

## RESEARCH

# *Moving and Improving: Investigating Programming and Familial Influences on Physical Activity for Children with Autism Spectrum Disorder (ASD)*

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The primary characteristics of Autism Spectrum Disorder (ASD) fall into three broad categories: communication problems, difficulty relating to people, things and events, and repetitive body movements and behaviours (American Psychiatric Association, 2014). Unfortunately, potential barriers for children and youth (5–17 years old) with ASD achieving the recommended 60 minutes of physical activity (Canadian Society of Exercise Physiology, 2012) may be due to characteristics of the condition and/or the lack of specific guidelines for this population. The purpose of the current study was to explore the influence families and physical activity programming has on the physical activity patterns of children with ASD. The perspectives from both family members of children with ASD, and from instructors of physical activity programs for children with ASD were obtained. The participants completed questionnaires and participated in semi-structured one-on-one interviews. Two themes emerged from the data describing physical activity for children with ASD (1) physical activity, regardless of ability, and (2) the nature of ASD: programming and family challenges. Given the rich data collected, this paper will focus solely on the second theme. Two subthemes developed: “So how do we modify that activity?”, and “It can be fantastic and then it can just be like a total nightmare”. Overall, this research indicated unique challenges for physical activity participation for children with ASD and provided suggestions on improvements to physical activity programming. Considering various challenges to physical activity for this population, physical activity instructors play a vital role in delivering effective programs for children with ASD.

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**Keywords:** Autism Spectrum Disorder (ASD); Physical Activity; Exercise; Disability Research; Qualitative Research

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## 1. Introduction

Autism Spectrum Disorder (ASD) has been defined as a developmental disorder affecting an individual's language skills and ability to think, feel, and relate to others (American Psychiatric Association [APA], 2014). Worldwide, approximately one in 160 children has been diagnosed with ASD (World Health Organization [WHO], 2016). The diagnostic criteria for ASD points to possible barriers for physical activity for this population including deficits in nonverbal communicative behaviour, hyper- or hypo reactivity to sensory inputs, and highly restricted and fixated interests (APA, 2014). In Canada, the Canadian Society of Exercise Physiology (CSEP) recommends that children and youth participate in 60 minutes of moderate-to-vigorous physical activity daily; however, there are no specific physical activity guidelines for individuals with ASD (CSEP, 2012).

A review of the literature indicated there was an ambiguous relationship between children and youth with ASD and the time they engaged in physical activity. Findings were equivocal, in that some research indicated children with ASD were less active (McCoy, Jakicic, & Gibbs, 2016; Pan, 2009; Pan, 2011; Pan & Frey, 2006; Pan, Tsai, Chu, & Hsieh, 2011) while other research suggested little or no difference (Bandini et al., 2013; Corvey et al., 2015) between children with ASD and their typically developed (TD) counterparts with respect

to physical activity. Worth noting is the evidence that some children with ASD were capable of obtaining physical activity guidelines much like their TD peers (Tyler, MacDonald & Menear, 2014). The current rates of physical activity in children with ASD as described in the literature is important in understanding programming and familial influences on physical activity for children with ASD.

In 2016, a secondary data analysis from the National Survey of Children's Health (NSCH) conducted by McCoy et al. (2016) determined youth with ASD had lower physical activity levels than their TD peers. McCoy et al. (2016) concluded children and youth with ASD were more likely to be overweight and/or obese, however there were little differences between the group's sedentary behaviours. Similarly, Pan and Frey (2006) indicated youth with ASD were less active than their peers without disabilities. Overall, the researchers determined that youth with ASD did not regularly engage in continuous moderate-to-vigorous physical activity, therefore predisposing them to similar health risks associated with inactivity as individuals without disabilities. Conversely, Bandini et al. (2013) provided evidence that physical activity levels between children and youth with ASD may not be significantly different than TD individuals. Corvey et al. (2016) also found there was no significant association between the presence of ASD or severity of ASD and participation in physical activity. Despite the conflicting evidence on physical activity for children with ASD, Pan (2011) provided factors (i.e. environment and social interactions) that should be addressed to implement interventions and improve the physical activity levels of individuals with ASD, both in and out of school.

