommodations. – *Briana, caregiver*

Laura, Colin's caregiver, felt that the dance program fostered a sense of success in the children who participated in the class. More specifically, the instructors Ashley and Katie highlighted the strengths of each child throughout the season, which Laura felt was beneficial for everyone in the class.

> I like that everybody comes in with different skills and that he gets the opportunity to shine in different areas. And then he sees different kids shine in different areas. I just like that the teachers are so understanding and accepting. – *Laura, caregiver*

Hannah's caregiver, Grace, discussed her appreciation for Tricia as a dance instructor. She felt that Tricia was able to accommodate her daughter into the class and believed other children with disabilities would benefit from participating in the class as well.

> I like that they have their own, I can say space and time and they have really wonderful teacher. Somebody that can understand that, can show them how to do something. Because they learn new skills and their copying skills are different than other children have. And it's, it's like amazing, amazing program that I can recommend it to others, other parents. It's really good. – *Grace, caregiver*

The goal of the classes from the perspective of the dance instructors was to accommodate for all abilities in these two programs. Instructors said that they had an accepting attitude towards all children and would do whatever possible to include these children in their dance class. Caregivers appreciated this inclusive nature, saying that their children were welcomed into the classes and were encouraged to be themselves.

Juggling everyone's needs

These dance programs would not be inclusive if they were not able to adapt to the unique needs of each child. As discussed in the literature review, behaviour is one of the chief concerns associated with ASD and is also a concern for the participants in this study. The instructors and caregivers described their concerns associated with different challenges for each student and their methods for addressing those challenges. For example, Ashley found it challenging to pace the class appropriately for all of her dancers. Some children required additional time to move from one activity to another, while other children were anxious during this transition period.

> That's what I would say is the hardest thing to juggle, is the pace of the class and how quickly um, we're going. Because for a child with physical needs you need to give them time to get to the end of the room, whereas a kid with autism might have a harder time you know, waiting at the end of the room for something to happen. – *Ashley, dance instructor*

Ashley also described the importance of routine in her class. Again, some children were able to accommodate a change in routine, but others required verbal preparation beforehand.

> And like I said that routine, some of them really get into that routine and I find I have to at least stick to that routine as best as I can or give them warning of what's going to happen next and always saying "ok, this and then that." Um, and for a few of the kids we've used the visual schedules, which has definitely really helped, um, for kids with autism and some without autism too. – *Ashley, dance instructor*

On the other hand, Tricia described the importance of flexibility in the class schedule. She felt that it was important to plan her class, but equally important was the dancers' reactions to her plan.

> I always have a plan and I'm always ready to adapt or change or tweak or stray or completely move on to something else. Because even sometimes something that works one particular week, the next week is maybe not going to work as well. Just really depends on the kids and their mood, so um, yeah absolutely um, yeah as a teacher you just have to be willing to let something go if it doesn't work, or rethink about it. How can

> you try this a different way? How can how could we do this differently to make it work? *– Tricia, dance instructor*

In order for the two programs to run smoothly, they were designed to address behavioural concerns. Structure and routine were utilized to decrease behavioural incidents in many cases. For example, having a consistent routine and quick activity transitions were especially important for Colin, as described by Katie.

> I think any like breaks or change in routine, so if something's different um, that might set him off. Uh yeah, or just like the waiting, so even freeze dance sometimes. You know, just getting him to stop when the music stops or, 'cause he is always on the go and always moving so getting him to do that. Or initiating movements on his own, kind of thing. So sometimes we do like, need that hand over hand um, to get him to start and then he's fine to follow through. Uh, but he, he does follow along. Yeah I would say the change in routine and then any like breaks or transitions. – *Katie, dance instructor*

The researcher also observed signs of unease during transitions (such as standing close to the mirror and touching his eyelashes) and he relied on his volunteer, Cara, to help him at these times. Cara often stood in front of him holding both of his hands and jumped up and down. Colin responded by smiling and jumping with her until it was time for the next activity.

Like Colin, Sadie also relied on consistency and routine in the dance class. Previously, her instructor and volunteer directed her to a large foam matt on the side of the room in order to address adverse behaviour. This technique was effective for a period, but over time Sadie chose to spend more time on the matt rather than dancing. Ashley has recently diverged from this technique to encourage Sadie to participate in more activities with the class.

> Last year we trained her to sit on the matt. Now that that's not there, I think that was our biggest hurtle at first because she'd just go to the matt, sit, and we couldn't get her off the matt or she'd be jumping on the matt or whatever. And now that that's gone, well now she's moving around the room and we can at least redirect her to different spots. – *Ashely, dance instructor*

The researcher noticed that Sadie did in fact move around the room during her dance class, but often required direction from Ashley and her volunteer Stephanie to participate in the activity at hand. Kayla on the other hand, is quite high functioning and did have as many behavioural concerns in dance as her sister Sadie. However, Ashley felt that Kayla's behaviour could be addressed by progressing more quickly than the other dancers and stimulated her with additional techniques.

> She knows the routine and structure really well and um, likes to be challenged I think. I like to challenge her. Um, like I think she's sort of aware that she's working at a bit of a higher level than some of the students. – *Ashley, dance instructor*

Kayla supported this in her own interview, when she expressed her enjoyment in learning new dance steps, especially in the tap class.

Tricia described two accommodations in particular that she has made for Hannah. The first was associated with a physical limitation resulting from spinal surgery for Hannah's scoliosis. Tricia noted that seated and lying down activities may be uncomfortable and more difficult for her, and so she offered alternatives whenever possible.

> Every once in a while I do something where they're lying on their back. But i've tried to modify that for her and tell her not to lie on her back because I can see that's really uncomfortable for her. But she, I mean she still she still tries to do everything. – *Tricia, dance instructor*

Secondly, Hannah demonstrated physical aggression at dance class by hitting another dancer. The researcher was present during this incident and noticed that the atmosphere changed to become more negative after this occurred. Unfortunately, the other dancer was upset and began to cry. Grace and Tricia had been working together to determine the trigger and find a solution, but had not found any trends thus far.

> I think, I think we've just seen more of it because she's here more hours now. Right? Although, so the first time we ever saw this happen was during summer camp when she was here for an extended period of time. And then we saw it happen in the Tuesday afternoon. So again I thought, ok. An, and then it was towards the end of the day so I was thinking it was a timing thing. Like maybe when she's had too much. But then when it happened in the Friday class I was really surprised… Because it was like, right at the very beginning. Because I thought you know, as long as we're in the structured dance time. Because it, in camp, and the Tuesday afternoon it was sort of like, in the unstructured time. So I thought this is just something we have to worry about during the unstructured times. And then when it happened actually like, right in the class, like right as soon as she came in, my, I think my theory got thrown off a little bit. So, so, I don't know, it may be something that maybe is more of a problem, but I only, I think it's just because she's here more hours, so there's we're seeing it happen more because we're seeing her more. – *Tricia, dance instructor*

While there were many challenges associated with the behavioural concerns of the dancers, the instructors were able to accommodate for the children's needs so that they could continue to be a part of the program.

Volunteers make it possible

The instructors discussed their personal techniques for including children of all ability levels into their dance programs, but they also highlighted the importance of volunteer assistants in their classes. For the most part, volunteers were senior dancers from the same studio; however, not all had previous dance training or experience with children with special needs. Studio 1 had recently recruited young volunteers to dance with the younger children with special needs. Katie described the dynamic of the class with these volunteers as follows:

> So they're younger dancers who are kind of, we've matched them in the younger classes. And they're kind of at that level with the dancers where they're, like height-wise they're just kind of, like that peer. So they don't see them as like "bigger person who's trying to help me" and whatever. It's kind of "this is my friend and I'm dancing with my friend right now." … But all the parents have like, raved about that and they've noticed in their kids that, that is something that is huge. And we've seen in terms of that inclusion piece, like it just fits. – *Katie, dance instructor*

According to Ashley, the availability of one-on-one volunteer support helped caregivers feel more comfortable with enrolling their children in the program.

> Um, I would say that's often a worry of parents, is that their child's not engaged, whether it be they're not attending or they're you know, too over stimulated or whatever it is. Um, and because of the one-to-one in this class we can really address that, which is nice. – *Ashely, dance instructor*

Some dancers required more help from the volunteers than others. Sadie for example, functioned best in the class when she had two volunteers, as described by her mother Briana. Throughout the class, the volunteers would each take one of Sadie's arms to help direct her to a new activity, or one would stand behind her for physical support while the other stood in front to visually demonstrate the activity. According to Briana, Sadie used physical pressure to cope with stimulation and therefore would squeeze one of the volunteers in a hug in order to achieve this feeling. In these cases, the first volunteer provided her with pressure and the second volunteer redirected her back to the activity at hand.

> Sadie is quite difficult to keep on track. She'll do her own thing so that, the volunteers have to work really hard to keep her focussed. Um, the summer class they had two volunteers working with her and got a lot of great results doing that. They would, one, one girl would kinda stand behind her and help her move her knee in the right spot while the other one was in front demonstrating and that seemed to work quite well, but um, Sadie tried to climb on the teachers and, or just get up and take off. – *Briana, caregiver*

Colin had been paired with his volunteer buddy Cara for a second season because the two worked well together in the past. Katie commented on Cara's ability to keep Colin engaged and excited in the class.

> Colin's mom asked if Cara was going to be back this year if she could be his volunteer again. Um, because he knows her and um, Cara's also a very good volunteer. She's been with us for a while and knows how to deal with different situations, so. And she's comfortable, she's not afraid to jump in or deal with whatever you know, is going on. So they I think are very close and Cara's learning as well kind of what hi- his needs are in

> terms of like his sensory needs and um, if he needs that movement she'll just keep going with him even if Miss Ashley's teaching something else. She'll be, you know, keep going with him and keep him active and um, yeah. Or if he's seeking like a touch he sometimes is crawling all over Cara, but she's ok with that and so she's like, yeah, understanding of his needs in that sense. – *Katie, caregiver*

Kayla and Hannah were both in classes that did not have volunteers assigned to dancers, but rather several volunteers who assisted with the entire class. While the relationships were not as personal between dancers and volunteers in this scenario, dancers still appreciated having volunteers in the class. For instance, Tricia described one scenario where a child displayed her affection towards the volunteers in her class.

> I think most the volunteers have been great and they get along great with the kids. And the kids really like the volunteers. Um, like when we do, we do little parent viewings and there's always this one little girl who will, so I think this really shows how they feel about each other. So there's one little girl, so like we'll do a bow at the end of parent viewing and there's one little girl who will say "and what about Tricia? And let's all clap for her. And what about Andrea? And what about", and, and make sure that all the volunteers are recognized. So I think they really, really respect them and appreciate them. – *Tricia, dance instructor*

Volunteers had slightly different rolls at studio 2 and studio 1. Studio 2 had two to four volunteers who assisted with all of the dancers, while studio 1 had a one-on-on volunteer for each child. The researcher attended classes weekly at studio 2 and felt personal connections with the dancers. For example, Hannah often looked for the researcher when she entered the classroom and chose to sit beside her before class began. The instructors all stressed the importance of volunteers in their classes and said that their classes would not be effective without help. Creating dance programs for all abilities, instructors described their personal rolls in creating an inclusive dance program and accommodating for dancers' needs. While all three instructors felt they were able to implement these classes, they recognized that volunteers were noteworthy in program success.

The outcomes of being involved in dance

The participants in this study discussed several positive outcomes that resulted from participating in the recreational dance classes. Three subthemes emerged regarding the program outcomes, which were all the right moves, more than meets the eye, and everyone is affected. Each will be discussed in turn.

All the right moves

All participants agreed that dance incorporates music, movement, and self-expression, and that learning dance steps and creating movement was beneficial for children with special needs. The researcher noticed that each of the four children seemed happy while in the dance class, as they were often smiling and participating in the dance activities. Caregivers felt that their children enjoyed being physically active while in the class and gained new skills as a result. Specifically, Briana said that Kayla enjoyed the technical aspect of the class, as she talked to her family about new moves she learned at dance each week. Briana also felt that excelling in dance helped Kayla feel good about her physical abilities.

> [Kayla] said that she likes learning new moves. I had to fill out her little "About Me" sheet with her last week and uh, I asked her what, one of the questions was "what are you hoping to learn?" and she said that new moves um, she just likes to learn new things. She likes to learn the names of the, the moves and talk about it with [her younger sister] Becca because Becca takes dance as well. I think she likes to feel like she's as good as her sister. Becca's quite athletic whereas Kayla's more academic. So she likes to feel like she's good at something that's athletic because things like running and, and sports are more challenging for her. – *Briana, caregiver*

On the other hand, Briana reported that her other daughter, Sadie preferred the free movement to the technical movement. She also felt that Sadie was motivated by seeing the other dancers in the class and hearing the dance music.

> Just the moving and the music at the same time. And the freedom of a big space. Um, I think she likes seeing the other people dancing around her as well. – *Briana, caregiver*

Similarly to Sadie, Laura felt that Colin enjoyed the physical aspect of dance class and having the opportunity to move freely while listening to dance music.

> I think it's the activeness. I think he likes the running around, he likes the all the different activities. And he likes to hear music. – *Laura, caregiver*

Tricia believed that Hannah also enjoyed having the opportunity to physically move to the beat of the music.

> She seems to like music and moving. – *Tricia, dance instructor*

Hannah often sang along with songs that she was familiar with and moved to the beat of the song, which seemed to help her focus on the activity Tricia was leading. All of the caregivers in this study felt that their children enjoyed attending dance class, but they felt that there were additional outcomes beyond personal enjoyment. Both caregivers and instructors discussed the benefits associated with being physically active while at dance class. Briana for example, felt that dance may have improved Kayla's endurance and willingness to participate in other physical activities.

> She's hard to get motivated to move. And now she's doing two forty-five minute classes back to back and feels great when she comes out of it. Whereas when I take her shopping or something and she's wanting to sit down every five minutes, so that's huge that she can have the endurance and the motivation to move for that long. Um, and yeah the, working towards something all year… She did a kids triathlon this summer, which I don't think she ever would have tried before and, and it's, I think her endurance is built up, probably from doing the dance all year. – *Briana, caregiver*

Furthermore, Katie felt that Kayla developed specific skills from learning tap, including motor control and balance.

> And I think too, just noticing her like reaction, like her body reactions to being off balance are less like, drastic. Like before I think she was more wobbly and now she's able to control it a bit better so. – *Katie, caregiver*

And finally, Briana said that Kayla had difficulties with overall motor control in the past, which caused her to be clumsy. However, she believed that Kayla's balance may have improved because she had not communicated her concerns about clumsiness as often.

> Yeah, I don't hear her making comments any more about being clumsy or, which I'm just realizing, because she used to make comments about that. – *Briana, caregiver*

Grace felt that the dance class positively impacted her daughter's overall motor abilities as well, and believed that Hannah may have enhanced control of her body.

> She's not clumsy anymore. She used to be clumsy [laughs]. And it was scary you know. – *Grace, caregiver*

Hannah also practiced creative movement while at dance. For example, Tricia would play a piece of music and encourage the dancers to move according to the style of music and then make a shape with their bodies. Tricia felt that these creative movement experiences contributed to Hannah's ability to move her body in new ways.

