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Children with Autism Spectrum Disorder (ASD) commonly exhibit core symptoms such as challenges with social communication, interaction, repetitive behaviors, and motor ability. These core symptoms can create barriers to physical activity (PA) for this population, leading to reduced opportunities for routine exercise and decreased quantity of time spent in PA. This study helped fill in the literature gap by illuminating a more holistic understanding of these factors related to PA in children diagnosed with ASD. In phase one of this research, data collection and initial analysis procedures spanned over ten weeks. In phase two, semi-structured interviews were conducted with the children with ASD (n=5) and the facilitators of the PA (n=6). Based on inductive data analysis, six themes were drawn from the data: *motivation, social interaction, physical activity, environment, sensory, and communication*—analysis of the semi-structured interview data supported and enhanced the observation data. The findings suggest that facilitators of PA need to establish a positive, trusting relationship with children with ASD. Physical activities should be tailored to students' sensory needs, and visual cues such as modeling and clear verbal instructions can enhance communication. Extrinsically motivating children with ASD through specific goal-setting can reduce the feelings of being overwhelmed and provide opportunities for success. Person-centered planning, which prioritizes independence, can provide a more holistic pedagogical approach by centering the teaching of new physical activities to the child's needs with ASD.

AN EXPLORATORY STUDY ON FACTORS THAT IMPACT CHILDREN WITH AUTISM SPECTRUM DISORDER'S PHYSICAL ACTIVITY

by

Mandy L. Northcutt

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Dr. Ben Dyson
Committee Chair

DEDICATION

To my husband, Philip, for your unconditional love and support during this process. Whenever I thought it would be too much, you always reminded me what was important and encouraged me to see it.

My kids, Charlie, Abigayle, Alyssa, Joseph, and Jacob – your understanding and sacrifices have been instrumental in my pursuit of this degree. I am grateful for your patience and the love you have shown me throughout this process.

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APPROVAL PAGE

This dissertation written by Mandy L. Northcutt has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

Committee Chair

Dr. Ben Dyson

Committee Members

Dr. Heather Coleman

Dr. Michael Hemphill

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CHAPTER I: PROJECT OVERVIEW

Children with ASD often experience challenges with social communication, social interaction, repetitive behaviors, and motor ability, as noted by the American Psychiatric Association (2013). These symptoms can create barriers to physical activity (PA) for this population, as highlighted by Obrusnikova and Cavalier (2011) and Menear and Neumeier (2015), and can make it challenging to incorporate PA into daily routines, impacting the quality of the PA (Luiselli, 2014; Draheim et al., 2002; Foley & McCubbin, 2009; Pitetti et al., 2009; Rimmer & Rowland, 2008). In children with ASD, core symptoms typically begin in early childhood but commonly may go unrecognized until the child has reached school age (APA, 2013; Neil et al., 2014; AutismSpeaks, 2019). As the child develops, these symptoms persist, interfere with daily living, and may vary in the combination and severity of their impact on daily functioning (Nicholson et al., 2011; Luiselli, 2014). In addition to these core symptoms, many individuals with ASD experience sensory issues. These can involve over– or under–sensitivities to sounds, lights, touch, tastes, smells, pain, and other stimuli (AutismSpeaks, 2019; Luiselli, 2014). Assessing these barriers is a complex, multifaceted process, as stated by Must et al. (2015).

It can be quite challenging for children with ASD to participate in a typical PA program because the programs often require social interaction and athletic skills (Arnell et al., 2018). Understandably, this situation can be distressing for the children and their families, and it is essential to find ways to support them in their unique needs and abilities. Although a diagnosis can help identify concerns and provide a framework for interventions, ASD can marginalize these children (Grenier, 2014). Therefore, the PA interventions and training frameworks must be

grounded in the child's characteristics, abilities, and learning styles to enhance positive outcomes within this population (Grenier, 2014). Future research should explore all factors related to PA in youth with ASD, including motor skills, sensory processing, social communication, social interaction, and environment. This knowledge will help stakeholders develop evidence-based, flexible, and implementable strategies for providing PA interventions that meet the needs of children with ASD.

Although parents, practitioners, therapists, and teachers can recognize the needs of children with ASD, there is a lack of successful practical interventions for these individuals within the literature (Wood et al., 2015). Parents have reported feeling misunderstood, burnt out, and a lack of ASD-friendly facilities (Fondacaro et al., 2022). Therefore, there is a critical need for research to identify universal strategies that are the most effective in providing training and a way to implement evidence-based PA interventions that are flexible and integrative for children with ASD. This study aims to gain a holistic understanding of the factors that impact the PA of children diagnosed with ASD and to identify the best strategies for training and implementing evidence-based PA interventions. The rationale for this study is to bridge the gap between research and practice.

Symptoms and Characteristics of ASD

Children with ASD often struggle with both verbal and non-verbal communication. This can include difficulty understanding and appropriately using spoken language, gestures, eye contact, facial expressions, tone of voice, and non-literal expressions (AutismSpeaks, 2019; APA, 2013; Luiselli, 2014). In fact, about one-third of children with ASD are nonverbal. Additionally, children with ASD may struggle to recognize the emotions and intentions of others, as well as their own emotions, and how to express them appropriately. This can make

social situations overwhelming and make it challenging for them to seek emotional comfort from others or to take turns in a conversation (AutismSpeaks, 2019; APA, 2013).

In terms of restricted and repetitive behaviors, these can vary significantly across individuals with ASD. These behaviors include repetitive bodily movements such as rocking, flapping, spinning, clapping, and running back and forth (Kern, 1982; APA, 2013). Repetitive motions with spinning wheels, shaking sticks and flipping levers (Kern, 1982; APA, 2013). Additionally, they may be absorbed in staring at lights or spinning objects, exhibit ritualistic behaviors such as lining up objects or touching them in a specific order, have narrow or extreme interests in certain topics, and require a consistent routine or resistance to change (AutismSpeaks, 2019; APA, 2013).

Children with ASD also often experience deficits in motor abilities, including balance, postural stability, coordination, and motor dyspraxia. They may struggle with motor planning, locomotor patterns, and object manipulation, which can impact their ability to participate in PA (Grenier, 2014). These deficits have been linked to lower participation in sports, less PA, and a hypoactive lifestyle (Dudley et al., 2016; WHO, 2013), which can contribute to obesity (Curtin et al., 2010; USDHHS, 2008). In fact, children with ASD are 40% more likely to be overweight or obese compared to their neurotypical peers (Curtin et al., 2010).

Research on ASD and PA

Researchers have observed that children with ASD have limited participation in PA due to impairments in various domains like motor, social communication, sensory, and behavior (Srinivasan et al., 2014). Moreover, PA levels decrease in children with or without ASD as they reach adolescence (Dumith et al., 2011); therefore, there is a need to develop PA interventions for children with ASD (Nicholson et al., 2011; MacDonald et al., 2011). Physical activity is

essential for physical, mental, and social well-being, and all children should participate in at least 60 min of moderate-to-vigorous PA and several hours of light activity daily for optimal health (Pohl et al., 2019). Research shows that when children with ASD participate in PA, they experience positive effects on motor coordination, dynamic equilibrium, manual muscle strength, academic performance, and different psychosocial domains (Kern et al., 1982; Ferreira et al., 2018; Miramontez & Schwartz, 2016; Bremer et al., 2016; Lang et al., 2010; Stanish et al., 2017). However, interventions targeting Pa have not been successful in instilling long-term habits that increase PA levels among adolescents with ASD. There may be unaccounted-for aspects that require more research to describe the perspective of adolescents with ASD on participating in PA (Arnell et al., 2017).

A recent study by Stanish et al. (2017) aimed to better understand the PA participation of adolescents with ASD by examining accelerometer activity spent in moderate-to-vigorous PA. Adolescents with ASD engaged in similar PA as their neurotypical peers, like video gaming, walking/hiking, swimming, running/jogging, bicycling, dancing, and basketball. However, adolescents with ASD faced more obstacles engaging in the PA due to the context in which they participated, like the venues where they participated, with whom they were active, and the degree of activity organization/structure. Supporting the participation of adolescents with ASD in PA that transfer over to health benefits will require finding ways to promote their involvement in sufficient intensity levels for an extended period. Future research must explore adapting evidence-based interventions to promote this sustained participation in PA (Stanish et al., 2017).

Alternative Approaches to Understanding ASD and PA

Understanding the social and environmental circumstances associated with PA participation is a critical area to research within the ASD population (McIver et al., 2009). As

McIver et al. (2009) identified in their study, understanding the moment-to-moment circumstances of a child with ASD's PA can better inform the development of a more effective PA intervention. An initial study conducted by Bo et al. (2019) examined the impact of social functioning on PA programs' effectiveness. The results indicated that social functioning played a significant role in moderating motor outcomes for individuals with ASD. Notably, children with ASD often experience social exclusion, which can negatively affect their levels of PA and lead to more sedentary lifestyles. The study's findings supported that individuals with more significant social impairment may experience great motor problems. The researchers suggested that optimizing social programs for these individuals could improve their engagement in PA and lead to better motor performance.

According to a 2019 meta-analysis by Howells et al., a positive correlation exists between PA in a social setting, such as group-based activities. This suggests that focusing on group-organized PA could potentially provide a better understanding of how PA impacts social functioning in children with ASD. Srinivasan et al. (2014) addressed how alternative or specialized approaches to managing PA in children with ASD may be beneficial to them. To provide alternative approaches to avoid PA barriers while tailoring to the child with ASD to deliver a more discrete PA experience. These alternative approaches do not have to be complicated. As Oreskovic et al. (2019) studied, walking routes showed promising results in increasing PA for children with ASD while limiting PA barriers.

Rationale for Research

This study aimed to gain a holistic understanding (DeWalt & DeWalt, 2002) of the factors (motor, sensory, social communication, social interaction, and environment) that impact a child diagnosed with ASD's physical activities. This research included the perspectives held by

children diagnosed with ASD and the facilitators of the PA. The study was focused on the following specific aims:

Specific Aim #1: To observe children diagnosed with autistic spectrum disorder in moment-to-moment physical activity across different settings.

Specific Aim #2: To gain insight into the views of children with autistic spectrum disorder on their physical experiences.

Specific Aim #3: To gain the perspectives of facilitators teaching physical activity to students with autistic spectrum disorder.

Research Design

The study implemented a qualitative case study design, which is helpful in better understanding a particular subject matter or phenomenon (Marshall & Rossman, 2011). Qualitative research methods allow researchers to examine data collected through various empirical materials and gain a descriptive understanding of the subjects' values, meanings, and actions under study (Denzin & Lincoln, 2005; Pope, 2006). The central methodology for this research study was an exploratory case study with a descriptive design (Marshall & Rossman, 2016). Case studies are widely used among qualitative researchers because of their explicit focus on context and dynamic interactions (Marshall & Rossman, 2011). As Yin (2018) acknowledged, a case study's unique strength is dealing with a range of evidence collected by multiple methods or data sources. This allowed for the connection of empirical data to research aims and, finally, the conclusions. Triangulation was used in this study to gather data through various techniques, increasing the credibility and dependability of the results (Patton, 2002).