Arguably Tyler et al. (2014) provided the most encouraging evidence for children with ASD achieving their daily physical activity recommendations. Tyler et al. (2014), via assessments including developmental, aerobic fitness, flexibility, strength, physical activity and anthropometric, concluded there was no significant difference between the group's physical fitness. This suggests although children with ASD face health disparities, there were certain aspects of physical fitness that were attainable for children with ASD and comparable to TD youth. The disagreement in the literature regarding physical activity rates in children with ASD suggests the importance a multifaceted exploration of potential factors influencing their physical activity patterns.

In addition to the intrinsic abilities of children with ASD in a physical activity context, research has shown the influences of families and other environmental factors on their physical activity patterns. Interestingly, Pan (2009) suggested that physical activity for children with ASD was affected more by social and environmental constraints rather than the impairment of ASD itself. On the contrary, Polfuss et al. (2016) indicated that parents of children with ASD suggested certain characteristics of their children (i.e., lack of coordination and social abilities) affected their participation in structured sports. Additionally, Thompson et al. (2010) found that parents played key roles in supporting their children's participation in physical activity indicating another potential influential factor in physical activity participation for children with ASD. Prior to the research of Thompson et al. (2010), research on the familial influences of physical activity for children with ASD was limited, despite evidence of the familial and environmental influences on children's physical activity in the typically developed population (see, for example, Hume, Salmon & Ball, 2005; Maitland, Stratton, Foster, Braham & Rosenberg, 2014; Xu, Wen, & Rissel, 2015).

Uniquely, Obrusnikova and Cavalier (2011) examined the barriers and facilitators of physical activity from the perspective of children with ASD. Availability of physical activity resources proved to facilitate children's engagement in physical activity after school. Also, parental support was a strong facilitator among children with higher levels of moderate to vigorous physical activity. Participants with lower levels of moderate to vigorous physical activity, though, expressed frustration with their parents' encouragement to be physically active, as the children stated they would rather engage in sedentary activities than physical activities suggested by their parents. The findings from this study indicated the importance of familial influences on physical activity patterns in children with ASD (Obrusnikova & Cavalier, 2011).

In summary, information regarding physical activity in children with ASD within the literature was inconclusive. Additionally, there was limited qualitative research on physical activity interventions and programming for children with ASD. The most notable gaps in the literature pertained to assessments of the familial influences and physical activity programming on children with ASD's physical activity involvement. The purpose of the current study was to obtain various perspectives on physical activity for children with ASD by specifically investigating how families and physical activity programming influence the physical activity patterns of children with ASD.

## 2. Methods

### 2.1. Ethics Approval Process

After approval from a university ethics board, participants were provided an information letter and signed an informed consent form if they agreed to participate. Due to the fact the children with ASD were considered a vulnerable population, the primary caregivers provided written consent for their children, and the children provided verbal assent at the time of data collection. All participants were given the opportunity to ask questions about the research process prior to their participation. It was clearly communicated that participants could withdraw from the study at any point in time without penalty.

### 2.2. Participants

Four families (comprised of primary caregivers [ $n = 4$ ], children with ASD [ $n = 4$ ], and siblings [ $n = 4$ ]) and six physical activity instructors were recruited (see **Tables 1** and **2** for participant summaries). The children with ASD were six to 14 years old (mean = 11 years old), currently enrolled in elementary or secondary school, with a diagnosis of ASD as reported by their primary caregivers. The family members were asked to complete physical activity questionnaires, interviews, and member checks, with the primary caregivers additionally completing background questionnaires. The physical activity instructors were asked to complete background questionnaires, interviews, and member checks. In order to further protect the anonymity of the participants, pseudonyms were utilized.