> Yeah, I do think she's learned new things. Um, the like I think she's more able to move her body in different ways. Like she's exploring different movements that maybe she hasn't before. – *Tricia, dance instructor*

At studio 1, there were several dance routines that the instructors repeated each week as part of their regular class schedules. Laura described how Colin benefitted from practicing similar dance moves from week to week.

> The motor planning would have improved too. Because the more ways you make um, you do the same exercise over and over again, then that becomes cemented. And then he can do it easier the next time you ask him to do it each time. And then, if they did a similar move say from last year to this year he'd get that one and then maybe be able to work on another more intricate part that he couldn't have gotten last year or just add on to his repertoire of dance moves. – *Laura, caregiver*

Contrarily to the other dancers, Briana did not feel that Sadie developed specific motor skills from the class, although she may have enhanced motor control and imitation skills.

> She's always moving, but it's kind of more for random, or seems random. This, to learn to do the movements in a controlled way… That kind of thing and copying moves she seems to understand better, the copying aspect. So that's probably from learning how to do the, the moves. *– Briana, caregiver*

While Sadie did not always participate in the same activity as the rest of her class, the researcher noticed that she was often moving around the room. This physical activity of walking, running, and skipping around may have contributed to her motor skills as well. The dancers also learned specific dance skills while in the class and the instructors commented that they saw growth in each dancer over time. Ashley had been working on travelling steps in Colin's class and she felt that he learned how to do a variety of coordinated movements.

> I think trying to do more um, coordinated stuff, like the gallops I guess is new for him this year because we didn't really, it was in the circle song, but we're doing it more this year. Like travel, gallop, skips. Those kind of things where you have to yeah, differentiate like what each leg is doing. And I would say we are doing a little bit more demanding things in terms of coordination, so he probably is getting a little bit better. – *Ashley, instructor*

This season, Sadie's class was more structured than what she had previously experienced. Ashley commented that the transition into the structured class was difficult, but she had seen Sadie more willing to participate and learn as the season progressed.

> Uh, I think so. And I think now she's enjoying it again. Um, not that she didn't enjoy it, but she's more comfortable and you can see her responding to the music and getting to know that like, Mama Mia song. The other kids like love it, so we do it a lot and uh, I think she likes it. Like, she's not at all covering her ears this year. She's moving around the whole space, whereas at the beginning in September she was very much stuck at the end of the room where the matt was. Like, we couldn't get her out of that space and now she will do the full circle and yeah, stand at different squares. We can put her on any square for the ballet part and she'll kind of, go there with us. *– Ashley, dance instructor*

As previously discussed, Kayla enjoyed learning dance techniques in dance class and Ashley felt that she made technical gains over the course of the season.

> So she can do her cramp roll really quick. She can do flaps… She's getting that now with a little bit clearer sounds. The shuffle's still a little bit tricky. But all those kinds of steps … and we're doing like two step step hop kind of, in that other jazz class we've started. Um, and she can like she can do that now. But again it's the technique of like "ok, stretch your toes, like stick it to your leg, retiré." So yeah, she's definitely learned a lot of new steps. – *Ashley, dance instructor*

Tricia felt that Hannah made several gains as well, including creating shapes with her body and holding still in that shape over longer periods of time.

> I notice also being able to hold her shapes; she is definitely holding her shapes for longer. Because I think it's very hard for her to be still. She's definitely holding them for longer than she was. And yeah, I think uh, yeah I think in terms of like sequencing and remembering movements I would say i've seen some improvement there as well. – *Tricia, dance instructor*

The researcher also saw Hannah become more creative with her body as she observed the class. Furthermore, Tricia believed that she gained other physical skills including balance, as a result of being active and regularly practicing a variety of moves.

> And you know, because there are um, like some of her gross motor stuff would be below a, some, someone her age. So I think it's great for her to have the opportunity to get the physical exercise and be able to practice some of those things right. Because the more you're doing, the more you're going to improve your balance and your, and your gross motor skills. – *Tricia, dance instructor*

Caregivers and dance instructors reported that each of the four dancers made physical gains while participating in the dance class and may have developed new skills as a result. All of these gains were directly attributed to the movement associated with the recreational dance programs. The volunteers felt that the class was a positive experience as well, but did not notice as many improvements as the caregivers and instructors.

More Than Meets the Eye

While caregivers and instructors outlined many benefits associated with the physical components of the classes, they also discussed several other outcomes that resulted from being in the dance class. These outcomes were psychological, emotional, and social in nature. The participants mentioned benefits for the four children in this study, as well as the other children in the class. All three of the volunteers liked the welcoming environment of these classes and felt it was beneficial for the dancers. Cara, Colin's one-on-one volunteer, discussed how the inclusive nature of the class allowed students to be comfortable with their own abilities.

> Um, well they learn different dance moves, which is important. But like, I don't know, they learn to be themselves [laughs]. 'Cause it's just like, you go in and it's like, you're with other people that like everyone will accept you in that class. So it's like "I can be me", which is cool. – *Cara, volunteer*

Katie also discussed some of the psychological outcomes for the dancers in the class and believed that they extended to other environments, such as the school classroom.

> Um, yeah definitely. Like um, I don't know if psychological is self-esteem and confidence building, um, but we've had parents say how much it's improved their just ability to perform. Not necessarily perform, but even just every day activities of going up and talking to someone or their um their ability to raise their hand in class at school or that kind of thing. Um, but also in terms of just counting the music and developing rhythm, um, following instructions um, being able to remember steps from week to week. Obviously those are huge cognitive components and pieces. So they're always kinda working their brain and learning those skills as well. – *Katie, dance instructor*

More specifically, Ashley felt that Kayla developed confidence and self-esteem from the class, which was evident from Kayla's positive self-talk and her ability to perform dance moves.

> I think for her, like I said, the biggest thing is confidence. This is like, an environment that she enjoys being in and it's her time and she feels like top of the class right. She's like "I can do this" you know "I'm being challenged" and um, she's so confident when we perform it. She's like got a big smile and does everything really clean and doesn't need any sort of one on one. – *Ashley, dance instructor*

Briana had also noticed Kayla’s self-confidence increase after being a part of the dance program. She felt that Ashely and Katie challenged Kayla to learn new things, but they also encouraged her as she progressed in the class.

> So I think she likes feeling the confidence that she's good at this, cuz they're always great about getting her great feedback as well. They said that she picked up on the tap really well and just, really helped her with some of that physical confidence. – *Briana, caregiver*

During Kayla’s interview, she showed the researcher her recital photograph from her previous year of dance and seemed to be very proud of her role in the performance, which was another indicator of her enhanced self-confidence.

Grace believed that Hannah felt comfortable with the other dancers in her class, which may have fostered feelings of belonging within the dance environment. She was also comfortable with the researcher and showed excitement to see her from week to week.

> Uh you know, it depend on her environment. She knows that girls and she feels safe with that. You know, and she's with children with disability and she knows that nobody expect something extra from her or nobody judge her. – *Grace, caregiver*

Tricia believed that the positive atmosphere of the class was encouraging to her students, as well as for Hannah. For instance, she recalled one occasion where a dancer with some physical limitations expressed her ambition to become a ballerina. Tricia felt that the class positively influenced confidence and self-esteem in her students that they may not have experienced elsewhere.

> Social, and just an, and just like, that you know that um, opening up doors for them, of different things that they can do, right. Like I had um, the one little girl last year who um, had the physical disability and was in a wheelchair, and there, a lot, had a lot of physical limitations. And it just warmed my heart because she came in and we're dancing away and she looked at me and she said "I'm going to be a ballerina when I grow up." And I thought that's awesome! – *Tricia, dance instructor*

The dance class also appeared to stimulate creative thinking and encourage choreography memorization. For Hannah specifically, Tricia felt that she was creating more independent movements and exercised her memory while in the class.

> I notice that she is coming up with some ideas on her own. So sometimes she's initiating the movement rather than just copying what's being done beside her. And she's doing her leader job very well. Like she, she's remembering and doing that without a lot of prompting, so I think that's good. – *Tricia, dance instructor*

The dance classes also stimulated a variety of emotions in the dancers. Specifically, Tricia noted that one of the reasons she enjoyed teaching the class was because of the emotional responses of the dancers.

> And that's one of the reasons that I love teaching these kids, because they, they do show you their emotional response. And it's not where, like your typical teenagers where you can't really tell what they're thinking, but they're rolling their eyes right. Um, these kids like if yeah, when you do something that they like, they're over the moon bursting with enthusiasm. – *Tricia, dance instructor*

Hannah for example, showed her excitement to attend class each week by preparing herself ahead of time and asking her caregiver, Grace, when it was time to leave.

> I know that she's always excited. How I know, she'll be like ready half hour early or ask me like "I'm ready, are you ready? Ok, let’s go! Mom, can you put shoes on?" Or she'll go sit in the car and come in the house and say "hello, it's time to go. I'm late." – *Grace, caregiver*

Conversely, Grace noticed that Hannah expressed different emotions after the class had finished.

> Yeah and like what I notice, like after dance and music she's more calm, she has better time. She's like, like received like some kind of, I can say like, medication to her, calm her down. – *Grace, caregiver*

Colin was also excited to go to dance class, and like Hannah, prepared his things when it was time to leave.

> And he likes the dance and he just has like so much fun like I know he loves it. If I say it's time for dance he runs and gets his shoes and gets ready, he really loves it. – *Laura, caregiver*

Sadie looked forward to dance as well, and was compliant when her parents ask her to go from week to week.

> Now she willingly goes. You say "do you want to go to dance or stay home?" And she wants to go to dance. So that's huge, because she's a home body. – *Briana, caregiver*

Kayla did not show the same excitement as Colin and Hannah before going to dance class, but similarly to Hannah, seemed calm after the class was finished.

> And Kayla um, I think she's calmer after. Sometimes she's a little, it's getting out the door that piece is tricky. She's always excited to go, but um, sometimes has trouble getting her stuff together to go. And then afterwards seems less anxious. – *Briana, caregiver*

Colin showed his emotions to Cara during the dance class by being physically close to her.

> And he gets really excited and he, you know he started to like climb us at some point. We, he's stopped that now, but for a little, few classes he was trying to climb Cara. Like he was like, but I think it's his like way of saying like "oh I really like you" and he's just trying to have fun. – *Ashley, dance instructor*

During the dance class, Hannah also expressed her feelings in a physical manner by making a kissing gesture when she was having a good time. Tricia also noticed that Hannah ran into the dance class each week and felt that this was a sign that she enjoyed the class.

> She really seems excited when she's here, and happy. And she's, one thing that she's, new that she's done, that she hasn't done in previous years, is every once in a while, like when she's really happy about something. Like she'll come over and kiss me [laughs]. Which is just, I mean it's just her way of saying "I'm really happy and I really like this." Right. So um, not that I want to encourage the students to kiss me but it, you know what I'm saying? It's just it's, it's she's showing emotion and showing that she's really enjoying it. And then also seeing her run down the hallway into the class, like she's at the studio way before her mom ever is. She comes in this door, her shoes are off, and she literally runs to the dance studio. – *Tricia, dance instructor*

Dancers who participated in these programs may have also benefitted socially by spending time with others in an organized environment. While the majority of interaction was non-verbal, caregivers and instructors saw opportunities for social growth. For example, Ashley noted that Colin did not necessarily talk to the other students, but he did interact with others in the class.

> Most the time I'd say he's not really observing the other kids. It's more like the mirror, going around the room, he knows the studio. He knows Cara, I find when he comes in the circle he usually finds her and will sit with her. ‘Cause he, um they usually bring him in a few minutes late so that we're already in circle and he just comes in, finds Cara and knows to go to her. – *Ashley, dance instructor*

In addition to building a relationship with his volunteer, he also built a relationship with the researcher and gave her a hug before starting the third session of motor testing. Ashely also recalled observing Colin communicating in his own way, which helped her to know that he was paying attention in class.

> He does uh look you right in the eye. Like he'll look me right in the eye if I'm like "Colin", he'll look right at me and you know, he's you know, communicating in his own way, or like telling you "yeah". – *Ashley, dance instructor*

Kayla did not often communicate with the other students in the class, but instead talked to the instructors and volunteers and occasionally her sister.

> She doesn’t pay too much attention to the other dancers I would say. Uh, like she's very focussed, pretty quiet unless I like ask a question. She'll come up to me a lot of the times. Like I think she will, to me or Katie ‘cause she knows us and like, tell us I don't know, something. Or, or like "I remember this flap" and she'll show me and I'm like "oh that's awesome, good job". Um, but with the other girls I think she's pretty quiet. The odd time she'll notice Sadie, like if we're struggling to get her to her spot or to get up then Kayla will try to say like "Sadie stand up" or jump in. But most the time she's just kind of like, likes to do her own thing. – *Ashely, dance instructor*

The social goals may have been different for each child depending on his or her functionality. Briana's goals for Sadie were to function appropriately in a social environment, and she felt that the dance class helped to teach her about social norms.

> But yeah, and Sadie I think the social part of turn taking and paying attention, like those kind of beginning social skills that's always a good skills to work on. They're not, she's not really socializing with the kids, but she's doing more of those beginning social skills and it's good practice. – *Briana, caregiver*

Grace discussed similar goals that she had for Hannah in the class. She felt that Hannah did not socialize with the other dancers because it was difficult for her to do so, but she was still learning social cues from participating in a group environment that she did not experience at home.

> Yes, you know that, like, she's more patient. She'll wait like, on her turn. You know, she's learning more like, social clues. Like how to be, what to do, not to take from somebody, wait her turn, don't like push somebody. Or you know, like proper social skills that she can't learn from me being here at home, you know. – *Grace, caregiver*

The instructors knew that socializing was difficult for several students in their classes, but still wanted dance to be a social environment. They each described different methods for encouraging interaction between students in a less direct manner than speech. Katie outlined some of the activities she and Ashley facilitated in the class to encourage social engagement.

> So that's kind of, one of those background goals that the parents may have is that social piece and the kids may not see it as that, but the parents are seeing "oh this is an opportunity for them to socialize." And um, so that is something that we try to incorporate and have time for that as well. So in the younger groups we kind of do circle time, they make a pizza, they all have to go around and say what they want on the pizza. Sometimes we'll have the kids ask each other what they want on the pizza in that, so trying to facilitate that interaction between them sometimes is necessary um just to help develop those skills. But sometimes they're fine to do it on their own and a lot of them in the older group have been dancing like I said for the four years and know each other through other programs as well. So they get together outside of the dance studio and hang out as friends. So they come in and it's just like they're hanging out with their friends again. They you know, are here having fun, high fiving and hugging. – *Katie, dance instructor*

Similarly, Tricia described the techniques she used with Hannah to help her feel included in the group and to encourage social connections with other dancers.

> I always try to make sure that when she arrives I greet her personally and say hello to her and how are you today. And I try, even though um, I know that the conversation might not be reciprocated on her end, I try to still always have a conversation with her anyways. Right? To make her feel included. And you know, if we're having a group, sometimes i'll ask "Hannah do you have an idea or do you have something you want to show us?" Right like "do you have a move that you want to show us?" To try and make her feel included in the group, because she's not really able to initiate that herself so much… Um, and then yeah, just sometimes i'll try to stand beside her, give her a little one on one. I tried that, giving her the leader roll. Because I thought "let's see how this goes over if she's a leader." I think it went over really well. – *Tricia, dance instructor*

While caregivers, instructors, and volunteers described the benefits of physical movement in the dance class, they also highlighted several other important outcomes including psychological growth, emotional expression, and social development of the dancers.