Exploratory research is beneficial when studying children diagnosed with ASD, as it allows the researchers to identify or discover essential categories of meaning and generate

hypotheses for future research (Marshall & Rossman, 2016). Although exploratory research may not yield conclusive results, it provides valuable insights, often leading to new discussion topics or novel perspectives. Furthermore, a qualitative study allows the researcher to observe phenomena such as feelings and thoughts, which are often challenging to extract or learn through conventional methods (Strauss & Corbin, 1998). This approach is practical when studying a phenomenon in a natural setting (Denzin & Lincoln, 2000) and when the researcher seeks to understand the social context (Esterberg, 2002).

Philosophical Standpoint

The social constructivist paradigm grew from the philosophy of Edmund Husserl's phenomenology and Wilhelm Dilthey's study of interpretive understanding (Schwandt, 2000). It reconstructs and clarifies the meanings that individuals, including the researcher, hold about the phenomenon being studied (Guba & Lincoln, 1994). The basic assumption guiding the social constructivist paradigm is that knowledge is socially constructed by individuals active in the research process within the constraints of the physical and social environments. Researchers should try to understand the complexity of the lived experience from the point of view of those who live it (Schwandt, 2000). Catherine Ennis, a social constructivist within the field of Kinesiology, demonstrated in an ethnographic study in 2008 that participants' prior experiences with content and their immediate social interactions during the activity determined the quality of the experience and achievement. This study aimed to understand the participant's experience within the setting and how they made sense of the phenomenon (Pope, 2006), precisely their insight into the PA experience.

Research Settings

After obtaining Internal Review Board approval from the University of North Carolina of Greensboro during the summer of 2020, permission for site access was acquired from the homeschooling coop. The homeschooling coop was located on five acres of land with four buildings for academic and therapy purposes. Each child with ASD was a student within an integrated academic homeschooling environment. Each academic environment was divided into three groupings based on age ranges. Group 1 was based on the age range from five to eight. Group 2 was based on the age range of nine to twelve. Group 3 was based on the age range of thirteen to seventeen. Each group had an average of ten students, one lead teacher, and a teacher aide. Each group followed a similar schedule: centers, bible, physical education, math, workboxes, history, calendar/weather/geography, alphabet/story time/English, lunch, recess, stations/science, snacks, brain games, and fine arts visual. In addition to the academic environments, two physical therapists, two occupational therapists, and two speech therapists (including the coop director) were on site, totaling 42 subjects.

To define the settings in which moment-to-moment physical activity occurred, a therapy setting is defined as either a physical, occupational, or speech therapist that provided physical activity through a one-on-one therapy session, a recreational setting is defined as unstructured physical activity (e.g., free play, recess, walking, swinging), and a structured setting was defined as physical activity as traditional group or individual, organized, and sport-specific gameplay. Moment-to-moment physical activity is any body movement produced by skeletal muscle and increases energy expenditure.

Participants

To participate in this research study, a child participant must have had a current diagnosis of autism spectrum disorder (ASD) or a type of ASD such as Asperger syndrome, pervasive developmental disorder (PDD), pervasive developmental disorder not otherwise specified (PDD-NOS), or high-functioning autism (HFA). The facilitators of the physical activity criterion were reported to have worked in various roles with a child with ASD that provided physical activity, including lead teacher, teacher aide, physical therapist, occupational therapist, and speech therapist. The research in phase one included ten child participants [2 females (Caucasian), eight males (2 African American and 6 Caucasian), ages 5 - 17], and twelve facilitators of physical activity [12 females (Caucasian), ages 18 - 60]. In phase two, five child participants [5 males (2 African American and 3 Caucasian), ages 8 - 17] and six facilitators of physical activity [6 females (Caucasian), ages 18 – 40]. The criterion was discussed in the meeting with the director of the homeschooling coop. A pre-written email was sent to the director addressing the study's first and second phases to ensure confidentiality and an information sheet was attached (Appendix A). Interested parents were then required to contact the researcher directly to inform the researcher of the child's diagnosis for phase one and to provide a signed parental consent form for their child's participation in phase two. As for the child participant, a child assent form was obtained before conducting phase two. This same process was extended to the PA facilitators of the coop. If they were interested in participating in phase two of the study, they met face-to-face with the researcher for discussion and turned in their signed consent forms.

Researcher Positionality

My position is that I am a mother of a child with ASD. Being a part of my son's world as he has grown has given me unique and firsthand knowledge of working with a child with ASD.

In the world of ASD, when you have met one child with ASD, you have met one child with ASD! Each child with ASD has a unique combination of strengths and challenges. As the researcher, I acknowledge that this prior experience could influence my writing, but it also emphasizes the importance of thoughtful decision-making and meaningful insight. This approach is advocated by various experts, including Altheide & Johnson (1994), Creswell (2013), and Marshall & Rossman (2011). For the full researcher positionality statement, refer to Appendix K.

Data Collection

Observation played a crucial role in the first data collection phase (Creswell & Poth, 2018). Specifically, the focus was on observing data related to the factors that impact the PA of children diagnosed with ASD. These observations allowed for notations "memo taking" of the physical setting, the participants, their physical activity, and social interactions. A memo is a field note a trained researcher takes in a context they are familiar with through experience (Emerson et al. (2011). A nonparticipant observation method was used with an emphasis on discovery. The researcher positioned herself separately from the participants while maintaining a full view to take field notes from a distance (Bernard, 2011). This approach enabled data to be recorded without participating in the activity or interacting with the participants directly. The researcher entered the setting with a broad interest focused on the challenges shared with children diagnosed with ASD, such as social communication/interaction, restricted and repetitive behaviors, deficits of motor ability, and sensory processing patterns within the moments of PA. To ensure that personal perspectives and biases did not influence the researcher's observations, Emerson, Fretz, and Shaw's (2011) suggestions were followed. The researcher acknowledges that prior experience, training, and commitments could influence their writing. However, the

researcher aimed to maintain a fluid and flexible approach without trying to write in a consistent voice or style.

With phase two, semi-structured interviews were conducted with students diagnosed with ASD and facilitators of the PA. The observation data contributed to the interview process (Rubin & Rubin, 2012) by attributing to the interviewer's development of a more guided and focused interview guide for specific and relevant interview questions for both the children with ASD (Appendix B) and the facilitators of the PA (Appendix C) (Patton, 2002). Combining two or more methods enhanced the study's credibility (Marshall & Rossman, 2011). The interviews with the children diagnosed with ASD generally lasted twelve minutes in length. A semi-structured interview guide was used, and the child was able to either verbally answer or was given the option to select a card that represented their response, e.g., yes/no, or images of the PA, such as swinging, running, and swimming (Appendix D). The interviews with the PA facilitators lasted between fifteen and thirty minutes. Audio recordings were used in all interviews and stored on a password-protected computer only known to the researcher. Pseudonyms for the interviewees were used.

Data Reduction and Analytic Approach

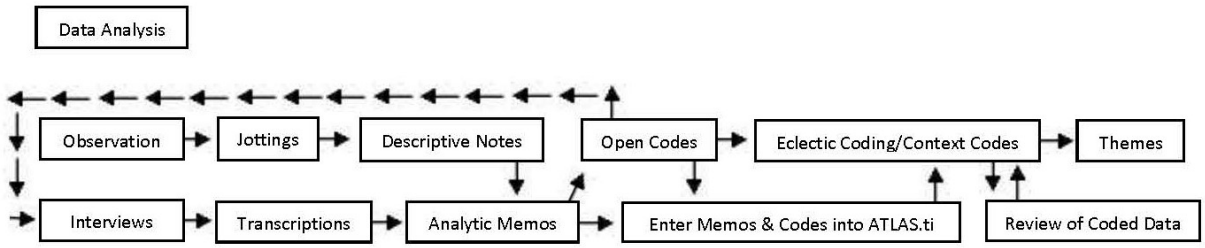
In phase one, data reduction and analysis occurred concurrently with data collection. The first method implemented within this phase was a data accounting log for data management (Table 1). Data collection and beginning analysis procedures were conducted over six weeks for phase one, with a frequency of two to three observations two to three times a week for fifteen days of student PA observed.

Table 1. Example of Log of Data-Gathering Activities for Phase 1

Week(s)	Place	Activity	Who	What to Explore
1	Coop – Wet/Rainy Observation took place inside	Observation	One-on-one Facilitators of PA w/ Students w/ ASD	Type of PA seen, interaction between FPA and SASD, note any methods used to encourage PA movement
2	Coop – Sunny – Observations took place inside and outside this week.	Observation	One-on-one Facilitators of PA w/ Students w/ ASD and Freeplay was observed this week	Type of PA seen, interaction between FPA and SASD, note any methods used to encourage PA movement. Observe the type of PA within free play, duration, and interactions with neurotypical peers.
3	Coop – Sunny – Observations took place inside and outside this week	Observation	One-on-one Facilitators of PA w/ Students w/ ASD, Freeplay was observed this week and coordinated group PA activity	Type of PA seen, interaction between FPA and SASD, note any methods used to encourage PA movement. Observe the type of PA within free play, duration, and interactions with neurotypical peers. Note the type of coordinated PA activity. The strategy used for improved SASD participation w/ neurotypical peers

After observing, the researcher transformed the jottings into rich, descriptive notes. This step allowed the researcher to gain a better holistic understanding of the data collected for that observation. The next step in the analytic process (Figure 1) was re-reading the descriptive notes and extracting relevant information into analytic memos. According to Corbin & Strauss (2008), writing memos forces the analyst to think about the data, leading to the analysis process. Following this method throughout phase one, six code themes were drawn from the data: motivation, social interaction, physical activity, environment, sensory, and communication (Appendix E). These six themes contributed to the development of semi-interview guides for both the children with ASD and the facilitators of the PA. The themes were refined to ensure the interview guides were comprehensive and relevant.

Figure 1: Data Analytic Process



In Phase Two, the research process was a collaborative effort. Semi-structured interviews were conducted with children with ASD and with the facilitators of the PA. The interviews were transcribed using an online transcription service. Member checking was performed by the researcher emailing a copy of the transcript to the facilitators of PA (Rubin & Rubin, 2012). The email requested that the participant review the transcript for accuracy, making them an integral part of the research process. The researcher informed them through email of errors within the transcript. After corrections were made, a final copy of the transcript was sent out for the participants to confirm that they agreed with the corrections. To enable and facilitate the interviews, an aide familiar with the children with ASD being interviewed was present during the interviews to help with communication.