**Table 1:** Summary of family participants.

	Name, age	Family Member Role
<b>The “White” Family</b>	Erica	Mother
	Matthew, age 11	Child with ASD
	Amanda, age nine	Sibling
<b>The “Murphy” Family</b>	Karen	Mother
	Ryan, age nine	Child with ASD
	Justin, age 21	Sibling (did not participate)
	Maddy, age 17	Sibling
	Drew, age seven	Sibling
<b>The “Smith” Family</b>	Heather	Mother
	Jack, age 14	Child with ASD
	Tessa, age 12	Sibling
<b>The “Williams” Family</b>	James	Father
	Samantha, age 10	Child with ASD
	Jessica, age six	Sibling, also diagnosed with ASD (did not participate)

**Table 2:** Summary of physical activity instructors.

Name	Physical Activity Program
Christina	Fitness/dance class for children with various disabilities
Darren	Physical Education teacher
Patricia	Skating program for children with varying disabilities
Alexis	Fitness instructor for varying disabilities
Amy	Yoga instructor for children with disabilities
Carrie	Dance instructor for children with disabilities

## **2.3. Research Tools**

### **2.3.1. Background Questionnaires**

Prior to the interviews, participants completed background questionnaires covering demographic information. The background questionnaire was used to build rapport with participants. The primary caregivers of the children were asked to provide information pertaining to: (1) the diagnosis of their children with ASD; (2) their personal physical activity patterns; (3) their children's physical activity patterns; (4) the dynamics of their family; and (5) the physical activity patterns of the family as a unit. Physical activity program instructors were asked to provide information regarding: (1) their experiences with children with ASD; (2) their perspectives on physical activity for children with ASD; and (3) any effects physical activity provides the children with ASD. The information obtained from these background questionnaires provided context, which helped to guide the one-on-one semi-structured interviews.

### **2.3.2. Interviews**

The researcher conducted one-on-one semi-structured interviews with the primary caregivers, siblings, physical activity program instructors, and the children with ASD if they were able. Interviews were completed face-to-face at a convenient and comfortable place for each of the participants. Each interview was audio recorded and transcribed verbatim. The interviews allowed participants to provide their unique perspectives on their experiences with the children with ASD and physical activity. The primary caregivers were asked open-ended questions that covered topics including: background and demographic information, their relationships and relevant information about their children with ASD, their perceptions of physical activity and education, and physical activity patterns within their family units. For physical activity program instructors, open-ended questions explored: his/her background and demographic information, and his/her experiences with the physical activity program for children with ASD. Interviews with siblings investigated: background information, their relationships with family members, and their experiences with physical activity. Finally, the interviews with the children with ASD examined: the activities they participate in with their family, and their personal experiences with physical activity. Completed interviews were transcribed verbatim, sent back to participants to complete member checks, and analyzed to examine recurring themes.

### **2.3.3. Field Notes**

The information obtained through data collection was enriched through the use of field notes. The researcher recorded any relevant information prior to, during, and after each interview. Relevant information included participants' body language, facial expressions, emotions to particular questions, and other non-audible reactions. Field notes allowed the researcher to record "feelings, reactions to the experience, and reflections" (Patton, 2002, p. 303) during the research process.

### **2.3.4. Journaling**

To further enhance the data obtained from the interviews and researcher observations, the primary researcher kept a reflexive journal over the course of the study period. The purpose of the reflexive journal was to allow the researcher to reflect on her potential biases and thoughts regarding the research process, and to record decisions and justifications for the chosen methods (Lincoln & Guba, 1985).

### **2.3.5. Member Checks**

After interviews were transcribed verbatim, participants were provided with their completed transcripts. Primary caregivers received their transcripts via e-mail or hard copy, and member checks with the children with ASD and siblings were completed verbally in person. Participants had the opportunity to clarify any information that may have been discussed during the interview and allowed the researcher to probe further in areas lacking information. Participants were given the chance to "correct, amend, or extend" any information within their transcripts (Lincoln & Guba, 1985, p. 236). Transcripts were sent to participants in their most desired form (paper or e-mail). If participants did not return member checks within the allotted three weeks, data analysis continued with the original transcripts.

