

Comparison of Behaviors of Children with Autism Spectrum Disorder in Different
Play Settings

by
Katrina Nussbaum

A THESIS

submitted to

Oregon State University

University Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Kinesiology
(Honors Scholar)

Presented May 16, 2016
Commencement June 2016

AN ABSTRACT OF THE THESIS OF

Katrina Nussbaum for the degree of Honors Baccalaureate of Science in Kinesiology presented on May 16, 2016. Title: Comparison of Behaviors of Children with Autism Spectrum Disorder in Different Play Settings.

Abstract approved:

Megan MacDonald

The purpose of this study was to compare the child behaviors of young children with autism spectrum disorder (ages 44-91 months) in different play settings. The hypothesis states that more positive child behaviors will be observed in the motor-based play setting compared to the free play setting. This study observed children (n=8) and their parent/caregiver for 10 minutes in each respective setting. The behaviors observed include child's sustained attention, child negativity toward parent, child engagement with parent and connectedness between child and parent. Positive behaviors are defined as decreased negativity, and increased child engagement, increased sustained attention and greater connectedness with their parent/caregiver. The correlation of behaviors in the free play setting compared to the motor based settings were significant ($p > 0.05$) for all four behaviors. The results of this study conveyed contrary findings to the hypothesis, there were more positive behaviors in the free play setting. One conclusion for why this occurred is the familiarity of a free play setting for this age group. A confounding influence could be motor skill level.

Keywords: child behaviors, free play, motor based play, autism spectrum disorder

Corresponding e-mail address: nkk994@gmail.com

©Copyright by Katrina Nussbaum
May 1, 2016
All Rights Reserved

Comparison of Behaviors of Children with Autism Spectrum Disorder in Different
Play Settings

by
Katrina Nussbaum

A THESIS

submitted to

Oregon State University

University Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Kinesiology
(Honors Scholar)

Presented May 16, 2016
Commencement June 2016

Honors Baccalaureate of Science in Kinesiology project of Katrina Nussbaum
presented on May 16, 2016.

APPROVED:

Megan MacDonald, Mentor, representing College of Public Health and Human
Sciences

Sam Logan, Committee Member, representing College of Public Health and Human
Sciences

Kiley Tyler, Committee Member, representing College of Public Health and Human
Sciences

Toni Doolen, Dean, University Honors College

I understand that my project will become part of the permanent collection of Oregon
State University, University Honors College. My signature below authorizes release
of my project to any reader upon request.

Katrina Nussbaum, Author

Comparison of Behaviors of Children with Autism Spectrum Disorder
in Different Play Settings

Introduction

Young children spend most of their day engaging in play, this can include opportunities for development of social, motor and cognitive skills. The settings observed in this study were two common play settings, a traditional free play setting, and a motor-based setting. The purpose of this study is to examine child behaviors of children with autism spectrum disorder in two distinctly different play settings. Autism Spectrum Disorder (ASD) consists of impairments in the social communicative domain, and restrictive and repetitive interests, activities, and behaviors (American Psychiatric Association [APA], 2013). ASD is almost 4 times more common in boys compared to girls (Christenson et al., 2016). More importantly, the prevalence rate for an ASD diagnosis in 2012 was 1 in 68 children (Centers for Disease Control and Prevention [CDC], 2016). Studies have shown that a diagnosis of ASD as early as the age of 1 can be valid and reliable yet, the median age for a child's first diagnosis is 46 months (Lord et al., 2000; Kleinman et al., 2007). This study focuses on how child behaviors towards their parent differ within different play settings. It is hypothesized that in motor-based play settings more positive behaviors will be displayed in children with ASD when compared to the free play settings. Positive behaviors are defined as decreased negative attitude toward their parent/caregiver and increased sustained attention, engagement and connectedness toward parent/caregiver.

Literature Review

Autism Spectrum Disorder (ASD)

Autism spectrum disorder is characterized by deficits in the social communicative domain (APA, 2013). Deficits in social communication and interaction can be seen through, limited social-emotional reciprocity, poorly integrated verbal and non-verbal communication and difficulty understanding relationships. Symptoms and signs of ASD can be seen as early as 12 months, however a more consistent diagnosis is made around 24 months (Kozlowski, Matson, Horovitz, Worley & Neal, 2011; Kleinman et al., 2007). A medical diagnosis for ASD is made using the criteria in the Diagnostic and Statistical Manual, DSM-5 (APA, 2013). Children with ASD typically display symptoms such as, lack of non-verbal communication including eye contact, difficulty understanding emotions, failure to initiate social interactions, wanting routine or sameness in daily activities and difficulty maintaining relationships with others.