The transcriptions were reviewed by the researcher several times for the researcher to become more intimate with the material (Marshall & Rossman, 2016). The coding process was divided into two main stages: the First Cycle, which involves assigning open codes to the data, and the Second Cycle, which refines the results from the First Cycle codes (Saldaña, 2016; Miles et al., 2020). The data was further analyzed by writing theoretical memos to identify eclectic code patterns between observation data and interview transcriptions (Patton, 2002). All memos and transcripts were uploaded to Atlas.ti 23 to identify code patterns and refine the data. The

initial analysis within Atlas.ti 23 revealed 33 open codes, refined by sorting out repeated codes and identifying themes.

During the analysis, it was necessary to use eclectic coding, which is a combination of various coding methods, including In Vivo Coding, Emotion Coding, Values Coding, and Holistic Coding methods (Saldaña, 2016; Miles et al., 2020). Eclectic coding is appropriate when various processes or phenomena are discerned from the data or when a combination of coding methods will better serve the research study's goals (Saldaña, 2016; Miles et al., 2020). The final stage involved reviewing the resulting themes with the coded data and the data set to identify their interconnectedness. An example of this process can be seen in Figure 2, Appendix G. The journey of this data analysis process allowed for mindful discoveries and connections on the phenomenon(s) under investigation (Miles et al., 2020).

Trustworthiness

Trustworthiness is a crucial factor that must be strived to establish confidence in the findings of a qualitative study (Miles et al., 2020; Patton, 2002). This is achieved by demonstrating four key attributes: credibility, dependability, and confirmability, as outlined by Lincoln and Guba in 1985. In this study, these attributes were facilitated through multi-method strategies that allowed for data triangulation, which involved using multiple sources of information to corroborate the findings. To ensure accuracy, the children with ASD and the facilitators of the PA program were asked to provide verbatim accounts of their experiences. Additionally, detailed descriptive notes were recorded to capture all relevant information. To further support the findings, member checking was conducted with the participants to ensure that the researcher's interpretation of their responses was accurate and aligned with their intended meaning (Creswell & Poth, 2018, p. 261). These data were collected to support the

trustworthiness of the study's findings and provide a strong, robust foundation for future research.

Findings

This project explored the factors that impact a child diagnosed with ASD's PA, including the points of view held by children diagnosed with ASD and the facilitators of the PA. The findings are organized under the study's three aims.

Specific Aim #1: To observe children diagnosed with autistic spectrum disorder in moment-to-moment physical activity across different settings.

Data was collected through observations to gain insights into the first specific aim of this study. These observations provided detailed descriptions of research phenomena, and prolonged fieldwork is necessary for conducting high-quality observations (Emerson et al., 2011). The six-week period yielded six overarching themes from the observed data: Motivation, Communication, Social Interactions, Physical Activity, Environment, and Sensory.

"That is it! I told you could do it!"

After analyzing the observation memos, it became evident that *positive reinforcement* played a significant role in motivating the children with ASD. It helped the children in question sustain their engagement in PA for extended periods, and the child with ASD was more willing to persevere with the requested PA.

> The facilitator stops the movement and lets the child have a break. The facilitator of PA spoke encouragingly and positively. They normalized the difficulty of the movement. Encouraged the child to try again. The child executed more successfully, and FPA joyfully stated, "That is it! I told you; you could do it!" (FN, 31)

A further aspect of this theme involved a system of rewards. This manifested in various ways, such as receiving a star on a reward chart, receiving candy like Skittles, and taking short breaks to pursue an activity of the child's choice before resuming the PA. Implementing a *reward system* served as an external motivation for a child with ASD to interact more effectively with the PA facilitator during the activity of the day.

> A child with ASD did not want to do the activity. The facilitator made a compromise, "Did the child want to swing for a few minutes first?" The child with ASD immediately ran to the room with the indoor swing. The facilitator told the time limit they could stay, and then the child with ASD voluntarily/joyfully engaged in the wanted physical activity. (FN, 24)

Visual and Verbal Cues

Effective communication can sometimes be a challenge when working with a child who has ASD. It can be difficult for them to understand what is being asked of them or to express their own needs and concerns. The resulting sub-themes highlighted two main ways to address this issue: through *visual* and *verbal cues*. Clear and concise verbal cues were essential for helping the child understand the sequencing and mechanics of the PA.

> Clear, direct verbal cues, along with visual aids, were used to help the child with the movement the therapist wanted. (FN, 8)

Often, these cues were given alongside visual aids like pictures and videos that showed the desired movements.

> The facilitator of PA handed a sheet of paper to the child with ASD. The paper had a short story of the intended movement the PT wanted the child to practice. The images on the sheet were cartoonist in nature, showing the sequencing of the squat. (FN, 11)

Additionally, facilitators sometimes modeled the movements themselves to provide a visual example for the child with ASD to follow.

> The movement was sit-ups. Verbal cues with visual demonstration helped the child complete this physical activity. Child did initially have trouble with posture and stabilizing lower extremity while on the up phase of the sit-up. The facilitator of the PA laid on ground beside child with ASD, showed him how to anchor his feet Had the child try again. Still had issues. The facilitator of the movement reduced the range of motion and limiting it to more of an ab crunch. Child was successful with this. (FN, 28).

The Buddy System

Historically, it has been observed that children with ASD tend to be more anxious and less likely to participate in activities with neurotypical children. A fascinating interaction known as "the buddy system" was witnessed during observations at the mixed-ability site. This involved pairing a child with ASD with a neurotypical child, who would guide and support them through the movements required, mainly if the PA involved a larger group. What was interesting to note was how the children with different abilities complemented each other. The more reserved child with ASD was partnered with a moderately outgoing, knowledgeable neurotypical child, resulting in a successful partnership for both children.

> Today for recess, the facilitator of PA wanted the group of kids to form teams to play kick ball. The facilitator of the PA called out, "Let's get our buddy system together!" Child 7 with ASD was paired with a neurotypical peer of the same age. Child 7 seemed very happy with this pairing due to his laughter and clapping. The neurotypical peer was also joyful and seemed familiar with child 7. The neurotypical peer started to explain the game to child 7. Child 7 held their partner's hand. (FN, 37)

Comfort and Ease

The rapport between the child with ASD and the facilitator of the PA was characterized by *warmth*, *comfort*, and *familiarity*.

> As I entered building one, I immediately noticed the "homey" atmosphere. The building was an old home remodeled for the purpose of the coop. The kids seemed to come and go into rooms. They immediately took their shoes and socks off in main room. Children were noted to be laying in the floor coloring, in a bean bag reading, and sitting at a table putting blocks together. Comfort is observed due to relaxed body language, the ease of conversation, and occasional laughter heard. (FN, 1)

Building trust and feeling at ease with individuals in their environment can be a gradual process for children with ASD. Their level of participation in the PA was contingent upon establishing *trust*. *Comfort* and *familiarity* were crucial not only in their relationship with the PA facilitators but also with their neurotypical peers.

> As a mom with a child with ASD, I can see that there is a long-standing relationship with the children with ASD and their facilitators of PA. The facilitators of the PA seem to read the body language, sounds, movements of the child with ASD to gauge their willingness to do the intended PA for the day. They were able to alter their approach with the child with ASD based off this. The child with ASD seemed at ease and most of the time willing to please the facilitators of PA. (FN, 26)

Physical Activity

Within the theme of PA, two main sub-categories were identified: *free play* and *structured PA*. The ultimate goal for children with ASD was a significant factor in determining which category was most appropriate. During free play, the emphasis was not on perfecting the

mechanics of movements but rather on social interaction and continuous movement for extended periods of time.

> As child 2 with ASD was jumping on the trampoline, the facilitator of the PA made a game of it. She told child 2 with ASD that they could jump or run around the trampoline but needed to stay moving for five minutes. The facilitator yelled, "Keep going, even if you need to slow down, just keep moving!" (FN, 13)

Repetitive movements, such as jumping, swinging, and running, were often observed during free play. On the other hand, structured PA was more complex and involved specific types of movement or stages of PA. Due to its nature, structured PA was not typically a voluntary choice for a child with ASD. An assigned facilitator of PA would coordinate structured activities, often similar to sports or workout activities.

> The facilitator of PA came and retrieved child 3 with ASD. The facilitator of the PA was a physical therapist. The facilitator of PA showed the child with ASD how to sit on a stable ball; while sitting, the child would toss the ball and then, while stabilizing on the ball, catch the ball back. The goal was to keep stable with feet on the ground while tossing and catching the ball (FN, 35)

Sensory

During observations, it was found that certain sensory barriers, such as sound, temperature, and texture, were present. However, it was also noted that a distinct *physiological response* to a specific type of PA impacted participation within a PA. The children with ASD who craved proprioceptive input were drawn to weight-bearing PAs like jumping, while those who craved vestibular input preferred swinging-type PAs. Furthermore, this also resulted in these children avoiding movements that did not meet their sensory needs.

> Child 5 seems to be more agitated today. He makes grunting noises and does not participate with the PA facilitator. The facilitator of PA asks child 5 if they are having a bad day. Child 5 did not answer; they just turned away. The facilitator of the PA then states, "I think I might know what could cheer you up! Would you want to swing for 5 minutes before we start?" Child 5 now turns towards the facilitator. He immediately grins and jumps up to run to the swing. As the child starts, the facilitator of the PA says, "Is this what you have been needing to do?" Child 5 yells, "Yes!" (FN, 42)

Specific Aim #2: To gain insight into the views of children with autistic spectrum disorder on their physical experiences.

Responsive interviewing was used because it emphasized the importance of building trust between the interviewer and the interviewee (Rubin & Rubin, 2012). This led to a more give-and-take in the conversation. The tone of the questioning was friendly and gentle, with little confrontation. This specific aim was essential to this study. Despite calls for gathering autistic individuals' choices on their experiences and views to better inform policy and practice, they have been missing from this conversation (Harrington et al., 2013; Parsons, 2015).

Five male children with ASD (n=5) were selected to participate in this phase of the study based on specific criteria, which included their ability to communicate with the help of visual aids and a familiar aide. The children, two African American and three Caucasian, ranged in age from 8 to 17 years. An aide who knew the child well was present during the interview to help clarify an answer for accuracy. Visual cards for Yes, No, Happy, Sad, and thirteen physical activities (Appendix D) were also used during the interview to assist the child with ASD in communicating with the researcher. Interview responses can be found in Appendix H.