### **2.3.6. Physical Activity Questionnaires**

To obtain information regarding the physical activity behaviours in the child/adolescent participants, the Modifiable Activity Questionnaire for Adolescents (MAQ-A) was chosen (Pereira et al., 1997). The TD siblings filled out the questionnaires if they were capable to complete it on their own, otherwise a primary caregiver assisted with the completion of the MAQ-A. The primary caregiver completed the MAQ-A for the child with

ASD. Each primary caregiver provided information regarding his/her physical activity behaviours over the past 12 months and completed the CARDIA questionnaire (Jacobs, Hahn, Haskell, Pirie, & Sidney, 1989). The CARDIA questionnaire provided a comprehensive view of the physical activities the primary caregiver of a child with ASD engages in regularly. Due to the fact these questionnaires required participants to recall activities from the past 12 months, the measurement quality may have been skewed by time, maturation, and differing behaviours of the participants. However, these self-report measures were chosen because of the usefulness in determining the stability of physical activity behaviours (Kohl, Fulton & Caspersen, 2000). No further analysis was completed on these questionnaires, as the purpose was to provide the principal researcher contextual information on the physical activity of the participants prior to the interviews.

#### **2.4. Trustworthiness**

Trustworthiness addressed the issue of how an inquirer can ensure his/her audience the findings of the inquiry were worthy. Lincoln and Guba (1985) contended trustworthiness was essential in establishing a study's significance. The three areas in which trustworthiness were established are: credibility, transferability, and confirmability (Lincoln & Guba, 1985).

Lincoln and Guba (1985) described credibility as the confidence in the truth of the findings. According to Patton (2002), three elements determine the credibility in a study: (a) rigorous methods, (b) researcher credibility, and (c) belief in the value of qualitative inquiry. Triangulation (data, method, and investigator), field notes, and member checks were methods of credibility that were used to establish trustworthiness (Lincoln & Guba, 1985).

Transferability has been described as the potential for findings to be applied to other contexts. This was achieved by providing a thick description of the phenomenon of interest (Lincoln & Guba, 1985). As such, in the current study, transferability was achieved by including cases that were information-rich via purposeful sampling, instead of aiming to satisfy a certain sample size. Including information-rich cases provided a thick description of physical activity patterns in children with ASD and therefore had the potential to be applied in other contexts (Creswell, 2013).

The concept of confirmability was described as the degree of neutrality within a study (Lincoln & Guba, 1985). In other words, the participants and their responses should shape the data, without researcher bias. Lincoln and Guba (1985) contended the use of triangulation and reflexive research journals are methods to establish confirmability in a study.

### **3. Results**

After analysis, two themes emerged from the data describing physical activity for children with ASD: (1) Physical activity, regardless of ability, and (2) The nature of ASD: programming and family challenges. For the purposes of this article, only one theme will be addressed in order to provide rich descriptions of the theme in question. The nature of ASD: programming and family challenges consisted of two subthemes: (a) "So how do we modify that activity" and (b) "It can be fantastic and then it can just be like a total nightmare". A collection of quotations that best illustrate each subtheme were chosen. The mean minutes of transcribed interview per group of children with ASD, siblings, primary caregivers, and instructors were approximately 14.50 minutes, 16.29 minutes, 38.95 minutes, and 52.83 minutes respectively. While a shorter interview time may indicate less information was obtained from the participants, the demographics of these participants should be considered.

#### **3.1. The nature of ASD: programming and family challenges**

Many participants indicated disability had unique influences on physical activity involvement. The first subtheme, "So how do we modify that activity" addressed the programming challenges, associated with having participants with ASD, while the second subtheme, "It can be fantastic and then it can just be like a total nightmare" addressed the experiences of physical activity as a family unit. Each subtheme will be discussed in turn.