Everyone is Affected

It was evident that caregivers enrolled their children in dance in order to benefit the child; however, caregivers, volunteers, and instructors also discussed how they personally benefitted from the program. Tricia mentioned the networking opportunities that caregivers had as a result of enrolling their children.

> They do a lot of things outside of dance together. Like I don't, in terms of other activities I know they participate in a lot of other activities. I don't know if they do those other activities as a group, but in terms of social, like those ones in the little class, there is almost every single Friday night, there is one of them that is handing out birthday party invitations. And when they're handing out birthday invitations, like they're all, they're all invited and they're all included in that. And, and then there's like, actually I'm on the e-mail list too, I get, I get invited to the socials. Like there's, and then I think like once every couple months there's like a social that includes all of the parents as well. – *Tricia, dance instructor*

Katie also believed that caregivers benefited by seeing their children accepted in a community program. Specifically, she felt it was important for the family to be accepted as a whole in this facility, rather than taking their typically developing children to one program and their children with special needs to another.

> Benefits for the parents, I think they're now having an opportunity to put their kid in something that they hopefully can feel that they trust us and that their kid is in something again, with all these benefits to the kid, um that are goals and values of the parents and the families. Um, and then if they have siblings, sometimes they bring their siblings to the studio and now both kids are now participating in the same kind of programming at the same facility. – *Katie, dance instructor*

Grace expressed how she was encouraged to enrol Hannah year after year based on how the program affected not only Hannah's happiness, but also her own.

> You know what, like everything together i've seen improvement. And it's the reason why I'm like there every Friday. If I didn't see anything positive from that dance class and if i've seen that she's moving so far or feeling bad, I won't go back. But i've seen that she's so happy, so thrilled to go there and be with them. You know, and honestly I didn't think "ok, what kind of like, she's feeling better in that way, that way" I just know that she's happy. And happiness is more important for us [parents] than anything else. – *Grace, caregiver*

The instructors also discussed the personal reward they felt from teaching the class. All three of these instructors described the aspects of the program that they liked and why they enjoyed teaching. Ashely found it personally fulfilling to help children with special needs feel accepted into a dance program, especially for children who would not have had the opportunity to dance otherwise.

> For me the biggest thing is just uh, being able to see how possible it is. Like seeing kids come through these doors and a lot of times their parents are hesitant or not sure um, because their child may have tried other things without much success. Or may not have been welcomed the way we've just sort of said "yeah come on in, we'll make it work." And seeing the change in perspectives in terms of families that come through our doors

> and the students and their self-confidence. And there's just so many changes on a bigger level um, that makes it very, very rewarding. – *Ashley, dance instructor*

Similarly to Ashley, Kaite enjoyed sharing her love for dance with the children and their parents, and felt that she was positively contributing to her community.

> I love [emphatic] seeing the kids smile and having fun um, doing what they love to do and being able to share that experience with them. Um, I love seeing the parents um, reaction and engagement in the program um, when they see that their kid can participate and do just like any other kid. Um, and three? I, I love, this sounds selfish, but the way I feel coming out of [this program], I know it's what I like to do. – *Katie, dance instructor*

Tricia enjoyed seeing her students learn new dance skills and progress over time. She also found it personally rewarding to be part of the dance experience for children with special needs.

> I mean they may make small gains, but when they make those small gains it's huge. And I find like the kids, the parents are all very, very appreciative and uh, it's just, it's just very rewarding to, to see how excited the kids get. – *Tricia, dance instructor*

Katie went on to say that the volunteers benefitted as well because they learned how to communicate with others and gain experience in working with children with special needs.

> I would branch out to the volunteers saying that they're developing their skills in working with kids, and working with kids with special needs, to communicating with parents. Um, and then just even a, raising the awareness and kind of, expanding their perspectives on what it means to be a dancer. What it means to um, participate in a community program. Um, yeah, so I think it's a lot learning and education for the volunteers as well. – *Katie, dance instructor*

For Cara, she enjoyed contributing to the well-being of children with special needs and helping them to be included in her community.

> I like how you can like, see the dancers growing. 'Cause like some of them come in and like they're really nervous and stuff, but then like, you hear stories about them going to school and being like "I'm a dancer." And like, that's pretty cool because it's like they're a part of something. Whereas sometimes like, they don't get that opportunity. – *Cara, volunteer*

Hailey also enjoyed spending time with these dancers and felt that volunteering had been a positive learning experience for her as evidenced by the following quotes.

> With little kids you can only like, tell them what to do. With the [special needs] girls you can know them, you can talk to them. So I like that better. – *Hailey, volunteer*

> I've just learned to like, appreciate more the like, disabled community and teenagers that do have disabilities. – *Hailey, volunteer*

There were many positive outcomes for the children who participated in these dance programs, but it appeared the benefits extended to caregivers, instructors, and volunteers as well. Caregivers benefitted from seeing growth in their children, instructors felt personally fulfilled from teaching the classes, and volunteers enjoyed to help these children dance. The theme of what it means to be a dancer encompassed the physical benefits of the program, non-physical outcomes of dance, and how it influenced the other people involved. Clearly there are far reaching benefits of these programs.

Summary

Two themes emerged upon analysis of the data, which were a) creating dance programs for all abilities and b) the outcomes of being involved in dance. Dance instructors, caregivers, and volunteers felt that the two dance programs were inclusive to children of all ability levels, which contributed to their psychological and emotional wellbeing. Dancers also benefitted physically from learning dance moves, and socially from dancing with other children in the class. Not only did dancers benefit from being involved in the class, but also the instructors, caregivers, and volunteers.

Quantitative Results and Discussion

Four children diagnosed with ASD: Kayla, Sadie, Hannah, and Colin, completed four sessions of testing over the course of this study, one at the beginning (September-October 2014), middle (October-November 2014), and end (December 2014) of the fall dance session. The final round of testing took place after the winter holidays (January 2015), during which the participants had not danced for several weeks. They completed five tasks at each testing session, which took approximately 20 minutes to administer to each child. These participants all had different capabilities for understanding and completing the testing. For example, Kayla was the highest functioning, was able to complete all tests accurately for each session. On the other hand, Sadie was the lowest functioning and was unable to complete several tasks during each round of testing. The abilities of Hannah and Colin fell between that of the two sisters. As these children varied in functionality, the results have been organized into four case studies to examine the motor outcomes over time for each participant.

Kayla

Kayla completed each round of motor testing at her home with 29 to 34 days between each session. See Table six for a timeline of Kayla's testing and dance class attendance. Each round of testing took place at 4pm after Kayla returned home from school. All sessions went smoothly and Kayla was partial to the testing process. Kayla's mother watched her complete the first session and then was less involved for sessions two to four, as Kayla did not require assistance. Kayla completed the standing balance, sit and reach, and upper body imitation tests, then had a break while her sister Sadie completed these tests. Then she completed the two-minute walk and four-meter walk tests.

Two-Minute Walk

In the two-minute walk, Kayla was required to walk around a pylon at each end of a 25 foot course as many times as possible. Sessions one and three took place outside on the sidewalk in front of her house, and sessions two and four took place inside the house due to adverse weather. Both walking paths were 25 feet in length; however, the path inside the house was narrower than the path outside, which may have affected Kayla's walking speed as she travelled shorter distances during the two inside sessions (see Figure 1). She walked the greatest distance (485') in session three and walked the least distance (400') in session four.

Four-Meter Walk

The time required for Kayla to walk four meters was measured in this test. Again, sessions one and three were outside on the sidewalk, while sessions two and four were inside the house. Figure 2 shows that Kayla walked faster during the outside sessions; however, it is important to note that she walked with a shuffling gait during the fourth session, which may have affected her walking speed. Kayla's walking speed ranged from 1.19m/s in session four to 1.57m/s in session three.

Sit and Reach

To measure flexibility, Kayla sat on the ground with her feet against the bottom step of the staircase and reached her hands towards her toes. Positive numbers represented the distance reached past her toes and negative numbers represented the distance between her toes and fingers (i.e. If she was able to reach to her toes but not any further, the measurement recorded was 0 centimeters). Kayla was 3cm away from reaching her toes in session two and reached 2.5cm past her toes in session one (see Figure 3).

Upper Body Imitation

Kayla was required to replicate four arm positions and did not require a visual cue from the researcher in order to complete this task. All four sessions took place inside, although session four was conducted on a different wall than the first three sessions due to furniture placement. Kayla was better able to replicate the four arm positions in each subsequent session overall, but consistently had the most error in the right arm up position (see Figure 4). She improved from 50 degrees of error in the first session to 25 degrees of error in the fourth session.

Standing Balance

Kayla's sway velocity in the medial-lateral direction and the anterior-posterior direction are shown in Figures 5 and 6 respectively. Both figures depict four states during each of the four sessions which were Eyes Open Hard Surface (EOHS), Eyes Closed Hard Surface (ECHS), Eyes Open Foam Surface (EOFS), and Eyes Closed Foam Surface (ECFS). Kayla only completed the eyes open states in the first session, and then completed all 4 for the subsequent sessions. Generally, velocity was higher in the eyes closed and foam surface conditions. Kayla displayed greater velocity in the anterior posterior direction than the medial lateral direction.

Sadie

Sadie completed each round of testing at the same time and location as her sister Kayla; however, her dance attendance was slightly different (see Table 6). For each session, Sadie completed the standing balance, sit and reach, and upper body imitation tests after Kayla and then had a break while Kayla completed the walking tests. One of Sadie's parents (mother for sessions one, three, and four, father for session two) assisted Sadie for the majority of tests, such as encouraging her to stand still on the force plate, holding her hand while walking for two minutes, or offering a reward (i.e., favourite snack) upon completion of each test. Sadie was much lower functioning than Kayla and was unable to understand the testing instructions. Her parents helped her to understand the instructions and to focus in order to carry them out. Sadie grew more compliant to the tests over time, but was never able to do them without a parent. For example, she was able to complete more tests during the fourth round of testing than she was in the first and the time required to complete each test decreased with each session.

Two-Minute Walk

The results from Sadie's two minute walk test are shown in Figure 1. During the first session, Sadie walked 175 feet in 1.2 minutes and then ceased to complete the session. Her mother attempted to redirect Sadie to the task when she lost interest, but Sadie resisted. For this reason, her mother felt it was in Sadie's best interest not to force her to complete the task. For all four sessions, the researcher and Sadie's parent reminded her to turn around and keep walking at each end of the 25 foot walking course. If they did not remind her, she would stop walking and not complete the task. There was an increasing trend in sessions two (325'), three (350'), and four (425') showing that Sadie was able to walk a further distance over time with each session. Likewise to Kayla, sessions two and four took place inside the home, while sessions one and three were outside on the sidewalk.

Four-Meter Walk

Sadie's overall trend in this test was that she required less time to walk 4 meters in sessions three (1.59m/s) and four (1.82m/s) than she did in sessions one (0.96m/s) and two (0.75m/s, see Figure 2). Sessions one and three took place outside on the sidewalk, and sessions two and four took place inside the home. The researcher noticed that Sadie did not walk in a straight line during session three, which likely increased her time, and that she jogged rather than walked in session four, which likely decreased her time.

Sit-and-Reach

Sadie's flexibility could not be measured through the sit-and-reach test because she could not reach towards her toes with her legs straight. Instead, she bent her knees in a "W" sit each time she was instructed to reach forward and therefore the measures were inaccurate to the test. Sadie was more willing to do this test with each session because she had a greater understanding of what was expected of her. It also seemed as though her legs were bent to a lesser degree with each session; however, this was not measured and no conclusions can be drawn.

Upper Body Imitation

Sadie was able to place her arms in the correct position or close to the correct position for most sessions (see Figure 4). She completed all positions except for the right arm up position in session one, and required visual cues each time. Her degree of error ranged from 10 degrees in session two to 130 degrees in session four. It was difficult to measure Sadie's arm positions as she did not hold her arms in one place for more than a few seconds and she often moved away from the centre line of the measurement tool. Therefore, the majority of Sadie's results from this test were the researcher's best estimate.

Standing Balance

Sadie only completed the eyes open hard surface condition in the first session, but was able to complete both the eyes open hard surface and eyes open foam surface conditions in the subsequent sessions (see Figures 7 and 8). She also stepped on and off of the force plate in the first session, but was able to remain on the plate for sessions two to four. In addition, Sadie sometimes turned to look around the room and therefore measures of direction were not completely accurate (i.e. Medial lateral verses anterior posterior). During the third session, Sadie's mother thought it would be beneficial for Sadie to hold her ipad and watch one of her favourite TV shows. Results indicated that Sadie swayed less in the third session, which may have been due to holding the ipad. Overall, Sadie's sway velocity was greater in the medial lateral direction than in the anterior posterior direction.

Colin

Colin completed each round of testing at his dance studio before his Saturday morning dance class. More specifically, the space where he was tested was the space where his dance class was held each week. Table 6 shows Colin's testing and dance schedule. His mother was present for each round of testing and assisted him with the majority of tests. Colin did not take any breaks between each of the five tests and he was able to complete them quicker each time, likely because he grew familiar with the researcher and the motor tests with each round of testing. For example, he gave the researcher a hug at the beginning of the third round of testing, showing his affection for her. Also of note, Colin overslept and was quite tired during the fourth round of testing. His tiredness did not affect his mood, although he seemed more distractible during this session.

Two Minute Walk

Colin walked the furthest distance in session two (415') and the least distance in session four (288', see Figure 1). These results may have been affected by Colin's motivation and attention to the task, as he may have become distracted as the test went on. For example, in the third session, Colin stopped walking in order to look at his reflection in the mirror, and in the fourth session, he walked with his eyes closed for a portion of the course. His mother's support was fairly important for this test, as she walked with him for each session, either in front of him or holding his hand.

Four Meter Walk

In the first session, Colin walked on the metal tape measure in a heel to toe step, which may have slowed him down (0.93m/s). According to his mother, Colin likes to hear the sound of metal and therefore the tape measure was placed off to the side for subsequent tests. In sessions two and three, Colin jogged the four meters rather than walking, which may have increased his gait speed (1.50m/s and 1.60m/s respectively). Colin shuffled his feet on the floor during the fourth session which likely slowed his speed (1.48m/s, see Figure 2).

Sit and Reach

Colin could not complete this test with straight legs, but his legs were parallel and therefore a measurement was recorded (see Figure 3). In sessions one and three, Colin reached 3cm past his toes, while in sessions two and four he was 1cm short of reaching his toes. This measure may have been influenced by his motivation and/or understanding of the task on a particular day.

Upper Body Imitation

Colin showed greatest error in the right arm up position for sessions two to four, but was unable to complete this position in session one (see Figure 4 and appendix). The researcher provided visual cues for each trial of each session. He also tended to move away from the centre of the measurement tool and move his arms out of the position very quickly. Otherwise, Colin was able to imitate the arm positions fairly accurately for the other sessions (ranged from 50 degrees in session one to 110 degrees in session four).