The thirteen physical activity choices that were given in the interviews are the following: jumping, swinging, riding a bike, walking, swimming, basketball, running, soccer, squats, baseball, sit-ups, planks, and lifting weights. Jumping, swinging, walking, swimming, riding a bike, running, and doing repetitive movements all had positive points of view from all five children with ASD. Expressions of "yes," "happy," and "I like" were all expressed through these physical activities. *Sports physical activities* that required multiple stages of knowledge to play and interact with peers were negatively viewed by three of the five children with ASD. John enjoyed playing basketball but not with peers. Paul expressed the same sentiment with soccer. *Bodyweight physical activities* such as squats, sit-ups, and planks had high negative perceptions from four of the five children with ASD. Expressions of "stupid," "so hard," "no," "do not like," "ouch," and "makes me sad" were stated. Sam expressed the emotion of being "happy" with lifting weights, but this was also an activity he and his father did one-on-one.

Social interaction and *friends* played a significant role in the children's physical activity choices. On all physical activity options presented to the children with ASD, they all commented that they preferred doing the physical activity "with a friend" or "with their teacher." This preference for social interaction during physical activities suggests the importance of incorporating social elements into physical activity programs for children with ASD. Although there was no preference for being outside or inside to conduct a physical activity, four children with ASD did comment on "loud sounds," "sweating," and "hot" as negative associations with physical activity.

Specific Aim #3: To gain the perspectives of facilitators teaching physical activity to students with autistic spectrum disorder.

The findings of the interviews conducted with the six PA facilitators (n=6), as detailed in Appendix I, revealed several key codes that emerged from the data. All the PA facilitators agreed that there are obstacles to overcome when working with children diagnosed with ASD. *Modeling* emerged as an important code within communication for PA instructors to overcome communication barriers. Tina, facilitator of PA 1, states, "I think modeling is a beneficial tool to have or technique to use.....modeling different scenarios of that activity."

When working with a child with ASD, communication hurdles can arise, from the child not comprehending instructions to the child feeling too afraid to ask for assistance. Cindy, facilitator of PA 3, states, "Limit the language. Use two to three words max. Use video modeling and model the movements yourself with the child." Within the modeling category, sub-categories included *physically demonstrating movements for the child*, *using cards, playing games,* and *utilizing videos* to aid instruction. Several examples of this theme were observed during the study.

Introducing a new PA to a child with ASD can be a challenging task. However, a supporting code such as *positive relationships*, *positive reinforcement*, and *trust* within the theme of social interaction suggests that building a *positive relationship* with the child is crucial in overcoming barriers with PA. Tina, a facilitator of PA 1, puts it like this. "Expanding on this means that the individual introducing the activity will need to work on a relationship with the child with ASD." *Positive reinforcement* and *trust* were seen as significant in helping to introduce new activities. Jeanine, the facilitator of PA 4, shared, "You do not want it to be a traumatic experience for them because not only then are they not going to be as willing to try it again next time, and they could lose their trust with you." Children with ASD often require more time and patience to adjust to new routines, and building a trusting relationship with them can go

a long way in helping them feel comfortable and confident. Trusting relationships also help in fostering a sense of security and predictability, which can be particularly important to children with ASD. Therefore, when introducing a new PA to a child with ASD, it is essential to focus on building a positive relationship with the child, providing positive reinforcement, and fostering trust to ensure a successful and enjoyable experience. Shelly, facilitator of PA 2, says, "The biggest teaching philosophy is that some days you will not be able to instruct your kid. All you must do is just love your kid today, and maybe you will get to teach them tomorrow. You keep loving them, and eventually, you will get to teach them."

The *buddy system* emerged as another supporting code within social interaction. "The buddy system is a very effective method with children with ASD," says Cindy. She goes on to add, "Using a buddy system has been shown to reduce a child with ASD's anxiety and enhance their self-efficacy in accomplishing a task at hand. Therefore, this increases their intrinsic motivation to participate in the PA." It encouraged PA and promoted positive social behaviors. It is worth noting that children with ASD are often characterized by one of two personality types—those who struggle to comprehend the concept of personal space and those who are hesitant to initiate play with other children. The buddy system helped mitigate these challenges and facilitate more meaningful interactions for these children. Claire, facilitator of PA 6, states, "For the buddy system to work more effectively, you need to try to match a child with ASD with another child knowledgeable about the task and able to model the desired behavior for that activity." Jeanine agreed and added, "They have a model of what is to be expected and a friend to do it with, so they are not alone."

Sensory input was important for children with ASD when engaging in PA. According to PA facilitators, children with ASD tend to gravitate towards PAs that can cater to their sensory

needs for that particular day. Gayle, the facilitator of PA 5, says, "Some children with ASD are only drawn to certain motions and will try to avoid others. Due to this, when encouraging them to make a new movement/movement, you may need to trade off with them – let them know that they can try a new movement but will have a break to make the movement/motion that they want to do or like." For instance, children who seek vestibular input may prefer to swing, use a stability ball, or walk on a balance beam. Similarly, those who crave proprioceptive input may opt for weight-bearing activities such as jumping, jumping rope, climbing, or bouncing.

Within the theme of motivation, a *reward system was a dominant code*. All six PA facilitators made statements about this area of interest. "A reward system will also add to the success of this strategy." "For a reward system to be effective, it has to be something of interest and want for the child with ASD." "Using praise provided a reward system for everything that he did." "Sometimes, if we need them to complete multiple stages/steps, then a charting system for a reward may be a more effective visual system for a child with ASD." It is recommended to introduce new PAs to a child with ASD gradually. A reward system can be an effective tool to motivate a child with ASD extrinsically.

Discussion

There has been substantial progress in research for adolescents diagnosed with autism spectrum disorder (ASD), but evidence-based interventions for autism are rarely adopted or implemented in settings where most youths with ASD receive services (Wood et al., 2015; Dingfelder & Mandell, 2011). Children with ASD share common core symptoms such as issues with social communication, social interaction, restricted and repetitive behaviors, and deficits in motor ability (APA, 2013). These core symptoms are critical factors for this population's barriers to physical activity (PA) (Obrusnikova & Cavalier, 2011; Menear & Neumeier, 2015). These

barriers exacerbate the time and quality spent within a PA while decreasing opportunities for routine exercise (Luiselli, 2014; Draheim et al., 2002; Foley & McCubbin, 2009; Pitetti et al., 2009; Rimmer & Rowland, 2008). The purpose of this study was to help fill in the gap by illuminating a more holistic understanding of all factors (motor, sensory, social communication, social interaction, and environment) related to PA in youth diagnosed with ASD. To lead to deeper discussions about how to provide a more flexible and integrative approach for stakeholders to implement evidence-based strategies within settings where most children with ASD will receive services.

According to the findings, children with ASD may benefit from consistent external motivation, not just to try out a new PA but also to remain engaged in it. The facilitators of the PA for children with ASD pointed out that this external motivation must be something that interests the child for it to be effective. Although children with ASD may struggle with trying new PAs due to hesitations or lack of motivation, research findings did show that there are effective strategies to be implemented to help turn these experiences into positive ones. One such strategy is to break down the task into smaller steps, making the activity less overwhelming and more manageable. Additionally, giving positive reinforcement and implementing a reward system can help motivate children with ASD to continue engaging in the activity. Another important aspect of working with children with ASD is to focus on self-directed learning (Hoggan et al., 2017). This means they should be encouraged to take control of their learning and decide what they want to learn (Hoggan et al., 2017; Weimer, 2002). One recommended approach to achieving this is through person-centered planning. This approach emphasizes self-determination and intrinsic motivation, which can help children with ASD feel more engaged and invested in the learning process. Setting achievable goals is another important aspect of

working with children with ASD. By setting attainable goals, children avoid feeling overwhelmed and experience success in completing the activity. This can help build their confidence and encourage them to continue engaging in PAs. Overall, these strategies can help children with ASD overcome their hesitations and feel more confident in trying new PAs.

It is crucial to prepare the child with ASD before introducing them to any new movements, according to the study's results. Scheduling time to familiarize them with the intended movement is beneficial. As strong visual learners who quickly grasp patterns and routines (Grenier & Yeaton, 2011), children with ASD may benefit from visual aids such as videos, cards, or personal movement modeling. Along with clear and concise verbal cues, these aids can facilitate better communication with the child. It is important to note that children with ASD may face difficulty with verbal and nonverbal communication, and visual aids can assist them in communicating back to the facilitator of the PA.

According to Salters et al. (2022), who children with ASD engage with and how facilitators of the PA describe motivation, confidence, and competence in social and motor domains, underlie participation patterns and preferences. When comparing social skills with motor skills, the facilitators perceived social challenges to play the most significant role in participation among children with ASD. Dudley et al. (2016) support this by highlighting that children with ASD tend to exhibit anxiety or nervousness, and this can create a barrier, causing poor engagement in PA and social interaction with neurotypical peers.

Findings highlighted multiple facets of how to ease a child with ASD's anxiety, increase self-efficacy and self-confidence, and enhance a positive experience with PA. The two most prominent themes within this area were the buddy system and building a positive relationship. Our attitude and intention towards working with children with ASD can significantly affect the

relationship and trust between the child with ASD and us (Burke & Sutherland, 2004). A child with ASD's learning confidence aligns with these trusting relationships (Mezirow et al., 2009). Furthermore, studies have indicated that children with ASD engage in PAs similar to their neurotypical peers (Stanish et al., 2017). The buddy system, which pairs a child with ASD with their neurotypical peers, provides them with another opportunity to build a positive relationship and to model the desired PAs. However, it is also an excellent way to help model the desired PA. It is essential to consider the voice of children with ASD in this study, as many of them commented that they preferred to engage in PAs "with a friend."

When developing a PA intervention program for a child with ASD, it is important to consider the types of PAs involved carefully. It is common for children with ASD to have specific motor deficits, particularly in core stabilization (Lang et al., 2010). Additionally, physiological responses may influence a child with ASD's attraction to or avoidance of certain activities. Research findings support that children with ASD respond better to specific PAs that provide necessary sensory input, such as vestibular, rotatory, and proprioceptive. However, these sensory inputs that draw a child with ASD to an activity may also cause them to avoid it (Grenier & Yeaton, 2011). In such cases, it is important that the instructor have a gradual introduction to the activity that may be necessary to help the child with ASD become more comfortable with the movement.

CHAPTER II: DISSEMINATION

The dissertation findings will be shared as initial training for PA facilitators to assist in planning an inclusive PA intervention program. The training will focus on proactive strategies for the inclusion of children with ASD. The discussion topics will include planning, instructional delivery, physical activities, sensory, environment, motivation, and conclusion. The training will be a narrated PowerPoint presentation (Appendix J). PA facilitators will be able to interact with the presentation through opportunities to practice implementing the content learned during the presentation. It will be provided via email to interested stakeholders, including the coop director, PA facilitators, parents of the students diagnosed with ASD, and the students themselves. The long-term goal is to refine this educational training program through feedback and prepare for local practitioners, therapists, teachers, and parents of children with ASD within the local community.