##### **3.1.1. "So how do we modify that activity"**

Due to the nature of ASD, participants expressed challenges to physical activity programming for children with ASD. Creating opportunities to be physically active posed different challenges than for a TD population. The presence of support persons to assist in classes, beyond the instructor, was reported to be an integral part of any physical activity program for children with ASD. All instructors, except Amy, who presently does not have the ability to have one-on-one volunteers present during her yoga class, indicated that the volunteers for their programs were essential components to making the physical activity classes run smoothly.

Challenges for me, I would say just being comfortable with the [education assistant, (EA)] that's with me, depending on who I have. I have one EA that is, that I worked with for three years and when she comes to the gym [my] stress level is low. When she doesn't come my stress level goes up because some of the other ones aren't as capable of helping out and knowing the kids as well.

– Darren, PE teacher

Christina expressed similar sentiments about the importance of volunteers:

... It's very important that we have the volunteers. So like when we have weeks where five volunteers cancel, me and [Erin] are pulling our hair out because we know the class is going to be so tough. And, keep in mind that if that child is so used to working with that volunteer, and then that volunteer isn't there and we have somebody new, and let's just say that they don't connect, because that happens, it's a nightmare. So that child is out of sorts, the volunteer isn't enjoying themselves and then [Erin] and I have to take time away from us teaching and monitoring the class to try and diffuse whatever situation is going on. So I would say that [program M] would **not** be possible without our volunteers.

– Christina, fitness instructor

Aside from the presence of volunteers, Alexis suggested building quality relationships with the children was an essential component to programming. It was also evident that Alexis believed the intrinsic personality characteristics of the volunteers and instructors were integral to the success of her fitness programs.

Probably, I mean other than the coaches; we have really amazing relationships with all of our people, especially the kids. Adrian [fitness instructor]... he, the relationships he builds with the boys, like we put boys with boys and girls with girls for mentorship. And friendship building and you know, to be comfortable. Because there could be some other personal issues that come up too, so we want to make sure everyone is taken care of and treated fairly and again we build that relationship.

– Alexis, fitness instructor

Patricia agreed with the importance of building rapport and getting to know the children in the class, in addition to having the ability to adapt the course of the programming on a day-to-day basis.

And some days, like we have a rule here where, all coaches have to have a plan, a skating skills plan every day. And our thing is, you may have that on paper, but the likelihood, you'll probably throw it out the window because it depends on the child. One day you're not going to get anywhere on that program that you wrote, and some days if the child is really good, then you know "oh I can push them a little bit more today" so you can take advantage of their happy day and do something else new!

– Patricia, skating instructor

Similarly, other instructors indicated flexibility was vital to ASD programming. In contrast to programs for TD children, instructors of physical activity programs for children with ASD indicated that although they may have a plan for the class, more than likely they would not complete all of the activities planned. For example, Darren said:

...I think the other thing is, just being very, very flexible. You gotta be flexible with these kids... some days you got to go with the flow. Don't make things black and white. Some people like to make things black and white but with kids with ASD you gotta have a lot of grey in you... if you are going to push the limits you have to, you have to be able to gauge that and is it worth your while and are they going to, how upset are they getting? So I mean that's all part of it too with them.

– Darren, PE teacher

Amy echoed the importance of being flexible as an instructor:

...So I typically would do my lesson plans ahead of time. And sometimes I keep with my whole plan, sometimes it's just the kids are scattered and you have to be quick on your feet and you're moving on to the next activity.

– Amy, yoga instructor

In addition, instructors suggested the “little successes” were important when running a class for children with ASD. For example, Christina stated:

So for myself I think that, I try to keep my expectations low, because sometimes like at the beginning I had really high expectations of being able to see that they've physically changed and stuff, but once I kind of accepted that the class is going to be very disorganized, the class, instead of doing 20 push-ups they might only do one, and to be happy with that. To be happy with all that they give because as long as they are giving effort I think that I need to be happy. So really, not having expectations is probably the best thing.