Standing Balance

Colin stepped off of the force plate during the eyes open hard surface condition in the first session of testing. Because he was unable to remain on the force plate for this portion of the testing, he was not required to complete the foam surface condition. In subsequent sessions, Colin stayed on the force plate, but it is important to note that he moved his arms, shifted from foot to foot, and looked around the room rather than straight in front of him. It does not appear that there are any trends among the conditions or the sessions (see Figures 9 and 10). Colin displayed less sway velocity in the medial lateral direction than in the anterior posterior direction.

Hannah

All of Hannah’s testing took place at her home on weekday afternoons. Her mother was involved in the first session of testing, but not the subsequent sessions because Hannah did not require her support. See Table 6 for a summary of Hannah’s testing and dance attendance. Hannah appeared enthusiastic when the researcher came to her home and was compliant with the testing procedure. At times, Hannah began to giggle and her mother asked her to “stop being silly”, but this did not affect her ability to complete the tests. Each session of testing was quicker to administer than the previous and Hannah did not take any breaks during the sessions.

Two Minute Walk

Hannah was able to complete all sessions of the two minute walk test (see Figure 1). Sessions one to three took place outside on the sidewalk, while session four took place inside the home due to adverse weather. Unfortunately, Hannah’s home did not have a long enough hallway to walk the 25 foot course, and therefore she walked at 16 foot course instead. Due to the shortened distance, Hannah was required to turn more often and therefore walked a shorter distance during that session. This can be seen in Figure 2, as Hannah was relatively consistent in sessions one, two, and three (304’, 375’, and 340’) and then walked a shorter distance in session four (300’). It is also important to note that the researcher had to remind Hannah to turn around and continue walking at each end of the course for all four sessions. Without this reminder, Hannah would have stopped walking when she reached the starting position and failed to complete the task. With the reminder, Hannah only paused at the end and then continued walking; however, this pause likely shortened her total walking distance.

Four Meter Walk

Similarly to the two minute walk test, sessions one to three of the four meter walk took place outside on the sidewalk and session four took place inside. Hannah required less time to travel four meters in sessions one (1.28m/s) to three (1.56m/s) and the most time in session four (1.05m/s, see Figure 2). While Hannah's home had a long enough space to complete the four meter walk unobstructed, the different atmosphere may have caused her to walk slower than she walked outside.

Sit and Reach

Unfortunately, Hannah was unable to straighten her knees for this test due to her back surgery, but she was able to keep her legs parallel and therefore the researcher recorded these results. Hannah became less flexible as time went on, as she was able to reach 5cm and 2.5cm past her toes in sessions one and two respectively, but reached to 0cm in sessions three and four. One complication was that Hannah may have misunderstood the instruction "reach as far as you can" and only reached to touch her toes when she could have gone farther (see Figure 3).

Upper Body Imitation

Hannah was able to stand in the centre of the measurement tool and to hold her arms up long enough for the researcher to record the results. The researcher provided Hannah with visual cues about where to place her arms when necessary. She had the most error in session one (145 degrees) and the lease in session three (90 degrees). It appeared that Hannah was better able to replace her arms in the correct position when both arms were in the same place (i.e., both straight up and both straight out), as she showed less error in these sessions (Figure 4).

Standing Balance

Hannah's sway velocity in the medial lateral direction is shown in Figure 11 and her velocity in the anterior posterior direction is shown in Figure 12. Hannah was able to remain on the force plate for all tests except for the eyes open foam surface condition in the first session. She also had the tendency to look around the room at the researcher and her mother, which may have impacted her sway. Hannah seemed to have lowest sway in session two, and the highest in session three. She also displayed less sway velocity in the medial lateral position than in the anterior posterior direction.

Summary

The results in each of these cases are highly variable and there were very few trends over the testing period. This is can be explained by the fact that no two children with autism are the same (Autism Speaks, 2015). Kayla scored highest on all tests except for the sit and reach task; however, she was the only participant who was able to do this test in the correct position. Sadie scored the poorest on all tests except for the upper body imitation task, in which Hannah and Colin both had more error. No clear trends were found upon comparison of the four children over the four testing sessions. There were several factors that may have influenced the results, such as an inconsistent testing environment and/or the children's motivation to complete the tests. These will be explored further in the discussion.

Table 6: Schedule of participant's testing dates and dance attendance. Instructors provided information about how many classes the participants attended over the testing period.

Participant	Session	Day of Session	Total Dance Attendance
Kayla	1	0	3 (90 minutes each)
	2	29	6
	3	63	10
	4	97	10
Sadie	1	0	1 (45 minutes each)
	2	29	5
	3	63	10
	4	97	11
Hannah	1	0	1 (60 minutes each)
	2	30	5
	3	79	12
	4	112	14
Colin	1	0	0 (45 minutes each)
	2	35	3
	3	84	8
	4	119	9

Figure 1: Distance travelled in feet during the two minutes of walking.

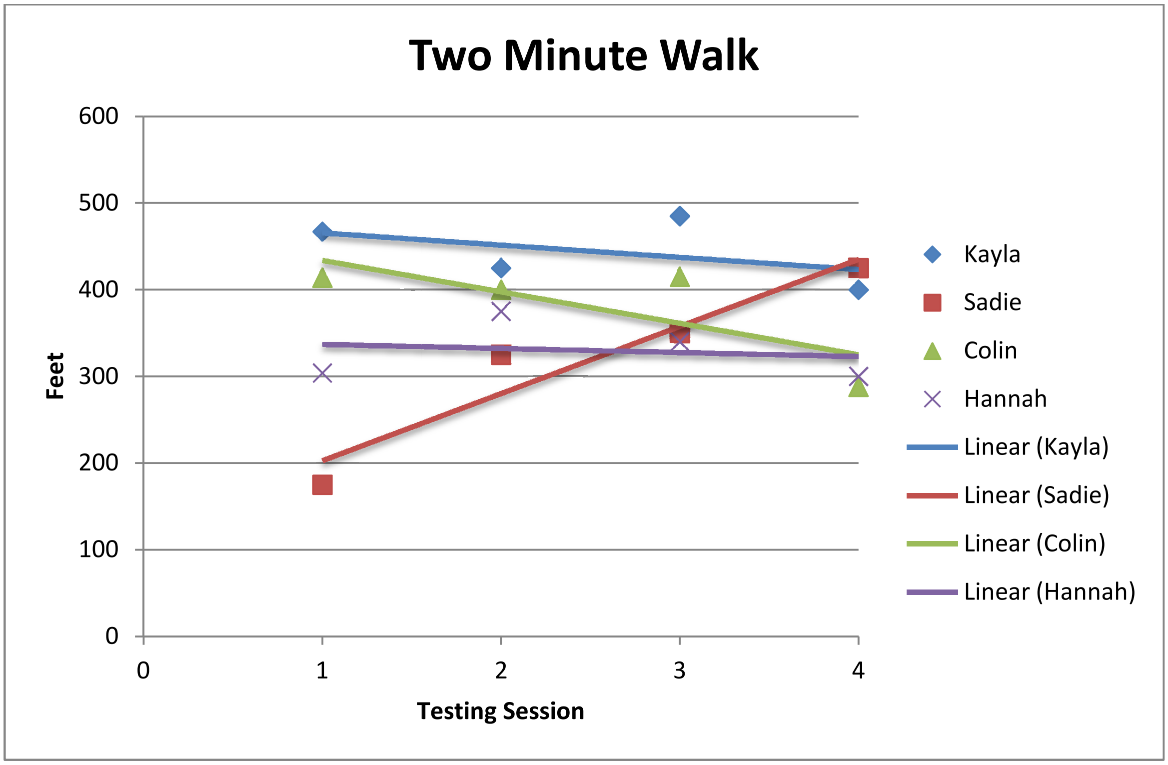


Figure 2: Time required in seconds to walk four meters.

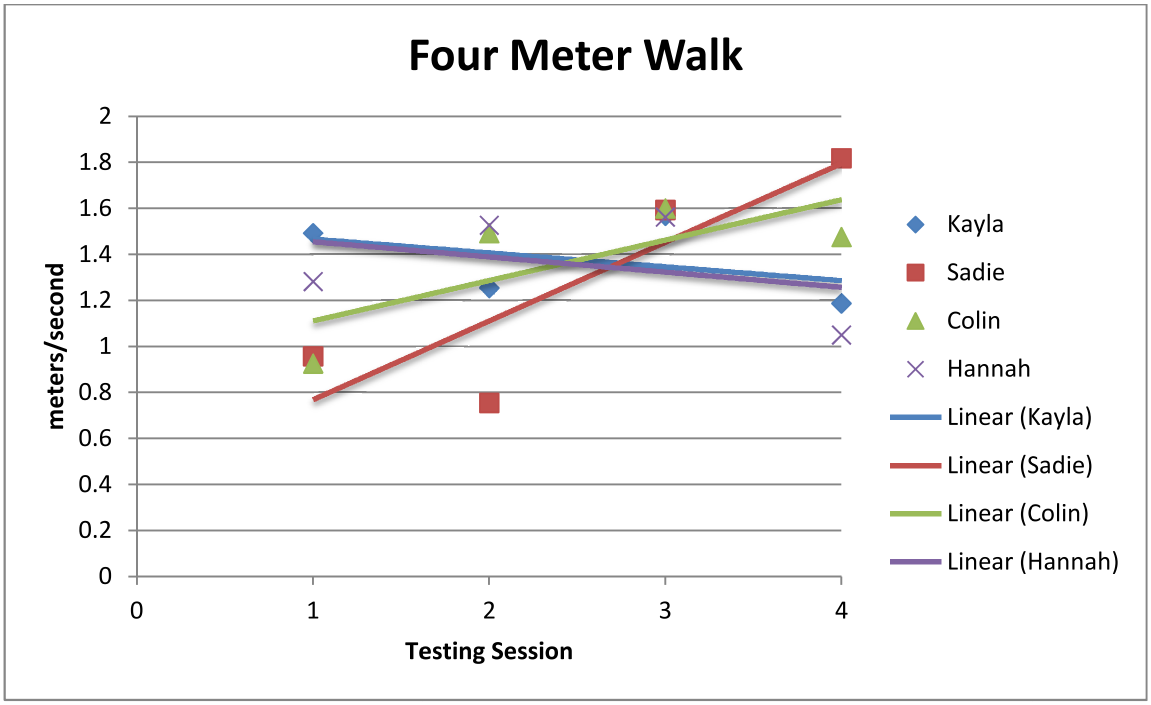


Figure 3: Distance in centimeters reached towards the toes. Note: Negative numbers represent distance between the fingers and toes, positive numbers represent distance reached past the toes.

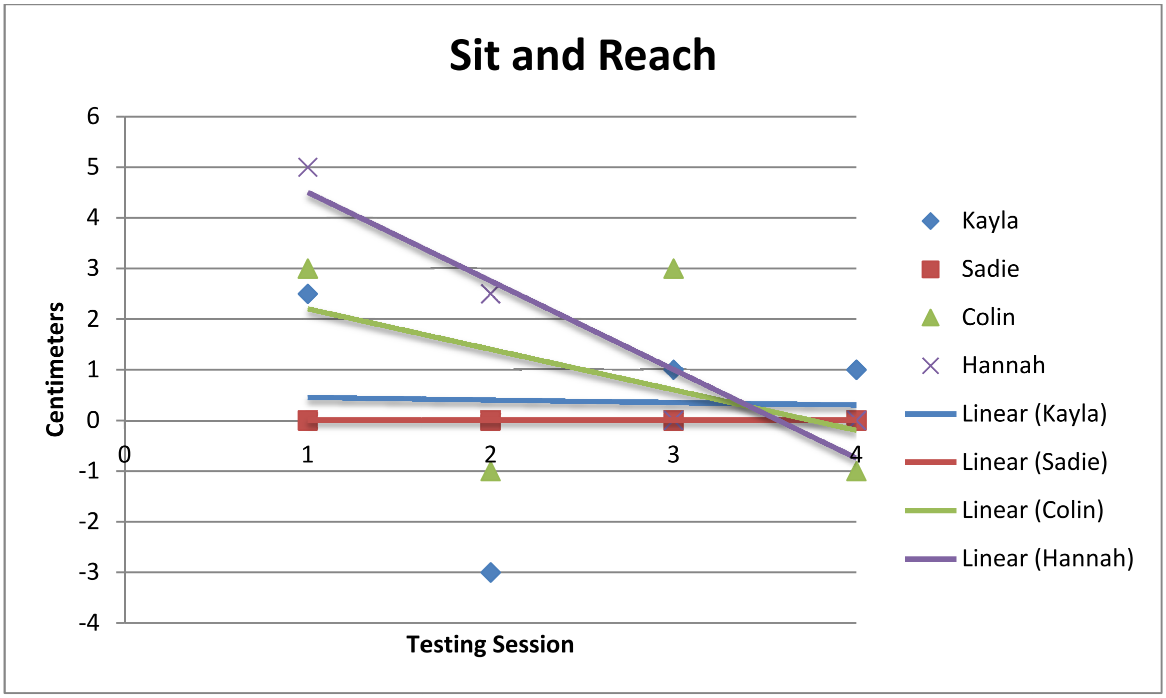


Figure 4: Degree of error in arm replacement for the upper body imitation test.

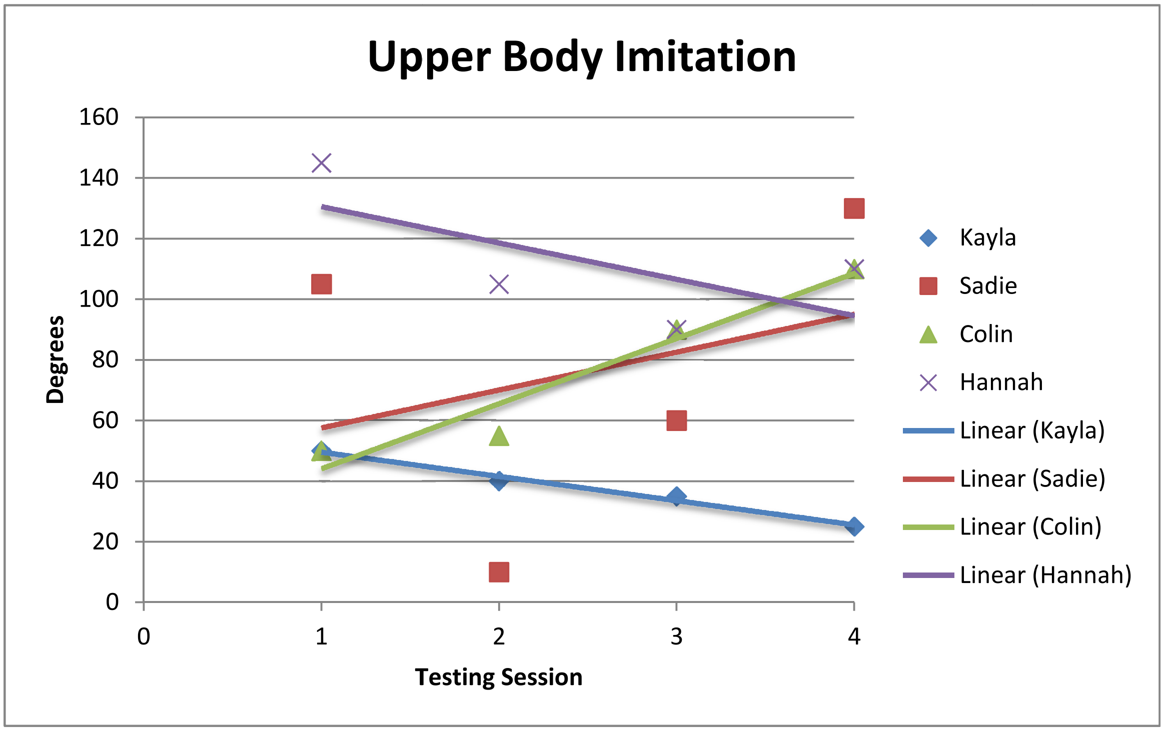


Figure 5: Root mean square of Kayla's standing balance in the medial lateral plane.