Planning

This starting stage of an intervention program begins with the facilitator of the PA understanding the shared challenges that children with ASD experience. They share common core symptoms such as issues with social communication, social interaction, restricted and repetitive behaviors, and deficits in motor ability (APA, 2013). Preparing and acknowledging that each child with ASD will have variability within these challenges will help the PA facilitator in selecting innovative teaching strategies and assistive technology that can be used to address these concerns (Grenier, 2014).

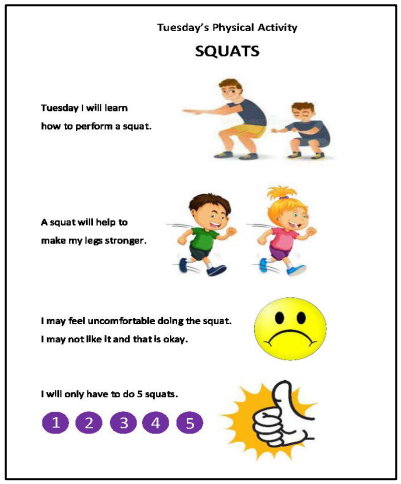
Facilitators of PA need to establish a positive and trusting relationship from the very beginning with the children with ASD that they will be working with (Mezirow et al., 2009).

This was a central theme of the study. A facilitator of the PA stated, *"Meeting them where they are, building relationships with them, and figuring out what they need is fundamental."* This means that the facilitator of the PA will need to learn how each child with ASD communicates. The negative behaviors associated with children with ASD (outbursts, anxiety, reclusiveness) stem from their difficulty in understanding social situations or the lack of structure within their environment (Grenier, 2014; Menear & Neumeier, 2015; Goodwin et al., 2006). The more comfortable a child with ASD feels, the higher the probability that they will respond more positively within the PA environment. A shared response from the facilitators of PA in the dissertation study was that the more the facilitators of the PA get to know their child with ASD, the better they will be able to interpret the child with ASD's actions and behaviors.

Instructional Delivery

When preparing PA for a child with ASD, it is essential to consider how they communicate. Sandt (2008) suggests providing a lesson preview or social story beforehand to help the child with ASD understand what to expect from the activity (Example 1).

Example 1. Interactive Activity 1: Physical Activity Social Story Example



Note. Each participating PA facilitator will practice composing a social story of a movement during the presentation.

This was observed in phase one of the dissertation study, with themes from the interview data that further supported the effectiveness of this inclusive approach. The social story could include instructions on performing specific movements, e.g., a squat, allowing the child to review and practice the necessary motor skills.

It is important to prepare the child beforehand and use short, precise verbal cues and visual aids during instruction to enhance communication. Over-explaining should be avoided, and a soft, low, and firm voice should be used to provide clear directions. One effective visual aid repetitively used with success throughout the dissertation study was modeling. The facilitator of the PA physically demonstrated the activity for the child with ASD or a peer student, which can help the child understand what is expected of them and how to perform the activity correctly (Example 2). In addition to modeling, other visual aids can provide transparent information about PA. Play cards, photos, and videos can all be practical tools for providing clear instructions and demonstrating proper form. By using these visual aids, children with ASD can better understand and participate more confidently in PA, which can positively impact their overall health and well-being.

Example 2. Interactive Activity 2

Practice Facilitating a Physical Activity to a Child with ASD

1) Break up into groups of 2.
2) Each person will take a turn in being the facilitator of PA.
3) Pretend you are facilitating a PA to a child with ASD.
4) We will continue with using the squat as the PA.
5) How will you break this movement down to the child with ASD?
6) Practice physically modeling the movement. As well as using simple language cues for the movement.

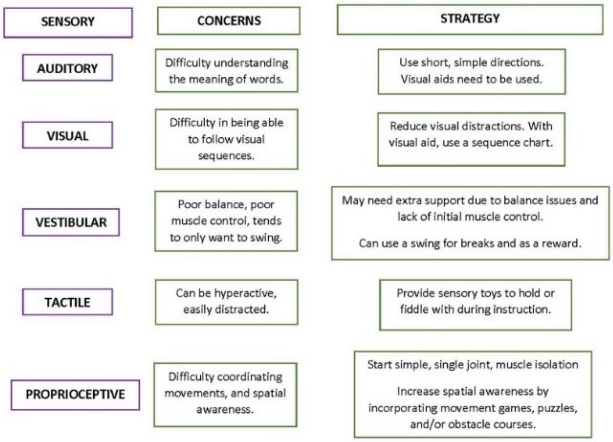
e.g. "Pretend to sit in a chair."

"Stand back up."

Sensory

Understanding how a child with ASD's sensory systems impact their PA can provide valuable insight for facilitators of PA. Children with ASD may struggle with sensory processing, leading to increased stress and anxiety (Grenier, 2014; Ferreira et al., 2018; Luiselli, 2014). By recognizing and addressing a child's sensory needs, PA facilitators can create a more positive experience. There are five sensory systems to consider when working with a child with ASD: visual, auditory, proprioceptive, tactile, and vestibular. Understanding a child's needs can help facilitators plan effective strategies to reduce stress and increase comfort during PA. Stress management techniques that work for neurotypical individuals can also benefit children with ASD. The dissertation study supported prior findings that children with ASD may be drawn to or avoid certain PAs based on sensory input. Figure 2 provides an example of implementing sensory information in PA strategies.

Figure 2. Example of Sensory Strategies for PA Activity.



Physical Activities

Prior research studies have found that regular PA can have a positive impact on children with ASD, leading to decreased stereotypic behaviors, increased self-confidence, and improved

task attention (Bremer et al., 2016; Ferreira et al., 2018; Kern et al., 1982; Lang et al., 2010; Miramontez & Schwartz, 2016; Stanish et al., 2017). Additionally, since children with ASD have a higher prevalence of obesity (Curtin et al., 2010), promoting PA is crucial for their overall health and well-being (Bandini et al., 2013).

In creating a PA intervention program for a child with ASD, it is vital to anticipate modifications for the PA (Example 3). It is common for children with ASD to have specific motor deficits, mainly related to core stabilization (Lang et al., 2010). Additionally, a child's physiological responses may influence their attraction or avoidance of certain PAs. In this case, a slower introduction or breaking down the PA into smaller steps may be necessary for the child to adjust. Another strategy discovered from the dissertation study is to engage them in a PA that satisfies their sensory needs to help calm them before moving on to more complex or stressful activities. It is essential to always include a warm-up and cool-down section in a planned PA session, with the main component being an individual exercise, group-based activity, and/or "free play" activity.

Example 3. Interactive Activity 3

Let Us Practice Modifying the PA, "e.g., Squat."

1) *How could you modify if a child with ASD had stability issues with the descent phase of the squat?*
2) *How could you modify if the child had issues with the range of motion of movement?*

Environment

In their 2015 publication, Menear and Neumeier provide valuable insights on preparing the PA environment for a child with ASD. The strategies they propose, from using a timer and visual aids to providing a 'buddy' for modeling, are adaptable to various situations. Consider the

setting of the PA. How can you mitigate the child's sensory aversion? How can you better prepare the child for routine scenarios? These strategies can be flexibly applied to different scenarios, making them open to interpretation and adaptation.

Motivation

One approach for motivating a child with ASD is to leverage their sensory preferences. When introducing a new PA, positive reinforcement and a reward system can help shift the child's perspective from negative to positive. This motivates the child and fosters a sense of achievement and progress. Breaking down the activity into manageable goals can also alleviate the feeling of being overwhelmed and boost the child's self-confidence. A crucial aspect of working with children with ASD is promoting self-directed learning, which involves tailoring instruction to the child's needs and preferences. Person-centered planning is a widely supported approach emphasizing independence and intrinsic motivation. This allows the child to be directly involved in the PA intervention program's decisions, fostering a sense of control and empowerment. For an example of this approach in action, please refer to Example 5.

Example 4. Interactive Activity 4

1) *What are ways to extrinsically motivate a child with ASD to try a new movement?*

Example 5. Person-center Planning

1) *The PA facilitator provides the child with ASD with the opportunity to obtain the necessary equipment for that day.*

Conclusion

To ensure an effective and holistic PA intervention program for a child with ASD, it is crucial to not only focus on health components such as cardiorespiratory fitness, muscular endurance, muscular strength, flexibility, and improved body composition but also to consider

the child’s unique needs. This involves identifying strategies for communication, sensory, environment, and motivation beforehand. The beauty of these strategies is their flexibility and adaptability, allowing the facilitator to implement a more flexible and integrative PA intervention that caters to the child’s specific requirements. This reassures the facilitator that they have the tools to effectively meet the child's needs.

CHAPTER III: ACTION PLAN

The purpose of this study was to gain a more holistic understanding of the factors that affect PA in children diagnosed with ASD, including the perspectives of both the children with ASD and the facilitators of PA. The results of this study will contribute to the existing literature by either supporting or highlighting new themes that require further exploration for the effective implementation of inclusive PA interventions for children with ASD. The study findings will be attributed directly to the facilitators of PA and their children with ASD. The immediate goal is to discuss the study's results with the facilitators and see how it can be beneficial to incorporate them within their PA programs. Further dissemination of this study's results can provide a more flexible and integrative approach for stakeholders, such as parents, educators/facilitators of PA, and organizations that provide services to children with ASD, to implement an evidence-based PA intervention program.

Stakeholders Who Work with Children with ASD

Stakeholders who work with children with ASD are all individuals or organizations whose thoughts and actions can impact the strategies implemented in a PA intervention plan for children with ASD. The results of this study can offer these stakeholders more effective planning and strategies to make informed decisions about a PA intervention plan.

Individuals with ASD

Individuals with ASD should play a central and active role in the development and discussion of any personalized PA intervention plan. Their unique perspectives, needs, and preferences should be carefully considered and prioritized throughout planning to create effective and supportive intervention strategies.

Parents of Individuals with ASD

Grenier (2014, pg. 14) emphasizes the importance of involving parents in developing insights about their child with ASD, such as their interests, fears, likes/dislikes, and triggers. Taking cues from a child's parent can encourage the child's interest in PA and promote a healthy lifestyle. Parents can help prepare their children for PA by providing motivation and reward systems to reinforce positive behavior. Including the parent with the child in the PA intervention plan could facilitate the child's PA and meet the child's need to exercise.

Educators/Facilitators of Physical Activity (FPA)

Physical/health educators and other professional facilitators of PA should ensure that regular PA is a part of their classes/sessions and that their students with ASD understand the real-world opportunities for PA at home, school, and within their community. This may require preparation, modifications, changes in strategies, and updated content to support the promotion of inclusive PA practices for children with ASD. Educators and facilitators of PA can help disseminate evidence-based strategies and work collaboratively with other stakeholders that provide PA for children with ASD. They can center the PA intervention with essential modifications and environmental adaptations to ensure a "just right" challenge to produce improved physical results that can increase a child with ASD's PA literacy and self-confidence. Providing this dissertation's findings, especially in the form of preliminary PA intervention training, may open further discussion and help educators/facilitators reflect on the current methods being used within a PA intervention plan for children with ASD.