– *Christina, fitness instructor*

Carrie shared similar experiences:

...Then overcoming that challenge was just really recognizing small, small achievements are huge achievements, right? ...As an instructor, if they all were listening and participating for one activity in a 45 minute dance class, that's success. So just sort of setting those smaller goals.

– *Carrie, dance instructor*

The caregivers also indicated the intrinsic personality characteristics of the instructors or volunteers for a program make a world of difference for their children with ASD. They mentioned qualities like understanding, encouraging, and knowledge of how to effectively instruct children with ASD were essential characteristics of strong leaders. Erica suggested:

Additional support, an understanding of maybe how to present instructions, so if he needs the one-to-one explanation, or just visual cues and markers, things like that. To break down whatever the goal or activity is for him. For sure that's the difference between I think him being able to do it and also allowing for breaks to be allowed to leave is huge for him as well.

– *Erica White, caregiver*

James added that instructors of physical activity programs have to have the knowledge and training to be able to deal with various situations that may arise with children with ASD. He stated: “As long as...the coordinators understand and know how to deal with [behaviours of children with ASD]”. It was evident James felt instructors played a key role in his children's success in a physical activity program.

Karen spoke about the accessibility of programs and presence of accommodations inherent within programs. Karen's definition of accessibility referred to the availability of programs that would be suitable for her child with ASD, and the ability to find these programs to be able to enroll her child. She stated:

You have to know where to look, and we've gotten help about how to look... for example, if we signed him up for karate, which we aren't planning to do because we want Drew to have his own thing, but they say “oh sure, we've had kids with autism” but there's not, we would have to hire someone to be in there if he needed a helper. Like there's not a lot of awareness.

– *Karen Murphy, caregiver*

Erica also mentioned issues of additional support and program accessibility:

So that makes a huge difference having additional support. And I know there's a lot of programs where they get the one-to-one, but they fill up really quick and so if, so if you, you don't, if it doesn't work into your schedule, then it also makes it hard because there's so few of them. So I think accessibility to it, and size of it makes a big difference.

– *Erica White, caregiver*

Erica indicated the number of children in the program, and the support of the instructors and volunteers were important aspects of an ideal program for her child with ASD. Her frustration was evident with knowing where to find programs with these features to best suit her child with ASD's needs. Finally, Maddy expressed her brother Ryan did not need to be able to participate in the same activities as everyone

else necessarily. Rather, physical activity programs for her brother with ASD may need to hone in on his strengths. Her words stressed the importance of the differences between children and accepting children for their differences.

... He doesn't have to be able to exercise the exact same as everyone else, because everyone else has different issues too and maybe someone's great at baseball but they can't dance, and he can dance! So just stay open minded for that too!

– *Maddy Murphy, sibling*

Overall, participants indicated certain aspects of physical activity programming were essential for program successes for children with ASD. Further, modifications may be necessary to address program inadequacies in order to improve programming for children with ASD.

### 3.1.2. "It can be fantastic and then it can just be like a total nightmare"

Family members reported having a child with ASD influenced relationships within the family unit. Some, but not all of the family challenges were related to physical activity. The challenges with family physical activity, as expressed by the participants in this study, were unique to families in the current study with children with ASD. For example, Amanda felt her brother received different treatment from instructors and volunteers at the physical activity program they participated in together. She stated he was allowed to leave the gymnasium frequently during the class and go "on walks" with his one-on-one volunteer, and therefore was not always participating with her in the physical activity program. She questioned why she did not receive the same concessions or allowances as her brother.

More specific to physical activity as a family, Heather verbalized the challenges her family faced when it came to the rigid interests of her son with ASD.

It can be stressful at times because he has very rigid thinking. So sometimes we have to do whatever he wants to do or whatever way he wants to do. But then I think he's old enough so sometimes I tell him "it's not all about you".

– *Heather Smith, caregiver*

James echoed these thoughts in regard to his younger daughter with ASD.