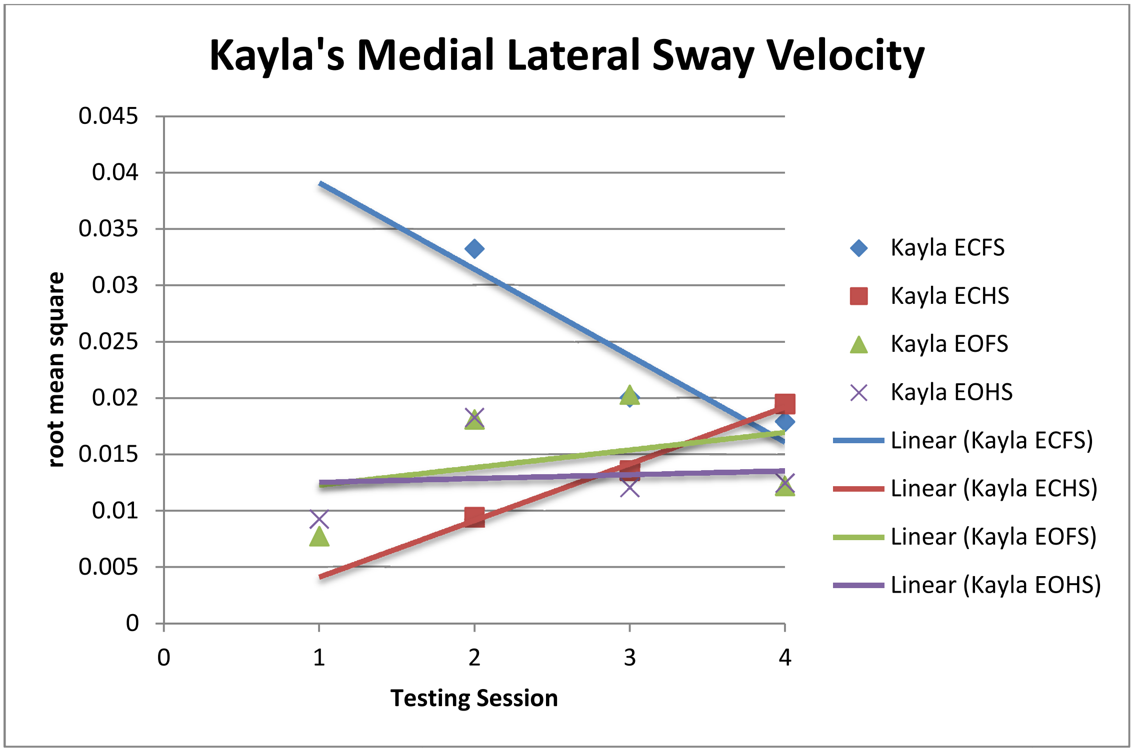


Figure 6: Root mean square of Kayla’s standing balance in the anterior posterior plane.

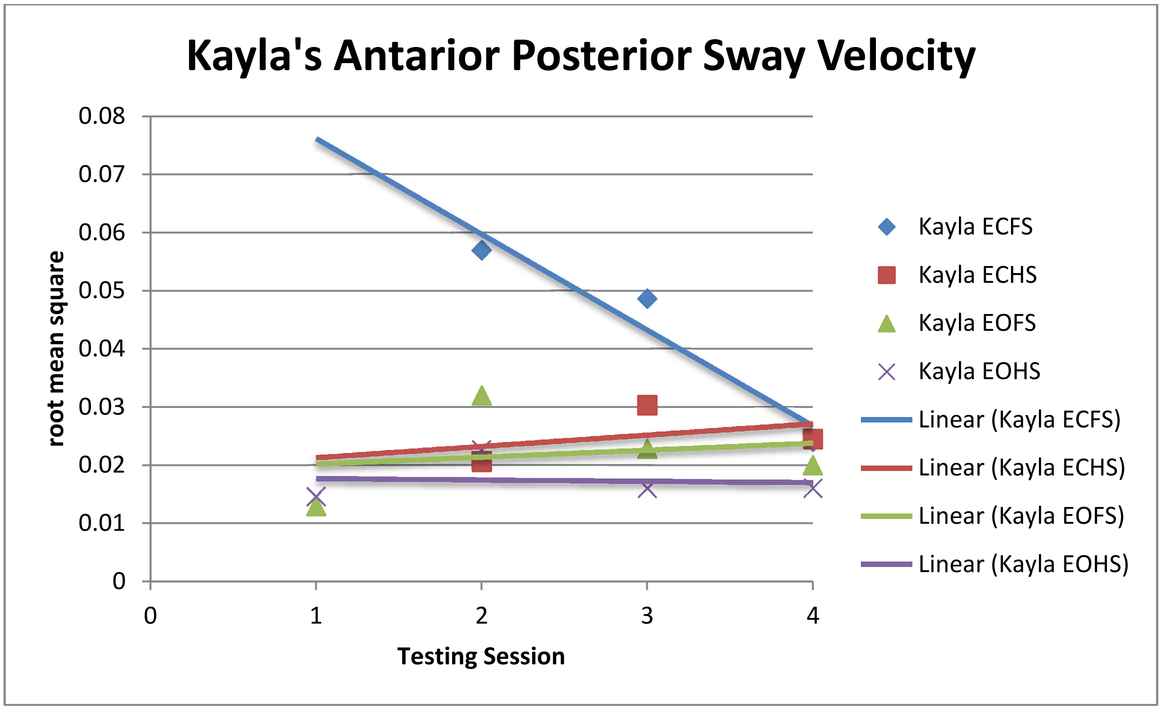


Figure 7: Root mean square of Sadie’s standing balance in the medial lateral plane.

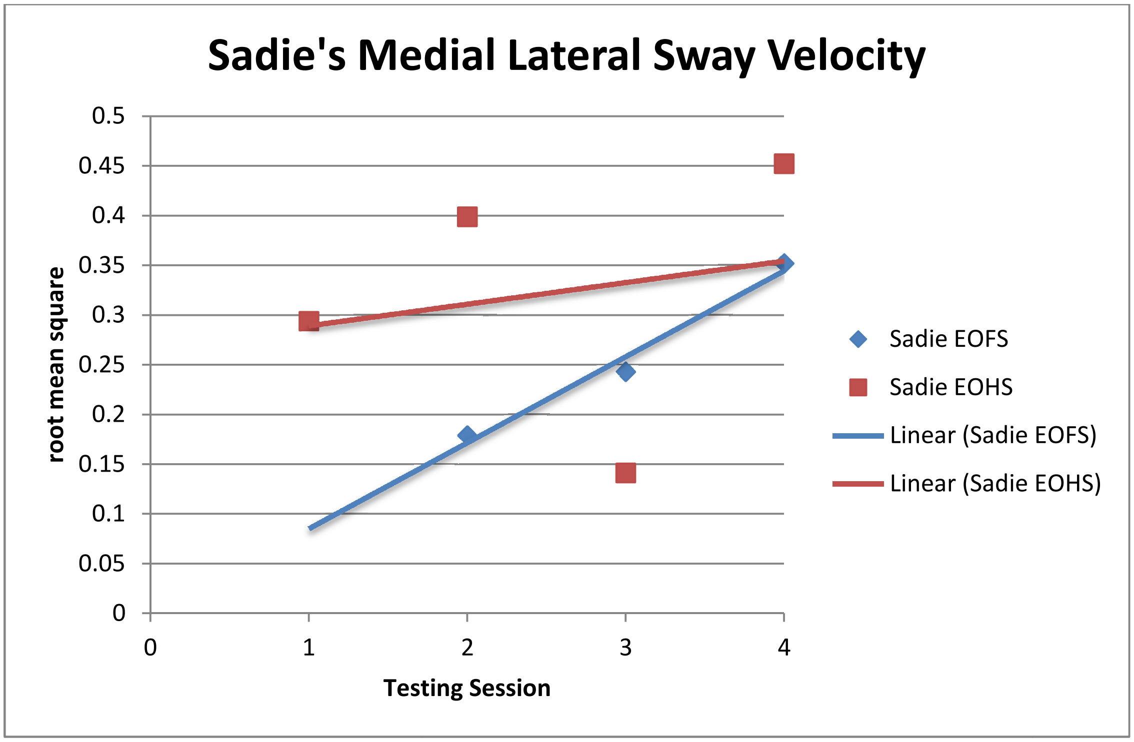


Figure 8: Root mean square of Sadie's standing balance in the anterior posterior plane.

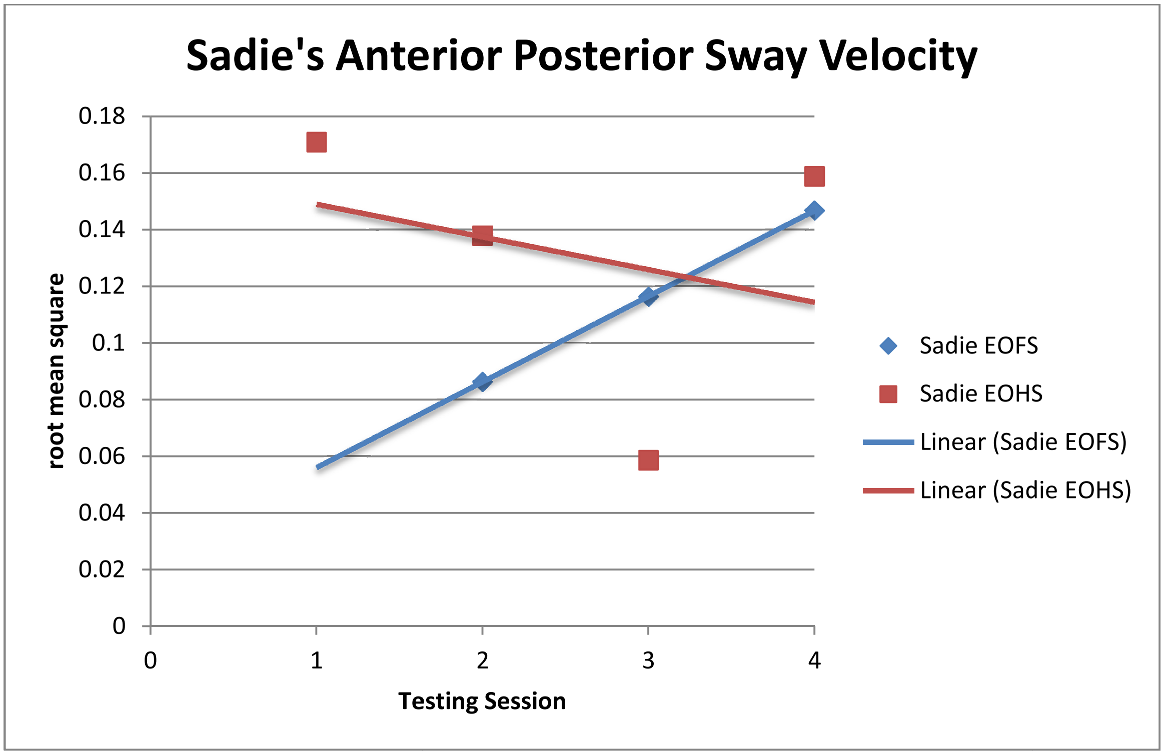


Figure 9: Root mean square of Colin's standing balance in the medial lateral plane.

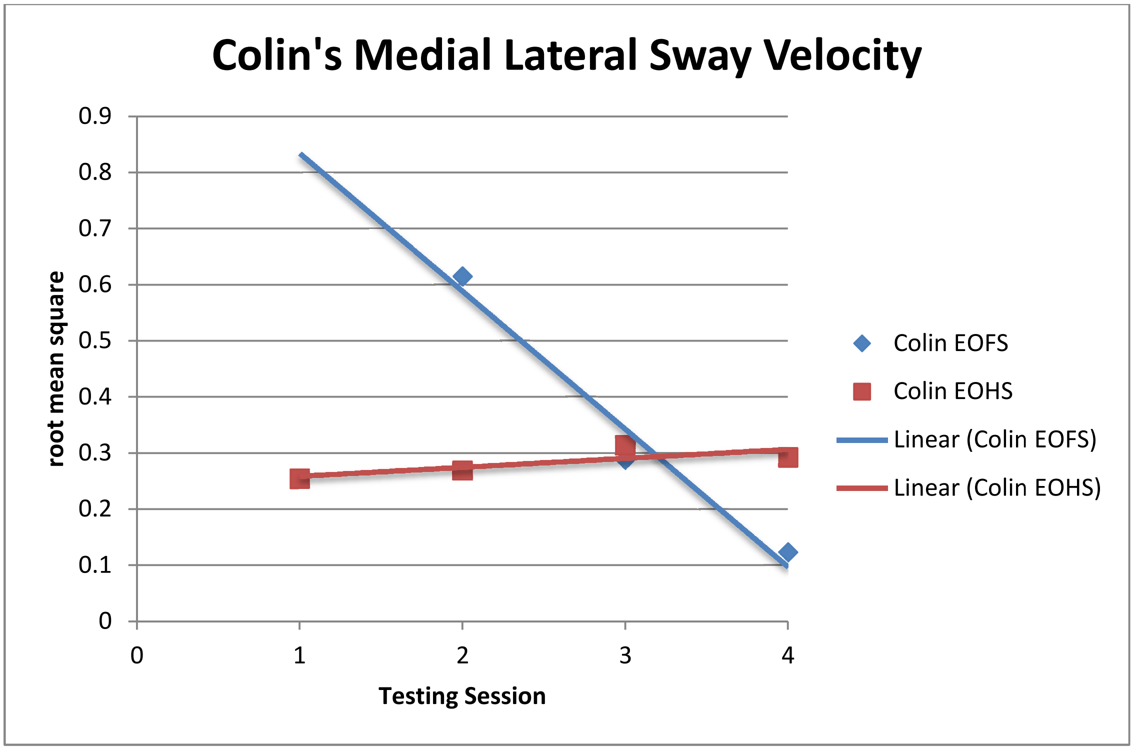


Figure 10: Root mean square of Colin's standing balance in the anterior posterior plane.