ASD Organizations

The study results related to children with ASD need to be shared with parents and educators and with organizations that provide services for them. It is essential to close the loop

and ensure that all stakeholders work collaboratively to achieve the best possible outcomes for children with ASD. To achieve this, the directors of these organizations will be given the study results via email. The objective is to schedule a presentation to directly disseminate these findings with employees and volunteers of these organizations. Through this, the researcher aims to ensure that everyone involved in the care and support of children with ASD can access the latest research and work together to provide the best possible support.

Conferences and Future Research

Stakeholders providing inclusive PA intervention programs to children with ASD need to ensure that they incorporate successful strategies based on adequate evidence and education to show positive results. The researcher's goal of this study is to disseminate its results through professional conferences in a presentation. These conferences will attract a broad range of professionals and experts in the field of PA education, such as health educators, physical activity educators, and professional facilitators of PA like Occupational Therapists (OTD) and Physical Therapists (PTD), as well as individuals from higher education and ASD organizations/service providers. Future research will involve following up with stakeholders using the narrative PowerPoint Training Presentation. The next step is to collect data from the PA facilitator's training experience to enhance the methodology or content being taught.

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APPENDIX A: IRB INFO SHEET

IRB Information Sheet

Project Title: An Exploratory Study on Factors that Impact Children with Autism Spectrum Disorder's Physical Activity
Principal Investigator: Mandy L. Northcutt
Faculty Advisor: Dr. Ben Dyson

What is this all about?
I am asking you to participate in this research study because *the purpose of this proposal* is to gain an in-depth understanding of what factors impact a child diagnosed with autism spectrum disorder (ASD)'s physical activity and to identify the best strategies in implementing an evidence-based physical activity intervention for children with ASD for health benefit outcomes. This phase of the research project will only take about 4 to 6 weeks and will only involve me observing your normal routine of – if a student - participating in physical activity or if a teacher - facilitating the physical activity. Your participation in this research project is voluntary.

How will this negatively affect me?
No, other than the time you spend on this project there are no know or foreseeable risks involved with this study.

What do I get out of this research project?
You may benefit in finding out what factors could benefit this homeschooling coop for recommendations for physical activity intervention programming for current student. Society could benefit because this study could provide beginning information in the development of an educational training program on physical activity intervention for children diagnosed with ASD for health benefit outcomes.

Will I get paid for participating?
There is no compensation for participating in this research study.

What about my confidentiality?
We will do everything possible to make sure that your information is kept confidential. All information obtained in this study is strictly confidential unless disclosure is required by law. We will not ask for any identifying information, and throughout use of observations pseudonyms will be used in place of names. Data will be password protected.

What if I do not want to be in this research study?
You do not have to be part of this project. This project is voluntary and it is up to you to decide to participate in this research project. If you agree to participate at any time in this project you may stop participating without penalty.

What if I have questions?
You can ask Mandy Northcutt at mlnorthc@uncg.edu or (870) 926-8352 and Dr. Ben Dyson at bpdyson@uncg.edu anything about the study. If you have concerns about how you have been treated in this study call the Office of Research Integrity Director at 1-855-251-2351.

Phase I of this study qualifies for a waiver of consent. The waiver of consent for Phase I has been approved by the UNC-Greensboro IRB. However, **if you would like to decline your child from being observed for study-related purposes please sign this form and return to the school by** _____. However, if you are okay with your child being observed for study-related purposes, there is no need to return any forms. Only sign and send in if you **do not agree** for your child (name provided below) to participate in this research.

_____ _____ Date: _____
Child's Name Participant's Parent/Legal Guardian's Signature

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APPENDIX B: SEMI-STRUCTURED INTERVIEW GUIDE FOR CHILDREN WITH ASD

Warm Up/Get to Know

1. Tell me a little about yourself – what grade are you in?
2. What kinds of things do you like dong in your spare time
3. Do you like any physical activities?
4. Who do you like do those activities with?

Topic 1: Physical Activities

1. Does physical activity make you happy or sad?
    a. Follow up to #1 – Can you pick the card of how physical activity makes you feel?
2. What type of physical activity do you like to do?
    a. "-enjoy or that makes you happy?"
    b. Follow up to #2 – Can you pick the cards of the physical activity you like to do?
3. What type of physical activity do you not like to do?
    a. "do not enjoy or that makes you sad?"
    b. Follow up to #3 – Can you pick the cards of the physical activity you don't like to do?

Topic 2: Peer Interaction

1. Do you prefer "insert the PA they choose above" "e.g.swinging" by yourself or with your friends?
    a. Follow up with all the PA cards they liked and insert above to see if they respond one way or the other.

Topic 3: Facilitator of Physical Activity

1. Does your instructor motivate you to be more active?
    a. Follow up with card of yes or no.

Topic 4: Environment of Physical Activity

1. Do you prefer to be inside or outside for physical activity?
    a. Follow up with cards showing inside and outside activity.
2. On outside – What seasons do you like for physical activity?
    a. Show cards depicting seasons.

Topic 5: Sensory

1. Does sweating bother you?
    a. Show picture of sweating. Yes/no card.
2. Do loud sounds bother you sometimes?
    a. Show pictures of loud noises. Yes/no card.
3. Do shoes & socks bother you sometimes?
   Show pictures of shoes & socks. Yes/no card.

APPENDIX C: SEMI-STRUCTURED INTERVIEW GUIDE FOR FACILITATORS OF PA

Warm Up/Get to Know

1. Tell me a little about yourself and your experiences with ASD students.
2. Can you tell me about your teaching philosophy?
3. Can you give me an example that helps kids be more physically active?

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Topic 1: Physical Activities

1. Have you noticed specific physical activities that the students with ASD are more drawn to?
    a. Follow up – "meaning – have you noticed certain types of physical activity that they seem to enjoy more?" What are they?"
2. What types of physical activity have you noticed that they try to avoid?
    a. Follow up – Why do you think that may be?

•

Topic 2: Peer Interaction

1. Do students with ASD enjoy peer interaction while participating in physical activities?
    a. Follow up – Do you think this could come down to the individual?
2. Do you notice if they enjoy this interaction more or less during free-play and/or a structured physical activity?
3. During some PA activities – I noticed a buddy system. How important is this? How do you know who to partner the child with? Is this important for desired participation?

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Topic 3: Communication

1. Can communication over the activity be a barrier at times?
    a. Follow up: How do you work through this? What tips would you give? What preparations are needed?

•

Topic 4: Environment of Physical Activity

1. What is the difference in preparation of a PA for inside versus outside with a child with ASD?
2. What specific environmental factors impact a child with ASD's participation in physical activity?

•

Topic 5: Motivation

1. What strategies do you use to help motivate participation in physical activity?

Thank You

Is there anything else you would like to add?

APPENDIX D: PA CARDS USED IN INTERVIEWS W/ CHILD WITH ASD

JUMPING

SWINGING

RIDING A BIKE

WALKING

SWIMMING

BASKETBALL

RUNNING

SOCCER

SQUATS

BASEBALL

SIT UPS

PLANK

LIFTING WEIGHTS

APPENDIX E: SAMPLE OF ANALYTIC MEMOS FROM OBSERVATIONS

Theme Code	Subtheme	Analytic Memos
Motivation		• *Clear direct verbal cues, along with visual aids for desired movement wanted. Lots of external motivation. Small bouts of activities, altered with breaks with children w/ ASD or activity child with ASD would be motivated by to continue with desired PA.* • *Enjoyment/laughter from child, facilitator of PA encouraged often, gave extra verbal and posture cues for child to move in correct posture.* • *If a child with ASD became distracted from PA task, facilitator of PA kept same soft, encouraging tone, redirected often. To reset, had child with ASD take deep breaths, then went straight back to reminding on correct technique to perform the PA.* • *Performing the PA, the FPA kept a calm tone and maintained expression of encouraging works "great job" "almost there" Child w/ ASD seemed receptive to the external motivation.*
Communication		• *Clear directives, textile cues and visual cues. Physical demonstrations "modeling" performed. Also, use of a mirror so child with ASD could see their own posture with movement. Faciliatory of PA explained the importance of the movement child with ASD was performing.* • *PA being conducted was sit-ups, Facilitator of PA gave visual demonstration (Modeling) then gave verbal cues w/ the movement. The child with ASD had difficulty maintaining posture with sit-ups. Facilitator of PA physically helped stabilize the child w/ ASD. Facilitator stopped child and asked the child where they thought the sit-ups worked. Child rubbed their stomach. Facilitator of PA added cognitive learning w/ physical movement to increase PA literacy.*
Social Interaction		• *PA was assisted with verbal, textile & Visual cues. FPA did movement w/ child w/ ASD. PA was to lift a weighted ball with an overhead press. Child liked seeing the FPA do the movements with them. Child body language and laughter confirmed these conclusions. Stemmed from excitement.* • *Free play was observed between neurotypical children and children w/ ASD. Neurotypical kids encouraged play interaction w/ children w/ ASD. Tag was the game being played. Children w/ ASD laughed and chased other kids but didn't always know to tag but neurotypical kids did not care.*