And again, it kind of circles back to Jessica's own agenda.... Where she'll have an idea of what she wants to do. And whether that's an indoor activity or an outdoor activity, there will be something that she wants to do and we'll end up doing that just because fighting her to do something that we want her to do isn't always productive, I guess is the way to put it.

– *James Williams, caregiver*

James and Heather verbalized explicitly that having children with ASD affected their physical activity patterns as a family unit; however, Erica and Karen stated how their children with ASD affected family relationships. These challenges were not always specific to physical activity, but could be translated into a physical activity context. For example, Erica said:

.... It puts strain that's for sure...you have less patience to deal with your other children, or to deal with other people. And you end up sometimes becoming more closed off just because you're kind of almost burnt out at times and you want less to deal with...but there are some other extreme other opposites of the fact there are some incredible things that having a kid on the spectrum does, because you're experiencing uh some of their gifts in such an extreme way, but it is all over the board. It can be fantastic and then it can just be like a total nightmare.

– *Erica White, caregiver*

Similarly, Karen spoke about how Ryan's ASD diagnosis affected his relationship with his younger brother Drew:

For Drew, I don't know what his personality would be for good, and I wouldn't say for bad, but just it is so much shaped. His natural temperament from when he was a baby was super easy going...



but he's gotten a lot more sensitive, and if someone raises their voice at him, he'd think you were screaming at him... But then he's also more compassionate, I think because of Ryan. More protective of people, and he has his own, I think it's really good that he has his own group of friends, I think that's really important to form his own personality.

– Karen Murphy, caregiver

Many participants indicated the influence children with ASD have on family dynamics, both in a familial and physical activity context. The challenges expressed were unique to children with ASD and participants in this study, and may not be experienced by families with solely TD children.

#### 4. Discussion

The principal researcher's experiences with children with ASD provided a unique approach to the research. The principal researcher has volunteered with a physical activity program for children with disabilities, including ASD, for the past two years. In this physical activity program, the principal researcher worked one-on-one with a child with ASD, allowing her to observe first-hand the physical activity patterns of a child with ASD. Additionally, the researcher was able to observe the challenges associated with physical activity participation for a child with ASD, and also utilize various techniques to encourage and modify the activity for the child to participate. Overall, her experiences allowed the principal researcher to see first-hand how physical activity programming for children with ASD works, and understand how accommodations may need to be made for the unique needs of children with ASD.

The first subtheme, "So how do we modify that activity", demonstrated physical activity programs for children with ASD must be modified in order to best provide physical activity to children with ASD. Each instructor discussed how he or she modified their programs to best suit children with ASD. The primary caregivers echoed these sentiments and provided their suggestions for modifying programs to best serve their children with ASD. Modifications consisted of changes to class content, instructional methods, and environmental factors for children with ASD. Both the instructors and the primary caregivers stressed the importance of rapport being established between the children, volunteers, and instructors. The better the relationships between all the parties, the more the instructors were able to understand how to instruct children with ASD to be physically active. In terms of the structure of the program, instructors expressed the importance of being flexible in order to accommodate a myriad of issues that may derail the intended program of the day (e.g., rigidity of children, negative behaviours, etc.). The program instructors also mentioned small accomplishments needed to be celebrated to encourage the children with ASD to continue participation in physical activity. These findings reflect the work of Pan (2011), who determined that for individuals with ASD, there were environmental factors (i.e. instructors, content, location, etc.), which affected their physical activity participation. These findings consolidate the importance of the flexibility and instructional abilities of the instructors and volunteers as expressed by the participants in the current study. Parents also discussed the availability of programs suitable for their children with ASD. Although they agreed many programs are available, programs with proper training to instruct their children with ASD fill up quickly and may not be financially accessible. Pan and Frey (2006) also determined the delivery and accessibility of physical activity for children with ASD has been seen as a barrier, which aligns with the findings of the current study. These aspects of physical activity programming (instructor flexibility, rapport between children and instructors, and accessibility) should be taken into consideration when planning a physical activity class for children with ASD.