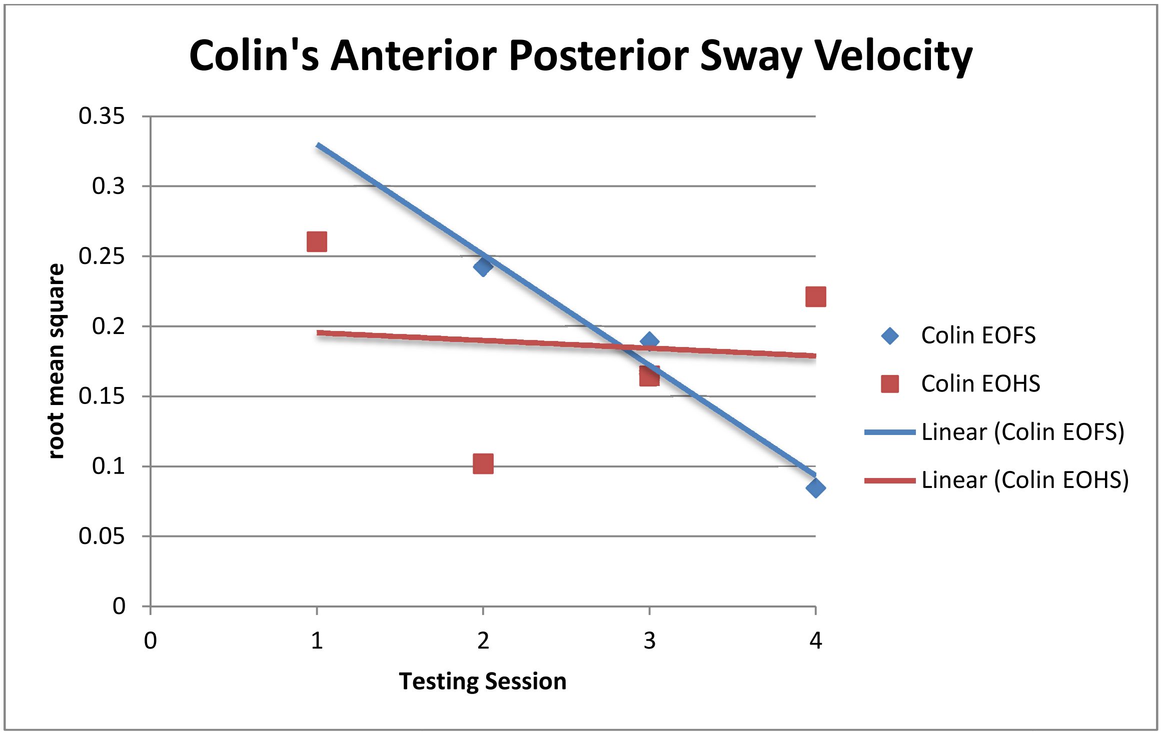


Figure 11: Root mean square of Hannah's standing balance in the medial lateral plane.

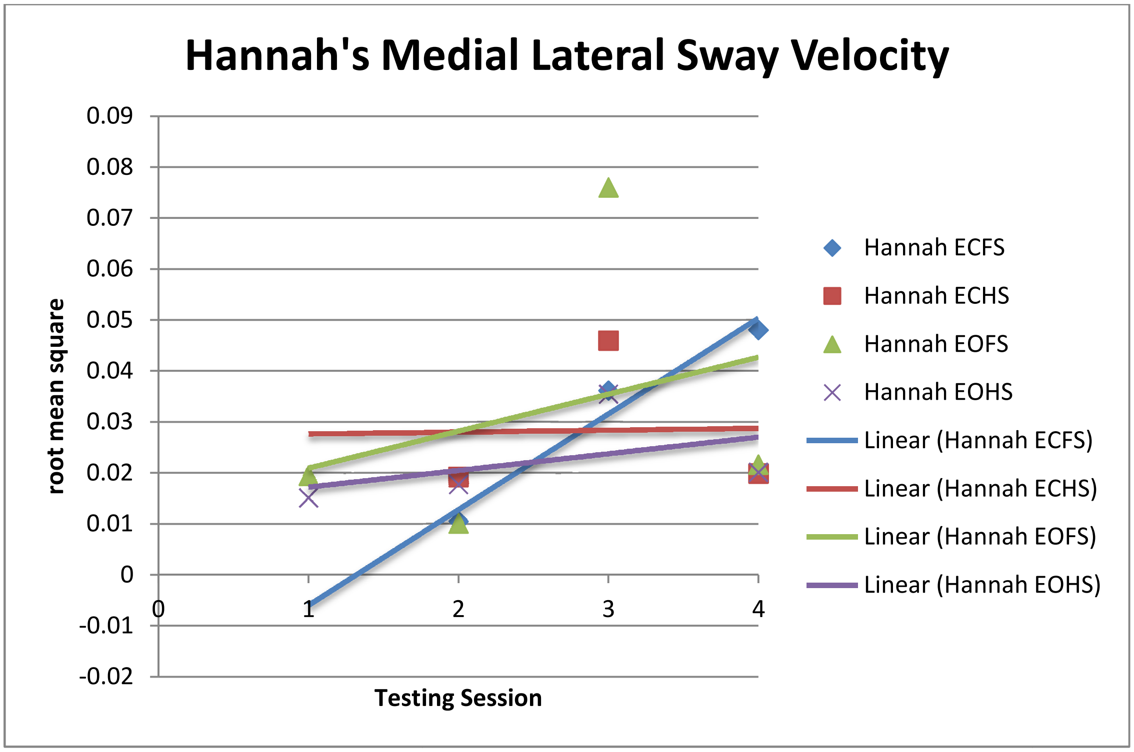
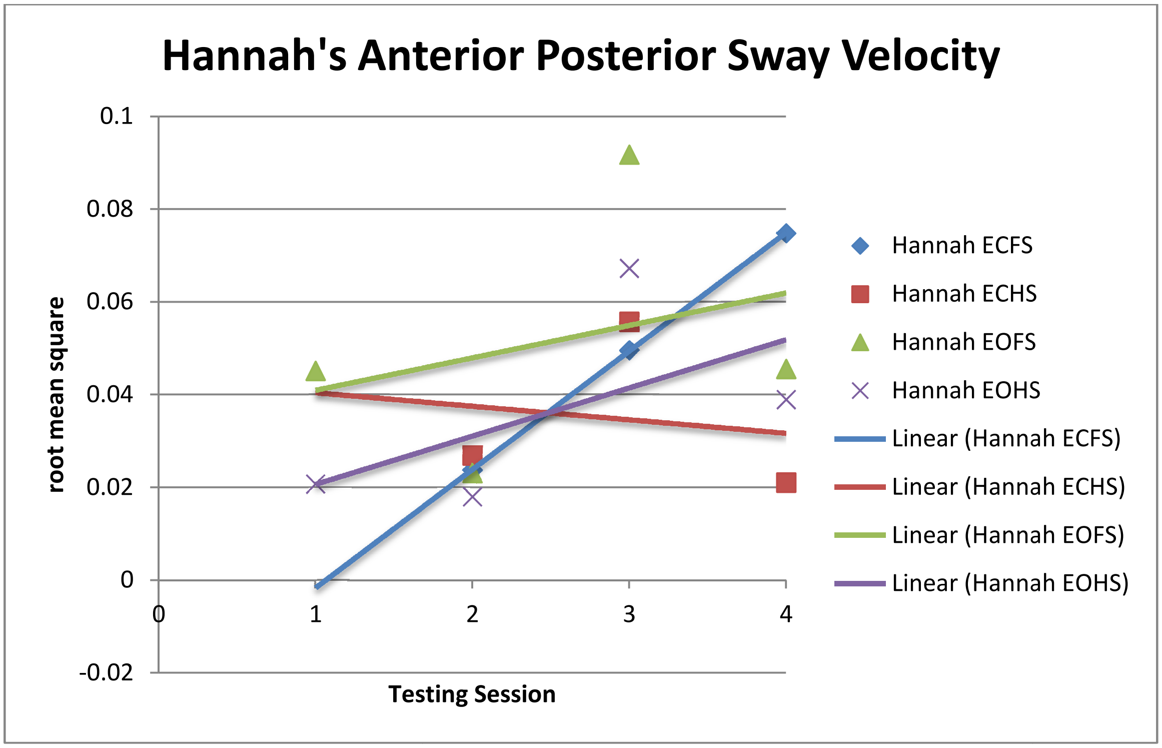


Figure 12: Root mean square of Hannah's standing balance in the anterior posterior plane.



CHAPTER 5

Discussion: Adding the Researcher's Voice

The present study focussed on recreational dance classes for children with special needs, primarily ASD. This research holds personal relevance to the researcher.

I have been a dancer for as long as I can remember. Dance has always been a significant part of my life and I believe it helped me grow into the person I am today. I began with jazz at the age of four and still remember dancing to songs from The Lion King in my first recital. Eventually, my dance instructor encouraged me to pursue ballet in addition to jazz to improve my technique. So at the age of ten I enrolled in ballet and studied the Royal Academy of Dance (RAD) syllabus. Over the next ten years, I continued in jazz, completed my grade 8 ballet exam with the RAD, and expanded my repertoire to contemporary and hip hop. There were many aspects of dance that I enjoyed, but performing in recitals was a highlight growing up. During my last years as a dancer, I started teaching my own classes, primarily in jazz and ballet, but also in contemporary and hip hop. My sister and I later opened a dance studio in our home town to share our love for dance with our community.

Dance has influenced my life, but I never imagined pursuing dance research that is until my cousin, who has Down syndrome, joined a dance class for individuals with special needs. I always knew that he loved to move and was so excited when he had the opportunity to dance at a studio with his friends. I quickly learned that recreational dance classes for individuals with special needs are very rare, especially for teenagers and young adults. It seemed apparent to me that he benefitted from the class – if in no other way than for pure enjoyment – and I saw a need for more programs like his. My goal was to evaluate existing programs to determine their effectiveness in order to improve these programs and to create new programs that would benefit children and adolescents with disabilities.

Over my teenage and young adult years, I have had several opportunities to work with individuals with special needs, whether it was spending time with my cousin or volunteering at special needs camps. I have seen the importance of music in this community and enjoyed dancing together whenever the opportunity arose. From the combination of my experiences, I have become passionate about the development and enhancement of recreational dance programs for individuals with special needs. My research began during my undergraduate thesis in the area of Down syndrome, and then shifted to ASD for my graduate degree. My dance friends were important to me growing up and I hoped that children with ASD would also be able to make social connections in the class, especially because that is one of the primary concerns associated with the disorder.

Through my research, I had the pleasure of watching four children with ASD attend recreational dance classes and I am excited to share my findings about their dance journeys. Because dance is multifaceted, I believe that anyone – Down syndrome, ASD, neurotypical, old, or young – can benefit in some way from this activity. My hope is that this research will lead to the creation of more dance programs for individuals with special needs, so that they have the opportunity to become a dancer just like me.

General Discussion

The objectives of the current research were twofold: first to study the lived experiences of individuals with ASD who participated in recreational dance classes; and second to determine if there were measureable motor outcomes for children with ASD as a result of this participation. Because three of the four individuals with ASD were non-verbal, their lived experienced were explored through the perspectives of their caregivers, instructors, volunteers, and the researcher's observations. Two themes emerged in the qualitative component of the study, which were creating dance programs for all abilities and what it means to be a dancer. The first theme revealed several factors in the design of these classes that made them successful, which were inclusivity, adapting to challenges, and receiving volunteer support. All participants agreed that it was important to include children of all abilities into the classes. While the programs were designed for all children, it is important to note that caregivers preferred enrolling their children in a class for students with special needs, rather than a class for neurotypical dancers that accommodated special needs. Specifically, caregivers believed that their children felt more comfortable in this type of class because they did not compare themselves to children without special needs.

The second theme had three subthemes regarding the outcomes of participating in dance for children with ASD from the perspectives of their caregivers, their instructors, and their volunteers. Past research has focussed on recreational dance for neurotypical children, as well as dance therapy for children with ASD, but few articles were found pertaining to recreational dance for children with ASD. This research has found that children with autism gained fundamental skills in four primary areas of development namely physical, social, psychological, and emotional. Overall, participants agreed that dancers enjoyed being physically active and learning to dance with the music. These findings resemble that of Gies (2012) in which all participants were able learn the Cupid shuffle and enjoyed learning the dance.

The subthemes all the right moves and more than meets the eye highlighted the perceived benefits for the four participants in this study. As a result of the physical activity associated with dance, the children in this study may have enhanced physical abilities, both in the dance class and in other environments. For example, Kayla's mother noticed that Kayla had the endurance to participate in two 45 minute classes in a row, which likely enhanced endurance for other activities such as a triathlon. This may be a more accurate measure of Kayla's endurance than the four minute walk test. According to Samaritter and Payne (2013), children who learn dance may be more likely to participate in other social activities including organized sport, which was clearly an outcome for Kayla. These benefits were less noticeable for Sadie, Hannah, and Colin; however, their caregivers, instructors, and volunteers felt that these children gained physical skills from the class, whether or not they extended to non-dance environments.

Common themes emerged during the qualitative portion of this research; however, few trends were found in the motor component of this research. The motor tests were used to assess five areas of motor development over time; however, the results of these tests may not have been suitable for the autistic population. One explanation for the variability in results is due to the different levels of functionality of the participants. These children may have also experienced external and internal factors that influenced their performance as proposed by Gowen and Hamilton (2012), who found that children with ASD have a reduced ability to integrate information and increased variability in sensory-motor processing. Both of these deficits may have negatively affected the ability for these children to carry out the testing protocols. For instance, a child with ASD may have difficulty performing a task based on a verbal instruction. For this reason, the researcher provided visual and tactile guidance wherever possible.

There were several other factors that influenced each child's ability to carry out the motor tests. The first factor was psychological, as the participants may not have fully understood the procedures of each test. This was evident in the sit and reach task, where some participants reached to touch their toes rather than reaching as far as possible. Another example was in the four meter walk where participants were instructed to walk at their regular pace, but some children ran, galloped, or shuffled their feet on the floor. Memory may have also been an important factor in motor test success. For example, the two metre walk course was only 25 feet and therefore the participants were instructed to turn around and continue walking at each end. It is possible that the participants forgot to do this as time went on and therefore required verbal cuing from the researcher. A good indicator of cognitive functioning is academic performance (Yen, Konold, & mcdermott, 2003). For example, Kayla understood verbal instructions for the test and required very little guidance, whereas Sadie did not understand the instructions and was fully supported by her caregivers. According to their mother Briana, Kayla is functioning at the same academic level as her neurotypical peers, while Sadie attends a life skills program.

Furthermore, attention and motivation to complete these tasks differed greatly among the four children. Continuing with the previous example, Kayla was able to pay attention fully for all of the tests, whereas her sister Sadie required redirection several times for each measure. In order to support the children during motor testing, caregivers often encouraged the child verbally or physically. Grace for instance, verbally instructed Hannah to pay attention to the researcher if she ever lost focus. On the other hand, Laura provided verbal instruction to Colin, but she also held his hands, arms, or shoulders to physically direct him to the task. Caregiver involvement was fairly consistent among sessions, in that children who required parental support required it for all four sessions. While caregiver involvement was necessary for the children to complete the tasks, the results may not be a true representation of the children's abilities. One example of this was in the two minute walking task, where Colin and Sadie both walked with their mothers. Their own walking speed may have been faster or slower than that of their mothers and therefore the results may be inaccurate.