		• *Free play was observed. Children w/ ASD seem to have a favorite spot, place they like to directly to every time for free play. Neurotypical peers and FPA encourage interactions but do not force the child w/ ASD.* • *A game of kick ball was observed today. The FPA paired the Children w/ ASD w/ a neurotypical peer. The neurotypical peer stayed w/ child w/ ASD and showed them what to do. They also would encourage, clap with child w/ ASD. Overhead FPA use term of "lets set up our buddy system!" at the beginning with set up of the game.* • *A game of basketball was observed. A "buddy system" was started again. The neurotypical peers seemed to know which child w/ ASD they needed to go with. Interactions seem to be pleasant between neurotypical peer and child w/ ASD. FPA kept supervision & interceded when necessary to give correction or external encouragement for all of the kiddos.*
Physical Activity		• *PA movement was an isometric PA, a plank. FPA gave the child with ASD a card showing the position of the exercise. FPA demonstrated the movement to the child w/ ASD. Child with ASD tried to get into the plank position as the FPA gave verbal cues. The child w/ ASD struggled. FPA gave modification for Child w/ ASD to put knees down while holding trunk in position. Still struggled. FPA gave child w/ ASD a break. Still gave encouragement. Demoed a tabletop position. Related it to object child with ASD was very familiar with. Child w/ ASD got into tabletop position. Was very excited that they were ab le to do it. FPA clapped, cheered Child w/ ASD on. Then had the child try to walk back knees/feet and then hold, then back in tabletop. Rewarded the child w iPad time in break before moving on to next PA.* • *PA was kettlebell activity. Child with ASD was to lift & slowly decline w/ the KB to green dot on the floor. Had trouble with control in the descent. FPA gave external verbal motivation. FPA maintained modeling with the child w/ ASD during all repetitions.* • *FPA aids Child 2 w/ ASD with catching a ball. The is thrown lightly for child to catch. Another aid helps to hold the child's hands for stabilization. Child 2 w/ ASD did well tossing ball back to FPA. FPA took a step back and tossed ball again, child seemed to have trouble catching, became frustrated. Aid encouraged child, said "it was okay that it takes practice" So they added a count so child w/ ASD could better prepare*

		for the toss. This seemed to lower the child's frustration and be more successful in the catching phase of the ball.
Environment		• *PA was inside today due to the weather. Child 6 w/ ASD seemed to be more engaged in quiet room in comparison to yesterday's PA outside. May be due to less distractions.* • *Child 6 w/ ASD did PA of kicking a soccer ball. FPA gave clear directions and a demonstration of where to kick the ball. Focus was on contact of foot w/ the ball. Child 6 w/ ASD was distracted, kept bringing head up and watching peers w/ their free play.*
Sensory		• *Child w/ ASD was already engaged with bouncing on a stability ball. Instead of making him stop; facilitator of PA encouraged and stated "you can continue to bounce on the ball but in one minute we need to start with our activities." Child responded "yes!"* • *FPA consistently reminded child with ASD on posture, grip with constant encouragement. FPA noticed child with ASD start to have continued poor posture, suspected fatigue, "are you tired?" "Do you need a break?" Child responded "Break, please!" excited for the break, the child with ASD ran straight for the stability ball and started bouncing repeatedly. Note that child was probably craving a different sensory input and needed a break with current PA to fulfill sensory input needed.* • *Child with ASD did not want to do PA for the day. FPA asked if the child was needing the swing first. Child w/ ASD immediately ran to room w/ the indoor swing. FPA gave a time clock and let the child know for how long they could swing and then they could do the FPA's PA. At time, child w/ ASD voluntarily did PA w/ frequent swing breaks.*

APPENDIX F: EXAMPLE OF JOTTING TO DESCRIPTIVE NOTATIONS

Observation Day 1:

Jotting:
FPTA1 worked with child 6,
PA was child 6 to balance on the stability ball.
Child 6 was to toss a 4lb weight ball to FPTA1 and to catch that weight ball from FPTA1.
FPTA1 took steps and widened the distance between them.
Gave great demonstration and motivational cues to child 6
FPTA1 also spoke on where the child should feel this work.
Child 6 body language is positive and heard laughter.

Descriptive Notes:

FPTA1 gave the child 6 clear and direct verbal cues. Stated how the child needed to support weight on stability ball, two flat feet on the floor. FPTA1 then showed Child 6 what they were to do for their PA activity that session. They demonstrated that Child 6 would hold the weight ball and toss it to FPTA1. FPTA1 was close to Child 6 and then they tossed the ball back and emphasized for child 6 to catch the weight ball.

FPTA1 gave strong verbal support/motivation cues of encouragement to child 6. Then FPTA1 took a step back and continued the PA of Child 6 catching the weight ball and tossing it back to them. FPTA1 took a step further away from child 6 with each turn to lengthen the distance between them. At one point child 6 stated, “My arms are getting tired!” and FPTA1 replied, “Because they are working throwing and catching the weight ball, just like you feel your abdomen/stomach working to keep you upright on the stability ball.”

APPENDIX G: EXAMPLE OF ANALYTIC CODING

Umbrella Theme	**Data Source**	**Sample Response**	**Preliminary Code/ Thematic Phrasing**	**Final Theme**
Physical Activity	Interview	*Baby steps. I can give you an experience that I had from last year. We had a child that would not even touch the swing – a compression swing, a cocoon they get in it, its huge so it is all around them. Would not even touch or even sit down in it. Using praise, provided a reward system for everything that he did. Providing a gummy bear or anything to get him to be open to trying this new activity. Then I would give him a reward for just sitting, a reward for letting me push one time in the swing, and then a reward for allowing me to push him five times in the swing.* *You just have to build up, but we had to begin with just touching the swing. He avoided vestibular things so bad and I think he knew "Oh, I know what they were going to do to me if they get me into that thing." Just had to start with those baby steps, find what he was motivated by gummy bears, food, a string, or a pop tube toy – whatever they are motivated by that day that is what you will use to entice them to try that new experience. Now we put him in the swing and I can swing him for 10 minutes at a time. I can give him linear input by swinging him back and forth and I can spin him in that swing to give him that rotary input as well.*	1 "Baby Steps" 2 "Using Praise" 3 "give him a reward" 4 "have to build up" 5 "avoided vestibular things" 6 "baby steps" 7 "whatever they are motivated by that day" 8 "give him linear input by swinging" 9 "spin him in that swing to give him that rotary input"	1 Small Steps 2 Positive Reinforcement 3 Sensory Input

APPENDIX H: EXAMPLE OF INTERVIEWEE RESPONSES WITH CHILDREN WITH ASD

Theme Code	SubTheme	Interview Responses of Children w/ ASD *All names are pseudonyms * Due to many yes/no answers, some questions are given w/ response. Responses from child w/ ASD are underlined.
Motivation		• *Points motivate me. Like a reward system? Yeah, yeah. So that reward you are working towards something. (child shakes head yes.) Well, that's good.* • *Just get a break.* • *Does your teachers help to encourage you to be more active. Yes, they do. Good.*
Social Interaction		• *I like to do with friends. With Pat, Aaron. We just always playing some. And we just build our fork of awesomeness board.* • *My friends, do it with my friends.* • *When we run, do you prefer to do that by yourself or do it with your friends? My friends.*
Physical Activity		• *Do you like to run? Yeah. Did you swim? I swim. Do you like to swim? Yes, yes. Yes* • *What kind of feelings would you get if I say, we're gonna go running, Would you get be happy or would you be sad?* • *I would be sad about that.* • *Do you like swinging? Yeah, swinging.* • *OK. Do you like that one walking card? Running? You like running? (Child shakes head yes.) I like walking too. Do you like sit-ups? No, no, we're over that now. What about lifting weights? Do you like to do dumbbells or anything like that? We're going to put that in the no pile. What about basketball? Do you like basketball? Nope. And no baseball. OK, do we like soccer? Oh, no, What about squats? Ouch. Ouch* • *What about planks.? No.* • *You do not like baseball, soccer or basketball? Stupid. Tell me why you think they're stupid?* • *Do you like swimming? Yeah. Paul, do you like running or swinging? Swinging. Swinging. What about running? We're gonna put that in the no pile. OK? What about walking? Yes. Yes. What about lifting weights? You, like, do dumbbells or things that are heavy? Yes You do like to do that? What about sit-ups? No. Do you like planks? No. No. What about squats? No. No. What about baseball? No. No. What about*

		basketball? No. Now, what about soccer? Yes, yes, we like soccer. • *I have cards like running or swinging or walking, and riding a bike. Do any of these activities, if you could point to the card, do they make you happy or do they make you sad, Happy! They make you happy? Good!* • *What about lifting weights and running? Which one would you prefer? Running. Running? Good deal.*
Environment		• *Do you like to be in here doing these things? Yes You do like to be inside? Do you also like to be outside doing them? Yeah, It doesn't really matter if you're inside or outside? Aide states: No preference I believe w/ him.*
Sensory		• *Does anything like sweating bother you? No. No. Does loud sounds bother you while you're exercising? No. No. What can we do about getting hot? This? Is getting hot bothering you? No. No.* • *Do you like me sweat? No. No. You like to be hot, Yes or no? Do you like it when you are too hot? No. OK. Umm. Loud sounds. Do you like loud sounds? No, no.* • *Does it bother you to sweat or to get hot when you're running? Yes. Does that bother you? So if you got real sweaty or hot, would you stop running? Yes. I do not like to be hot.*

APPENDIX I: EXAMPLE OF INTERVIEWEE RESPONSES FROM FACILITATORS OF PA

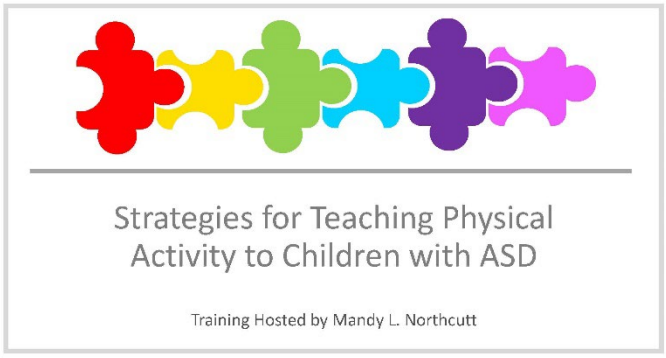
Theme Code	Subtheme	Interview Responses of FPA
Motivation		• *Baby steps.* • *Using praise, provided a reward system for everything that he did. Providing a gummy bear or anything to get him to be open to trying this new activity.* • *Just had to start with those baby steps,* • *whatever they are motivated by that day that is what you will use to entice them to try that new experience.* • *"Just try one time and then all done" using lots of verbal praise with them and if they are still not having it even after you have put the reward system* • *Sometimes if we are wanting them to do multiple steps a chart may be more effective.* • *What I will typically do – we have puzzles and sometimes if they need a brain break, something that is a little bit easier – have them go get a puzzle, sit down and focus on that* • *So a lot of positive reinforcement and affirmations.* • *I get the feeling that they don't like it because they just have to be still, so a lot of times we'll use like a timer, like you only have to do this for 10 seconds, um, to kind of increase that behavior momentum and then heavily reinforce that with either a token or, or a reinforcer, uh, too.*
Communication		• *It is because we have practiced, rehearsed and given them the supports that they need.* • *Meet them where they are, build those relationships with them, figure out what they need. What works with one may not work with another.* • *Yes, I think modeling is a very helpful tool to have or technique to use.* • *So I would state "Okay, so lay down and prop up on your elbows" they did not know what that meant but also could not say "could you say that differently. I don't know what that means. Can you help me with it?" It took a while because I just sat there and watched them to see what they would do and to see if they could figure it out. Then finally decide to step in but it was because of the communication and a little bit of motor planning too.* • *Verbally, I try to say are you okay. How do you feel? Try to get them to initiate them to talk about their emotions or prompt them.*