The second subtheme, "It can be fantastic and then it can just be like a total nightmare", revolved around the challenges families with children with ASD encounter. Primary caregivers expressed that in order to prevent a scene or bad behaviour from occurring, families would often have to participate in the activity the children with ASD wanted, even though other family members may have not wanted to do so. Often, events such as these affected family relationships. Although the strain experienced by family members was not solely related to physical activity involvement, it definitely spoke to the functioning of the family and whether or not they could participate in physical activity together. The development of fitness clubs that offered a myriad of activities families could engage in, some of which were tailored to the needs of children with ASD, would promote physical activity involvement for all members of families with children with disabilities. The notion that certain challenges with physical activity for children with ASD affected family relationships was a seemingly novel finding.

Overall, the results obtained in the current research indicated some unique challenges faced by children with ASD and their families in this study (for example: rigid agendas, strain on family relationships,

etc.). This study also provided suggestions from the perspective of the parent, and the physical activity instructors, on ways to improve physical activity programming to best serve the unique needs of children with ASD.

#### **4.1. Limitations**

The results obtained from the current study may only be applicable to a narrow demographic range. As such, the experiences of physical activity programming for children with ASD expressed in this study are representative of geographic areas that have available programming. Additionally, this study only investigated certain physical activity programs. There may be many other available physical activity programs focused on different sports and activities that exist for children with ASD, which may show benefits, or have different challenges. Therefore, the research findings are not applicable to every physical activity program for children with ASD, but they likely translate to other activities.

#### **4.2. Implications**

The current study provided implications for physical activity for children with ASD. First, the various perspectives obtained from the primary caregivers, children, and instructors in this study may help to improve current physical activity programs. These perspectives on physical activity programs were applicable to programs specifically for individuals with ASD. However, this may be extrapolated to the TD population, as a theme that emerged from the interviews with participants indicated aspects of physical activity for children with ASD might not be different than the TD population. The various perspectives of physical activity programs for children with ASD are useful for policy makers, instructors, and families when developing physical activity programs, and trying to find physical activity programs that will work for their children with ASD. Overall, this study presented potential considerations to physical activity programming for children with ASD, and described the physical activity patterns of children with ASD and their families.

#### **4.3. Recommendations**

Multiple suggestions to improve community-based physical activity programming for individuals with ASD surfaced from this research. Physical activity instructors in the community should take into consideration the population of individuals that the programs services. Regardless of the level of ability, instructors should speak to parents and participants to gain an understanding of how to best create a program for the unique needs of participants. For example, modifications to a physical activity program for individuals with physical disabilities would not necessarily be the same as the modifications needed for individuals with developmental disabilities. Using parents, as proxies for their children with disabilities, will provide insight on how to effectively instruct their children. Additionally, formal training to instruct individuals with a range of abilities would be instrumental in providing successful programs. Instructors are encouraged to complete their own research, and speak with other physical activity program instructors that may experience similar challenges and successes. Exchanging perspectives and experiences will aid in the development of successful programming.

Although creating a physical activity program for physical education teachers would be similar to the recommendations provided above, there are unique challenges within the school system. Administrators need to consider the modifications children with different abilities may need for physical education classes. Currently, modifications are typically available for children in other areas of elementary and secondary school, but it appears that physical education does not service children with disabilities to the same extent. Specifically, children with ASD may struggle to participate in physical education in a gymnasium with multiple other children due to physical, sensory, and social challenges. However, the challenges children with ASD may experience in physical education class should not discount the importance of physical activity participation in school for each child. The school system needs to consider the implementation of unique physical education classes for children with different needs, making necessary modifications to allow children with disabilities to succeed in physical education. As stated clearly by one of the instructors in the current study, "I believe every instructor in every program should open their doors to every single ability and be willing on a moment's notice to accommodate and modify that program to ensure that everyone fits in."

#### **Competing Interests**

The authors have no competing interests to declare.

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
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