With respect to the motor component of the research, key characteristics associated with ASD, more specifically, restrictive and repetitive behaviours may have influenced the ability for these children to complete the motor tests. Sadie for example, swayed side to side and front to back while standing on the force plate, and therefore the results may not be accurate to balance during quiet stance. In addition, Colin often waved his arms back and forth, especially when over stimulated, as he was during some of the testing. This arm movement may have impacted the force plate measures causing him to have greater sway displacement and velocity. While there were discrepancies between the overarching qualitative and quantitative results, there were some trends between these results for each case, each will be discussed in turn.

Kayla

In the interviews, Kayla's caregiver, dance instructors, and volunteer listed some of the physical outcomes they felt Kayla gained from the class. These included balance, posture, body awareness, coordination, flexibility, endurance, and ability to learn and execute dance steps. In the motor tests, Kayla displayed less error in the upper body imitation test over time, which suggests that she did in fact gain skills in body awareness. However, Kayla did not show trends towards improvement in the other tests.

Sadie

Sadie's caregiver, instructors, and volunteer felt that she learned new moves, was more capable of imitating movement, and was better able to control her body. Over the four sessions of motor testing, Sadie showed improvement in the two-minute walk, which may suggest that she had increased endurance or increase ability to focus for the entirety of the test. She also showed improvement on the 4-meter walk, suggesting that she had increased gait speed. Both of these results could mean that Sadie developed motor control skills or that she was better able to imitate her parent as they physically demonstrated the task. On the other hand, Sadie did not improve in her ability to complete the upper body imitation task, which contradicts the previous conclusion.

Colin

Similarly to the other children, Colin displayed variable motor capabilities over the four testing sessions. His caregiver, instructor, and volunteer felt that he gained coordination and imitation skills while in the class. It would be expected that his upper body imitation test would have been more accurate with each session, but unfortunately this test, as well as most of the other tests, were not reflective of this. He showed improvement in the 4-meter walk; however, this may have been due to him walking on the tape measure in the first session.

Hannah

During the interviews, Hannah's caregiver, instructor, and volunteer felt that she gained body control, specifically standing with a good posture, holding her body in a position, coordinating her steps, and balancing. Her mother also felt that Hannah grew less clumsy over time as a result of attending dance. The results from the motor tests showed that Hannah did not improve in the walking, flexibility, or balance tasks contrary to the qualitative results. On the other hand, Hannah showed a trend in the upper body imitation task towards greater accuracy in placing her arms. This may mean that she gained body awareness and imitation skills.

While the motor results were variable, caregivers, instructors and volunteers felt that the class was beneficial. In addition to the children's physical outcomes, their caregivers, instructors, and volunteers conveyed that dance also influenced the social, psychological, and emotional well-being of the children. Socially, being in a class environment and cooperating with other children was a positive experience for these participants. Psychological outcomes included learning and remembering dance steps. These children also experienced feelings of self-esteem, success, and happiness while dancing and therefore benefitted emotionally. Findings from DMT research regarding ASD support these findings (social: Torrance, 2003; psychological: Duggan, 1978; emotional: Erfer, 2006, Siegel 1973); however, there is still not enough literature to support the use of DMT as an evidence-based therapeutic approach for ASD (Neuburger, 2012). However, findings from the present study highlight four cases where recreational dance benefitted children with ASD. Neuburger (2012) supports this in her statement that "dance and aspects of DMT, should be used, not as a therapy, but as a fun activity for children with ASD" (p. 31). Each of the dancers in the current study enjoyed movement and music, and it was beneficial to be accepted into a dance studio environment in order to dance.

The purpose of the qualitative portion of the study was to explore the lived experience of children with ASD, but the other participants shared their own experiences with dance in addition to those of the children. Caregivers felt comfortable enrolling their children in these classes and were able to network with other parents in similar circumstances. They also appreciated that their children were accepted into a social environment, which is a primary stressor for parents of children with ASD (Firth & Dryer, 2013). It was important to these caregivers that the instructors were competent in teaching individuals with special needs. Caregivers felt the programs would have been less successful had it not been for the experience of these instructors.

Instructors felt personal fulfillment in teaching these classes and providing their students with a special opportunity. It was personally important for each of these instructors to foster an inclusive and accepting environment for individuals with special needs. They all agreed that dance is a beneficial activity and stressed that more programs like theirs should be made available in other communities. Likewise, the volunteers also benefitted from their participation in the programs. The three volunteer participants in this study discussed their own reasons for helping with the classes. First and foremost, they were all dancers and like to be part of the dance studio community. They also enjoyed meeting individuals with special needs and helping them to dance as well. Furthermore, they learned important skills such as how to support children with special needs and how to effectively communicate with caregivers. These findings are similar to a survey by Statistics Canada (2010) reporting the benefits for people who volunteer. The top two benefits were interpersonal skills (64%) and communication skills (44%), which were both outcomes listed for the volunteers in the present study.

Interestingly, the programs at Studio 1 and Studio 2 were structured similarly to the model proposed by Amos (2013). Amos suggested ten factors for effective programming for individuals with ASD, three of which were assuming a capacity for children with ASD to learn, accommodating differences associated with the diagnosis, and providing a successful support system. The participants in this research felt that these three factors influenced the success of dance programs at studio 1 and studio 2.

Limitations and Future Implications

There were some important limitations in this study, first of which was the number of participants. Four children participated in this research and therefore data from the motor component cannot be generalized to the autistic population. Second, ten participants were interviewed over the course of this study: three instructors, three parents, three volunteers, and one child. While saturation was reached in each of the themes, there may have been more themes with more participants. Specifically, it would be beneficial to capture the perspectives of non-verbal children with ASD to uncover unique themes for this group. Qualitative data collection methods that utilize stories, crafts, photographs, and concrete interview questions may be more effective for individuals with ASD than traditional interviews (see Beresford, Tozer, Rabiee, & Sloper, 2004; Preece & Jordan, 2009).

In addition, caregivers, instructors, and volunteers noticed physical growth in children with ASD; however, the motor tests utilized in this study did not reflect their experiences. Therefore, it is proposed that further research be conducted in both of these areas. The dance aspect of the research should incorporate more rigorous assessment of autistic symptoms over time, by using a tool such as the Revised Clinical Scale for the Evaluation of Autistic Behaviour, a valid and reliable measure for autistic symptoms (Barthélémy et al., 1997). This analysis would enhance the observations made by the researcher and participants over the course of the study. It would also serve as a more robust measure of child functionality throughout the course of the study. For example, this scale could be completed at several time points over the course of the study to determine if autistic symptoms fluctuate with dance participation.

Regarding the quantitative aspect of this study, more research is needed in testing the motor capabilities of children with ASD. As reported above, there were many factors that may have affected the results and therefore they may not truly represent the children's abilities. Assessments should be created to address the specific needs of children with ASD. For example, Sadie was better able to stand still on the force plate while holding her ipad. Perhaps having participants look at a screen or an ipad while standing on the force plate will lengthen the amount of time they remain in quiet stance. Another example would be to have the child walk a circular track rather than a straight line for the two-minute walking session, because this may reduce the number of times a participant stops walking over the course of the test. For the upper body imitation test, the researcher could take a picture or video of the participants as they place their arms. In this way, the researcher would have more time to look at their arm placement and more accurately record the results. The tool used in this study was only accurate to the closest five degrees, but if the researcher were to have taken a picture of the participants, a more precise tool could be utilized.

The 4-meter walking test was generally free of issues for these participants, except for Colin during the first session of testing. The researcher used a metal tape measure to measure the distance of the course and left it extended on the ground. Colin became distracted from walking on the tape measure because he liked hearing the sound of the metal. The researcher should have marked the length of the course with masking tape on the floor and then put the tape measure away. Other children with ASD may be similar to Colin and become distracted by testing materials left on the ground.

The fifth measure in this study was the sit and reach test. Several participants had difficulty holding their bodies in the correct position for this test. Only Kayla was able to reach forward with straight knees. Hannah and Colin both had bent knees, but were able to keep their legs parallel. No measures were recorded for Sadie as she was unable to keep her legs straight or parallel. Future researchers could measure knee angle in addition to distance reached towards the toes; however, it would be difficult to measure both of these factors before the child moved into a new position. Again, a picture could be used to capture the participant's position, or perhaps another test would be more appropriate to measure flexibility. This may be an indication that flexibility should be addressed during the dance class or in another activity.

It is important to note that all of the children involved in this study had been dancing for at least one full year when testing began. It is possible that physical benefits were more pronounced during the first year of dance rather than the second or third. Future studies should test children who are dancing for the first time in order to determine the full impact of these programs. It would also be interesting to capture the perspectives of the dancers. In the present study, Kayla was the only dancer able to participate in an interview because Sadie, Colin, and Hannah were all primarily non-verbal. Hannah said that she loves to dance during one of her mother's interviews, but she was not able to answer specific questions about why she likes dance.

Lastly, it would be beneficial to conduct task specific testing in addition to the general measures as utilized in this study. While it is important to test whether the skills learned in dance are applied by the participants to non-dance environments, it may disregard the skills that they are learning in the class. It would be noteworthy for the dance instructors to assess the participant's abilities to carry out dance moves over the course of the season to determine how many new dance steps they have learned and whether or not they can remember choreography. Dance instructors and volunteers could also record dancer progress over time. For example, the instructor could record the child's ability to correctly execute dance steps in each class (i.e. Plies, port de bras, skips, gallops, etc.). If this were in the form of a simple checklist, the instructor could compare the dancer's abilities from week to week to determine if they have learned new skills.

Video recording and analysis may be another way to record skill development in the dance class. If the child were video recorded at several points over time, a researcher could analyse the results for several key outcomes. For example, they could record the child's ability to carry out dance steps, as suggested above, but also time spent resisting the instructor or amount of eye contact with others (see Hartshorn et al., 2001).

In conclusion, this pilot research project has shown that participants benefitted from participating in a recreational dance program based on the perspectives of their caregivers, instructors, and volunteers. Most importantly, the four children with ASD all enjoyed attending dance class, so much so that they have all been dancing for over a year. Without accessible dance classes, many children with special needs would not have the opportunity to dance. Some benefits of these programs have been uncovered from this pilot test, however, future research is necessary to enhance existing programs and provide structure for instructors looking to create new programs. In addition, future research should work towards finding sound testing measures for children with ASD. Additionally, further research regarding children and adolescents with ASD and other disabilities is warranted.

APPENDIX 1

May 14, 2014

Dear Nicole,

REB # 4039

Project, "Exploring the Social Impacts of a Recreational Dance Class for Children with Autism Spectrum Disorder"

Expiry Date: April 30, 2015

The Research Ethics Board of Wilfrid Laurier University has reviewed the above proposal and determined that the proposal is ethically sound. If the research plan and methods should change in a way that may bring into question the project's adherence to acceptable ethical norms, please submit a "Request for Ethics Clearance of a Revision or Modification" form for approval before the changes are put into place. This form can also be used to extend protocols past their expiry date, except in cases where the project is more than two years old. Those projects require a new REB application.

Please note that you are responsible for obtaining any further approvals that might be required to complete your project.

If any participants in your research project have a negative experience (either physical, psychological or emotional) you are required to submit an "Adverse Events Form" within 24 hours of the event.

According to the Tri-Council Policy Statement, you must complete the "Annual/Final Progress Report on Human Research Projects" form annually and upon completion of the project.

All the best for the successful completion of your project.

(Useful links: ROMEO Login Screen ; ROMEO Quick Reference Guide ; REB webpage)

Yours sincerely,

Robert Basso

Robert Basso, PhD
Chair, University Research Ethics Board
Wilfrid Laurier University

May 28, 2014

Dear Nicole,

REB # 4038

Project, "Measuring Cognitive and Motor Abilities of Children with ASD who Participate in Recreational Dance Classes"

Expiry Date: April 30, 2015

The Research Ethics Board of Wilfrid Laurier University has reviewed the above proposal and determined that the proposal is ethically sound. If the research plan and methods should change in a way that may bring into question the project's adherence to acceptable ethical norms, please submit a "Request for Ethics Clearance of a Revision or Modification" form for approval before the changes are put into place. This form can also be used to extend protocols past their expiry date, except in cases where the project is more than two years old. Those projects require a new REB application.

Please note that you are responsible for obtaining any further approvals that might be required to complete your project.

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All the best for the successful completion of your project.

(Useful links: ROMEO Login Screen ; ROMEO Quick Reference Guide ; REB webpage)

Yours sincerely,

Robert Basso

Robert Basso, PhD
Chair, University Research Ethics Board
Wilfrid Laurier University

APPENDIX 2

Exploring the Social Impact of a Recreational Dance Class for Children with ASD

Background Questionnaire: Dance Instructor or Assistant

Please complete all the questions by either filling in the blank spaces provided or checking the box with the most appropriate answer. The following questions are about you:

1. Are you
   - ☐ Male
   - ☐ Female

2. Date of birth (MM/YYYY) ____

3. Have you had any dance training?
   - ☐ Yes
   - ☐ No

   If yes, please list

   ____

   ____

   ____

   ____

4. Please list any experience and qualifications you have had with children with disabilities:

   ____

   ____

   ____

   ____

Please answer the following questions pertaining to the dance class for children with special needs.

5. What is your involvement in the dance program? (check all that apply)
    - ☐ Creator
    - ☐ Teacher
    - ☐ Volunteer recruitment
    - ☐ Advertising the class
    - ☐ Other (please list):

      ____

      ____

      ____

      ____

6. Have your received any training for this program? (please check all that apply_
    - ☐ No training
    - ☐ Dance teacher certification
    - ☐ Educator for people with special needs certification
    - ☐ Training specific for individuals with ASD
    - ☐ Other disabilities (please list):

      ____

      ____

      ____

      ____

7. Why do you think parents enroll their children in this class? (check all that apply)
    - ☐ Benefit of parent
    - ☐ Benefit of child
    - ☐ For child to meet other children with special needs
    - ☐ The child enjoys to dance
    - ☐ The child enjoys music
    - ☐ For children to be physically active
    - ☐ For child to try something new (and learn something new)
    - ☐ As an opportunity to leave home??

☐ Other (please list):

____

____

____

____

Do you have anything else you would like to add?

____

____

____

____

Thank you for taking the time to complete this questionnaire!

Exploring the Social Impact of a Recreational Dance Class for Children with ASD

Background Questionnaire: Primary Caregiver

Please complete all the questions by either filling in the blank spaces provided or checking the box with the most appropriate answer. The following questions are about you.