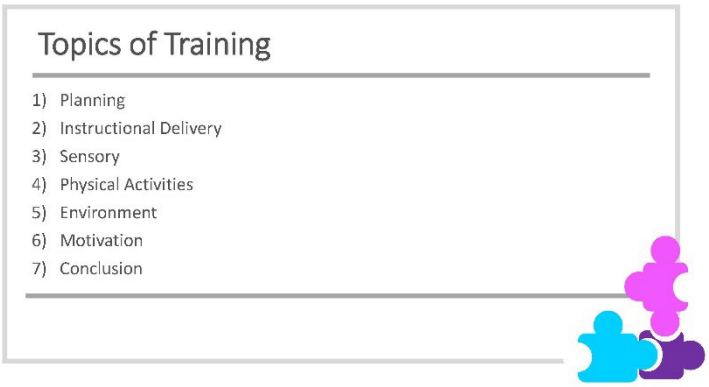
		• *....I have noticed with the non-verbal it helps to be very step by step this is what I need you to do. With the verbal kids , I mean I think in general step by step seems to work best. With the verbal kids it is easier to be this is what I need you to do. With the non-verbal you may have to really explain to them what you are needing them to do.* • *What I would do – if they are not understanding – is if it is on their talker – show them the activity on the talker and if they do understand – a timer is a great way to show them that they will be only doing that activity for this amount of timer. Timers are big here. Hey, I know you don't want to do this, but let's try it. Very upbeat voice.* • *Yeah, talking to them about what is about to happen can help.* • *..., and don't spend a lot of time explaining it. Um, you're gonna wanna use very few words.* • *so very simple language,*
Social Interaction		• *You will have to start all over with building that repour again if you push them too far.* • *Buddy system is very effective but it does depend on the kid.* • *So having a buddy system is good for that modeling. Modeling is one of the biggest things.....* • *We do have a lot of neurotypical children here as well so that is a great advantage to the way that we work in our environment.* • *The organized play helps them target certain things physically that they wouldn't do in free play. Jumping or stuff like that. Or having to run in a certain direction that they would not just do on their own. Interaction with their peers in a setting like that.* • *I know from working with several kids for years, I have learned to get to know them. I have learned that it is easier to teach kids when you have a connection with them.* • *Yes, we have some kids that don't like to do physical activity. Sometimes we are like "Okay well you can watch a friend do it so you can see if you want to try."* • *So when we do buddies we will pair them because we know they will get along. We try to pair – is this kid going to be helpful to this other kid.* • *Spending a lot of time with them. I spend a lot of time with these kids.* • *So far I haven't seen any really disadvantages to incorporating a peer.* • *I think also it's like, okay, I'm not the only one doing it.*

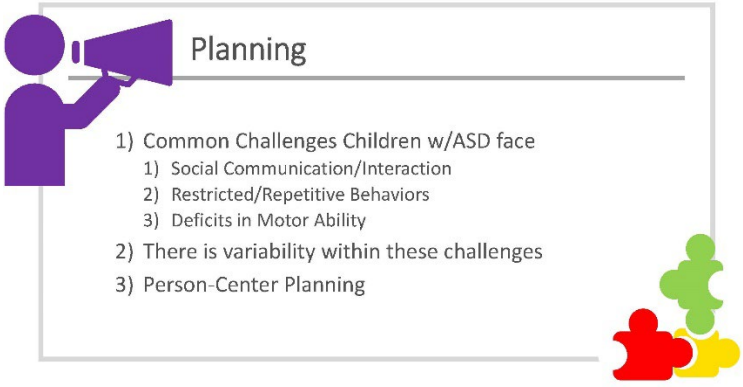
Physical Activity		• *First off, it is easier when they see another peer do it.* • *It seems that a lot of them are drawn to swinging. Jumping and spinning definitely.* • *Running is sometimes one that they do not want to do. ……..Let's see……..sometimes jumping off of things. For some of them, that is a big struggle.* • *I know most of the kids are okay with running, jumping and stuff like that but a lot of them don't like workout type things. Like push-ups, jumping jacks, wall sits – some of them that is hard I don't want to try it* • *if I was explaining to do a jumping jack, I would do starfish pencil, starfish pencil instead of, okay, now move your legs out. Now do this with your arms as well.* • *start out with five jumping jacks as opposed to 15 jumping jacks* • *definitely that trampoline, uh, running something that is getting them moving, swinging.* • *definitely if there's like a physical activity game. Okay. Such as tag or, um, red Rover, they play that a lot.*
Environment		• *I believe every child can learn. Given the right environment, right resources and support put in place.* • *I feel like they are more engaged inside because outside there are so many other things they want to do like explore or go onto the swings. And so I feel like they are more engaged to do whatever we need them to do inside.* • *Because indoors it gets loud, noise – a lot of them do not like loud noises. It can be overwhelming to them. Outside there is no echo, no stomping. I feel being outdoors calms them. To be outdoors, to be able to spread out, don't have to be so close. Some don't like to be in big groups so they can spread out.* • *I do think they enjoy outdoors better.*
Sensory		• *I really believe a lot of their experience with PA in what they like to do and don't like to do – it all comes down to the sensory system.* • *Ones that like to jump b/c they crave the proprioceptive input and then some of the ones that don't like to swing b/c they don't like the vestibular input. Really it comes down to observation what activities they are drawn to and what do they stir clear of. We look at it from a sensory perspective and do a sensory profile.*

		• *I can give him linear input by swinging him back and forth and I can spin him in that swing to give him that rotary input as well.* • *A lot of the time it will come across as anxiety. They will get very nervous and will not make eye contact.* • *Most of the time, loudness in the room can really bother many of the kids and set them off. ….they could have such a range or aversion to different sounds, different touches.* • *sensory activities help with that. Um, jumping up and down on a trampoline is something that's fun, and they can control that. They love that, that movement up and down. Even swinging too. Um, kids are usually drawn to swinging on the trampoline or running something like that. Um, but it just helps control that input.*

APPENDIX J: EXAMPLE OF TRAINING POWERPOINT PRESENTATION





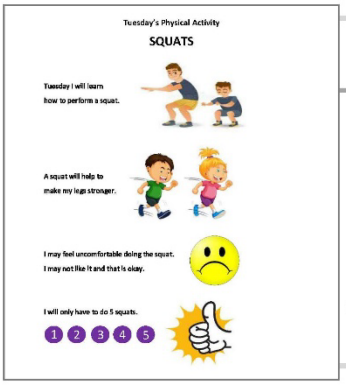


Planning

1) Positive and Trusting Relationships need to be established (Mezirow et al., 2009).
2) The facilitator of the physical activity (PA) needs to know how the child with ASD communicates.
3) Negative behaviors are attributed to not understanding social situations.
4) More comfortable a child w/ ASD feels, higher probability they will respond positively to PA.
5) Better you know your child w/ ASD, the easier it will be to interpret the child with ASD's actions and behavior.

Instructional Delivery

1) Short and precise verbal cues are needed in addition to preparation beforehand.
2) Modeling the PA by the facilitator of the PA.
3) Other visual aids can also be utilized.
    1) Play cards
    2) Photos
    3) Video modeling
    4) Peer modeling

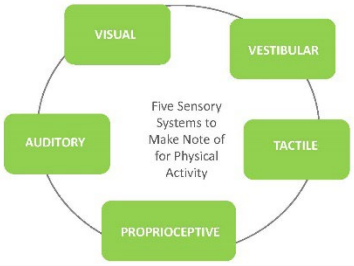


Instructional Delivery

1) Providing a lesson preview (e.g. social story) can increase the child w/ ASD's understand of what to expect the day of PA (Sandt, 2008).

Example of a social story.

Sensory



Children with ASD can have issues processing sensory information, thus leading to higher stress and anxiety for them (Grenier, 2014; Ferreira et al., 2018; Luiselli, 2014). Understanding a child with ASD's particular sensory needs, a facilitator of PA can implement a more positive experience for the child with ASD.

Sensory

Example of Sensory Strategies for PA

SENSORY	CONCERNS	STRATEGY
AUDITORY	Difficulty understanding the meaning of words.	Use short, simple directions. Visual aids need to be used.
VISUAL	Difficulty in being able to follow visual sequences.	Reduce visual distractions. With visual aid, use a sequence chart.
VESTIBULAR	Poor balance, poor muscle control, tends to only want to swing.	May need extra support due to balance issues and lack of initial muscle control. Can use a swing for breaks and as a reward.
TACTILE	Can be hyperactive, easily distracted.	Provide sensory toys to hold or fiddle with during instruction.
PROPRIOCEPTIVE	Difficulty coordinating movements, and spatial awareness.	Start simple, single joint, muscle isolation Increase spatial awareness by incorporating movement games, puzzles, and/or obstacle courses.

Physical Activities

1) Children w/ ASD can have a positive response due to regular bouts of PA.
2) Fewer stereotypic behaviors, higher self-confidence, and increased attention to tasks (Bremer et al., 2016; Ferreira et al., 2018; Kern et al., 1982; Lang et al., 2010; Miramontez & Schwartz, 2016; Stanish et al., 2017).
3) Expect Modifications
4) A child with ASD may be drawn to a PA or avoidance of that PA due to sensory input (Grenier & Yeaton, 2011).

Physical Activities

1) Break up learning the PA into smaller steps.
2) Always include a warm-up and cool-down section within PA session.
3) Main component of a Session can be one or a combination of individual exercise, group-based activity, and/or "free-play" activity.

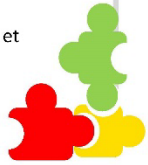
Environment

1) Prepare the envoinrment (Menear & Neumeier, 2015).
2) Timer/Clock on the wall.
3) Easy to see Play Cards explaining how to do the activity.
4) Modeling by pairing child w/ ASD w/ a neurotypical peer they are familiar with.

How can you mitigate the child with ASD's sensory aversion?
How can you better prepare the child with ASD for routine scenarios?

Motivation

1) Positive Reinforcement
2) Reward System
    1) Give regular breaks
    2) Do PA that the child w/ASD craves for sensory
    3) Chart
    4) Video Time
    5) Food
3) Center the teaching of the new PA to the Child w/ASD (Hoggan et al., 2017; Weimer, 2002).



Conclusion

1) Person-Centered Planning
2) Encompass Health Components within PA intervention.
3) Identify strategies beforehand for communication, sensory, environment, and motivation.
4) The facilitator of the PA can truly implement a more effective, flexible and integrative PA intervention for the child with ASD.

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APPENDIX K: RESEARCHER POSITIONALITY

As the researcher behind this study, I must recognize that my personal and professional experiences may have influenced my analysis of the data. As a mother of an autistic child and an educator of autistic students in higher education, it is possible that my interpretations of the research findings may have been biased. To mitigate this, I have conducted an in-depth study utilizing multiple sources of data. I was diligent in my observations, taking note of every detail and providing thorough descriptions. My personal investment in this area has given me a unique and informed perspective. My interpretations were made based on my knowledge and understanding, while also seeking guidance from trusted resources and faculty advisors throughout the research process.