1. Are you
   - ☐ Male
   - ☐ Female

2. Date of birth (MM/YYYY) ____

3. Highest level of education
   - ☐ Elementary school
   - ☐ High school
   - ☐ College
   - ☐ University
   - ☐ Post-graduate degree
   - ☐ Other (please specify): ____

4. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Separated
   - ☐ Widowed
   - ☐ Other (please specify): ____

5. What is your occupation?
   - ☐ Full time (please list): ____
   - ☐ Part time (please list): ____
   - ☐ On leave (please specify): ____
   - ☐ Unemployed
   - ☐ Retired
   - ☐ Other (please specify): ____

6. Relationship to child with ASD
    - ☐ Parent
    - ☐ Grandparent
    - ☐ Legal guardian
    - ☐ Other:____

7. Do you have other children?
    - ☐ Yes
    - ☐ No

    If yes, please fill out table below

	Gender	Date of Birth (MM/YYYY)	Health Concerns/Comments
Child 1	☐ Male ☐ Female		
Child 2	☐ Male ☐ Female		
Child 3	☐ Male ☐ Female		
Child 4	☐ Male ☐ Female		
Child 5	☐ Male ☐ Female		

The following questions are in relation to your child with ASD:

8. When was your child diagnosed with ASD? (MM/YYYY) ________________________

9. What signs and symptoms does your child *currently* display that are associated with ASD?

   ____

   ____

   ____

   ____

10. Does your child have any secondary health concerns?
    - ☐ Yes
    - ☐ No

    If yes, please list

    ____

    ____

    ____

    ____

11. On a daily basis, does your child face any of the following challenges? (Check all that apply)
    - ☐ Communicating with others
    - ☐ Repetitive and restrictive behaviours
    - ☐ Controlling his/her mood
    - ☐ Difficulty controlling movements
    - ☐ Violent outbursts harming others or self
    - ☐ Other:

    ____

    ____

12. Does your child with ASD receive treatment and/or therapies specific to his/her ASD?
    - ☐ Yes
    - ☐ No

    If yes, please list

    ____

    ____

    ____

    ____

13. Has your child with ASD participated in recreational activities within the past 12 months?
    - ☐ Yes
    - ☐ No

    If yes, please fill out table below

Activity	Date Attended	Description of program

The following questions are in regards to your child's recreational dance class.

14. What dance studio does your child attend? ______________________________________

15. Why did you enroll your child in the dance class? (check all that apply)
    - ☐ To meet other children
    - ☐ He/she enjoys dance
    - ☐ He/she enjoys music
    - ☐ To be physically active
    - ☐ To try something new
    - ☐ An opportunity to get out of the house
    - ☐ Child care
    - ☐ Other:

      ____

      ____

      ____

      ____

16. Are you able to watch the class?
    - ☐ Yes
    - ☐ No

17. What is your role with regards to your child's dance class? (check all that apply)
    - ☐ Transportation to and from the class
    - ☐ Enrolled child
    - ☐ Practice at home with child
    - ☐ Watch the class
    - ☐ Help in the class
    - ☐ Other:

      ____

      ____

      ____

      ____

18. What does your child enjoy about the class? (check all that apply)

- ☐ Dancing
- ☐ Listening to music
- ☐ Interaction with the dance instructor
- ☐ Interaction with other children
- ☐ Physical activity
- ☐ Other:

____

____

____

____

19. Did your child face any difficulties in the class?

- ☐ Yes
- ☐ No

If yes, check all that apply

- ☐ Paying attention to the teacher
- ☐ Making new friends
- ☐ Participating for the length of the class
- ☐ Following the dance steps
- ☐ Remembering the dance moves
- ☐ Other

____

____

____

____

20. Did attending the class change your child in any way? (list all that apply)

- ☐ Positive changes
- ☐ Negative changes
- ☐ No effect

21. Did you notice any changes in your child after attending the class?

☐ Yes
☐ No

If yes, check all that apply

☐ Physical abilities (e.g. balance, coordination, flexibility)
☐ Social abilities (i.e. making friends, maintaining a conversation)
☐ Cognitive abilities (i.e. memory, attention, problem solving)
☐ Emotions (i.e. happiness, sadness, moodiness)
☐ Signs and symptoms associated with ASD
☐ Other

____
____
____
____

22. Is your child interested in taking the class again?

☐ Yes
☐ No

If not, why?

____
____
____
____

23. Has your child's participation in the dance class affected you personally?

☐ No
☐ Yes

If yes, please explain:

____
____
____
____

24. Was this class: (check all that apply)

- ☐ At a convenient location
- ☐ Scheduled at a convenient time
- ☐ Affordable
- ☐ An appropriate length of time
- ☐ Appropriate instructor to child ration
- ☐ Contained content that was at your child’s ability level
- ☐ Add more

Other (please list):

____

____

____

____

Is there anything else you would like to add?

____

____

____

____

Thank you for taking the time to complete this questionnaire!

APPENDIX 3

Exploring the Social Impact of a Recreational Dance Class for Children with ASD

Interview Questions: Primary Caregiver

Thank you for agreeing to meet with me and for participating in this study. Please feel free to ask questions and make comments at any point throughout the interview. Also, please remember that your participation is voluntary. You may decide not to answer specific questions and you may choose to stop the interview at any point in time. I will be recording this interview on an audio recorder. Before we start, do you have any questions for me? (Pause) If not, let us begin. May I turn the tape recorder on? (Wait for participant to respond affirmatively and then turn on the tape recorder).

1. Please tell me about yourself.
    - Occupation
    - Family
    - Interests
    - Relationship with dance participant (are you the primary caregiver?)
2. Please tell me about your child with ASD.
    - Diagnosis
    - Current signs and symptoms
    - Does ASD affect his/her abilities?
        i. Physical (e.g. balance, flexibility, coordination, endurance)
        ii. Social (how does he communicate with others?)
        iii. Psychological (i.e. memory, problem solving, attention)
    - Does he/she experience difficulties in day to day living?
    - Is he/she dependent on others? If so, how?
    - What therapies and treatments does your child currently receive?
3. Does your child participate in other community-based programs?
    - Please list
    - How much time does your child spend doing these activities each week?
    - Does he/she prefer these to dance?
    - Do these programs hinder or encourage your child's participation in dance?
    - Is he/she socially stimulated in these programs?
    - Is this your first time in the dance program?
4. Please describe why you enrolled your child in the dance class
    - Whose idea was it to enroll in the class (e.g. mom, dad, own)?
    - Did he/she express interest in dance? What triggered it?
    - How did you hear about the class?
    - What about the class inspired you to enroll your child?
5. Please describe your child's experience in the dance class
    - What does he/she enjoy?
    - What does he/she dislike?

- Does he/she have any limitations? Challenges?
- Do you think he/she benefited from the class?
- Was your child participating in other activities while enrolled in the class? If so, what were they? (i.e. school, day care, camp, other recreational programs).

6. Please describe his/her interactions with others in the class.
   - Teacher?
   - Volunteers?
   - Students?
   - Does he/she co-operate and participate with others?
7. Describe any noticeable changes in your child before and after the dance program
   - Immediately after the class finishes, several hours later and several weeks into the program
   - Were there any changes to your child's signs and symptoms associated with ASD?
   - Physical (e.g. flexibility, balance, coordination, fine motor control)
   - Social (e.g. friendships, communication with others, self-expression)
     i. Tell me about his/her social engagement in the class
     ii. How did this social engagement affect him/her?
   - Cognitive (e.g. control of mood, self-esteem, body awareness)
   - Did his/her behaviour change?
   - How does dance affect your child's interactions with your family?
8. Would you enroll your child in the program again?
   - What did you like and dislike about the class?
   - Is it in a convenient location?
   - Is it affordable?
   - Does the schedule work for your family? Why or why not?
   - Would you recommend this class to other people? Why or why not?
9. Were there any barriers to participation in the dance class?
   - Barriers for the caregivers
   - Barriers for the child
   - Do you feel that the dance class was more or less beneficial than other programs your child has participated in?
10. Does your child dance at home?
    - What initiates it?
    - Are you involved?
    - What type of dance is it?
    - Doe any of this dance come from the dance class?
    - Does your child with ASD respond to this? If so, how?
    - Do you play music at home?
11. Is there anything else you would like to add?
12. Do you have any questions for me?

Thank-you for doing this interview with me!

Exploring the Social Impact of a Recreational Dance Class for Children with ASD

Interview Questions: Dance Teacher and Assistant

Thank you for agreeing to meet with me and for participating in this study. Please feel free to ask questions and make comments at any point throughout the interview. Also, please remember that your participation is voluntary. You may decide not to answer specific questions and you may choose to stop the interview at any point in time. I will be recording this interview on an audio recorder. Before we start, do you have any questions for me? (Pause) If not, let us begin. May I turn the tape recorder on? (Wait for participant to respond affirmatively and then turn on the tape recorder).

1. Tell me about yourself.
    - How long have you been a dance instructor/assistant?
    - Do you have any training or certification for dance? If so, what?
    - What classes and age groups do you teach?
    - Can you tell me more about your experiences with people with disabilities?
    - How long have you worked with children with disabilities?
    - Have you had any training for working with children with disabilities?
2. Please describe the dance studio where you teach/assist.
    - What is the philosophy of the studio?
    - What kinds of classes are available?
    - What demographic does it serve?
    - Are there other classes for children with disabilities?
3. Please describe the dance program
    - Who created it?
    - How long has it been running?
    - Why do you teach/assist it?
    - What do you like most about it?
    - Is there anything that you would like to do differently?
    - Are there helpers?
        i. How many and who are they?
    - What is the composition of the class (i.e. age, gender, disabilities, ratio of instructors/helpers to participants)
    - Class dynamics
        i. How do the students interact with the teacher?
        ii. How do the students interact with the volunteers?
        iii. How do the students interact with the other students?
    - What do the participants enjoy most?
    - Does it benefit the students who participate? If so, how?
    - What do the participants find challenging?
        i. How do you alter the class to make it the right level for these students?
    - Does this class participate in a recital?
4. Can you tell me about the participants with ASD in your dance class?

- What do they enjoy?
- What do they dislike?
- Did they have any difficulties participating in the class?
    i. Give an example.
- Did any part of the class cause an emotional response (sad, happy, ignoring instructions, frustration, etc.)
    i. How did you work with these?
- Did you do anything to make these students feel more included?
- How do they do in the class as compared to the other students?
- Describe how these students respond to music (e.g. physical or emotional response)

5. Describe any noticeable changes in any of these participants over the course of the dance program
    - Physical (e.g. flexibility, balance, coordination, fine motor control, etc.)
    - Social (e.g. friendships, communication with others, self-expression)
    - Cognitive (e.g. psychological, control of mood, self-esteem, body awareness, emotions, memory, ability to follow instructions)
    - Other changes?
6. Does the program need to be changed in the future?
    - Is there anything that would make the program better?
    - If so, what aspect of the class needs improvement?
    - What would you recommend?
    - What do you see for the future of this program?
7. Do you have anything else to add?
8. Do you have any questions for me?

Thank-you for doing this interview with me!

Exploring the Social Impact of a Recreational Dance Class for Children with ASD

Interview Questions: Child with ASD

Thank you for agreeing to meet with me and for participating in this study. Please feel free to ask questions and make comments at any point throughout the interview. Also, please remember that your participation is voluntary. You may decide not to answer specific questions and you may choose to stop the interview at any point in time. I will be recording this interview on an audio recorder. Before we start, do you have any questions for me? (Pause) If not, let us begin. May I turn the tape recorder on? (Wait for participant to respond affirmatively and then turn on the tape recorder).

1. Please tell me about yourself.
    - Family
    - Interests
2. Why did you join the dance class?
    - Whose idea was it (e.g. mom, dad, your friends, your own)?
    - Have you danced before?
3. Tell me about your dance class
    - What do you like best?
    - What don't you like?
    - Do you like the music?
    - Would you change anything? If so, what?
    - Would you go again?
4. Please tell me about the others in the class.
    - Teacher
    - Volunteers
    - Students
5. Did you learn anything new in the dance class?
    - Dance skills (i.e. flexibility, balance, remembering dances, doing the dance moves)
    - Social (e.g. making friends, taking to others)
    - Feelings (e.g. mood, self-esteem, body awareness)
    - Can you show me something you learned in the class?
6. Do you do other activities?
    - Please list
    - Do you like these more or less than dance?
7. Is there anything else you would like to add?
8. Do you have any questions for me?

Thank-you for doing this interview with me!

APPENDIX 4

Autism and the DSM-5

One of the most important changes in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) is to autism spectrum disorder (ASD). The revised diagnosis represents a new, more accurate, and medically and scientifically useful way of diagnosing individuals with autism-related disorders.

Using DSM-IV, patients could be diagnosed with four separate disorders: autistic disorder, Asperger's disorder, childhood disintegrative disorder, or the catch-all diagnosis of pervasive developmental disorder not otherwise specified. Researchers found that these separate diagnoses were not consistently applied across different clinics and treatment centers. Anyone diagnosed with one of the four pervasive developmental disorders (PDD) from DSM-IV should still meet the criteria for ASD in DSM-5 or another, more accurate DSM-5 diagnosis. While DSM does not outline recommended treatment and services for mental disorders, determining an accurate diagnosis is a first step for a clinician in defining a treatment plan for a patient.

The Neurodevelopmental Work Group, led by Susan Swedo, MD, senior investigator at the National Institute of Mental Health, recommended the DSM-5 criteria for ASD to be a better reflection of the state of knowledge about autism. The Work Group believes a single umbrella disorder will improve the diagnosis of ASD without limiting the sensitivity of the criteria, or substantially changing the number of children being diagnosed.

People with ASD tend to have communication deficits, such as responding inappropriately in conversations, misreading nonverbal interactions, or having difficulty building friendships appropriate to their age. In addition, people with ASD may be overly dependent on routines, highly sensitive to changes in their environment, or intensely focused on inappropriate items. Again, the symptoms of people with ASD will fall on a continuum, with some individuals showing mild symptoms and others having much more severe symptoms. This spectrum will allow clinicians to account for the variations in symptoms and behaviors from person to person.

Under the DSM-5 criteria, individuals with ASD must show symptoms from early childhood, even if those symptoms are not recognized until later. This criteria change encourages earlier diagnosis of ASD but also allows people whose symptoms may not be fully recognized until social demands exceed their capacity to receive the diagnosis. It is an important change from DSM-IV criteria, which was geared toward identifying school-aged children with autism-related disorders, but not as useful in diagnosing younger children.

The DSM-5 criteria were tested in real-life clinical settings as part of DSM-5 field trials, and analysis from that testing indicated that there will be no significant changes in the prevalence of the disorder. More recently, the largest and most up-to-date study, published by Huerta, et al, in the October 2012 issue of American Journal of Psychiatry, provided the most comprehensive assessment of the DSM-5 criteria for ASD based on symptom extraction from previously collected data. The study found that DSM-5 criteria identified 91 percent of children with clinical DSM-IV PDD diagnoses, suggesting that most children with DSM-IV PDD diagnoses will retain their diagnosis of ASD using the new criteria. Several other studies, using various methodologies, have been inconsistent in their findings.

DSM is the manual used by clinicians and researchers to diagnose and classify mental disorders. The American Psychiatric Association (APA) will publish DSM-5 in 2013, culminating a 14-year revision process.

APA is a national medical specialty society whose more than 36,000 physician members specialize in the diagnosis, treatment, prevention and research of mental illnesses, including substance use disorders. Visit the APA at www.psychiatry.org. For more information, please contact Eve Herold at 703-907-8640 or press@psych.org.

Pre-order DSM-5 and DSM-5 Collection at www.appi.org

Retrieved from http://www.psychiatry.org/mental-health/key-topics/autism

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