ASD and Social Skills

Nonverbal skills such as visual discrimination, coordination, orienting to sounds and following simple commands are commonly seen in ASD diagnosis (Steiner, Goldsmith, Snow & Chawarska, 2011). Individuals with ASD are frequently reported as having declined interest or having limited social interactions/initiations (Steiner, et al., 2011). There has been a pronounced notice of decreased ability to communicate through speech and understand gestures around the second birthday of children who are diagnosed with ASD (Steiner, et al., 2011). Children with ASD struggle with sustained attention and shifting their focus from one object/activity to another (Brigham, Yoder, Jarzynka, & Tapp, 2009). Some tendencies seen in children

with ASD are repetitive behaviors, and difficulty transitioning from one task or location to the next. Children with ASD have difficulty transitioning because they are known to either have sensory overloads by their environment or become very preoccupied with all of their focus on one behavior or activity. One common non-verbal communication skill that children with ASD struggle with is making eye contact with whomever they are interacting with. As far as language skills individuals with ASD range from having age-appropriate skills to some being ‘minimally verbal’ (Arciuli & Brock, 2014). This is one reason why verbal IQ is included in many studies of this population. Communication impairments of children with ASD can include pragmatics (taking turns in conversation or organizing language in context), gestures and language (Arciuli & Brock, 2014). Delayed onset of joint attention (often observed between 3-12 months) is an early indicator of ASD (Arciuli & Brock, 2014). Joint attention is directing their parent’s attention to a toy or following their parent when they point or gaze at an object. Children with ASD show fewer initiations and responses to joint attention than their typically developing peers (Arciuli & Brock, 2014). This concept of joint attention influences language development (Arciuli & Brock, 2014). A large proportion of toddlers with ASD have a delayed ability for appropriate responses to sounds, such as orienting to the sound and following simple directions (Steiner, Goldsmith, Snow, & Chawarska, 2012). Inability to appropriately respond to sounds has been seen more than delayed speech or word formation in children with ASD (Steiner, Goldsmith, Snow, & Chawarska, 2012).

ASD and Motor Skills

Recent research has shown that motor milestones may be one of the earliest diagnostic indicators of ASD allowing for earlier diagnosis and intervention. Children with ASD have motor milestone development delays; 9 out of the 11 delayed motor milestones have been observed before the age of 2 (Liu, 2012). The motor milestones most significantly delayed include: turning from side to back, reaching unilaterally, climbing, stepping, walking with help, cruising, toe walking, walking backward, running, jumping, and galloping (Liu, 2012). Motor development influences language, social development and cognitive development. One example of this relationship between motor and social development is the ability for children to participate in physical activity including sports and physical education. These opportunities for physical activity are learning opportunities for all domains of development (Liu, 2012).

Being able to move effectively early in life influences a child's ability to develop more complex motor skills. Young children with ASD have gross and fine motor skill delays, and with age, gross motor skill delays become wider (Lloyd, MacDonald & Lord, 2013). This was shown through a cross-sectional study of 162 children between the ages of 12 and 36 months (Lloyd et al., 2013). Follow-up of this study included a longitudinal study of 58 of the same children. Over a 6-month time difference children had gross and fine motor deficits that increased (Lloyd, MacDonald, Lord, 2013). This study showed that when the age gap increased, children with ASD fell behind further in both gross and fine motor skills. The gross motor subset on the Mullen Scale of Early Learning was used to measure motor proficiency (Lloyd et al., 2013). This study adds to previous research of gross motor

skills and developmental delay by being a large sample size and having a constant analysis of ASD diagnosis and IQ. Fundamental motor skills are often learned through social imitation. Environments that have social engagement and play might foster motor skill development. Lloyd, MacDonald, and Lord hypothesized that the gross and fine motor skills will be developmentally delayed for their age group (2013). Built upon this hypothesis was the idea that poor motor skills may limit social interactions and poor social skills may limit motor skill development. All in all gross motor and fine motor development affects a child's overall wellbeing including cognitive and behavioral development.

Another study found that object control skills, gross motor development and locomotor skills were lower in children with ASD than typically developing children of the same ages (n=91, 6-10 years old) (Pan, 2009). The Test of Gross Motor Development (TGMD-2) was used to evaluate the locomotor skills of, running, galloping, hopping, leaping, horizontal jumping and sliding and varying object control skills including, catching and kicking (Pan, 2009). This study acknowledged that having motor skills allows for success in any type of movement activity and success in physical activity throughout life.

Physical activity of children relates to their motor skill ability and sub sequentially affects their social skills. The physical activity behavior of children with ASD is an important topic of conversation given that recent research has indicated children with ASD are less physically active than their typically developing peers (Tyler, MacDonald, & Meneer, 2014). One study of 72 children ages 9 to 18 years old showed that older children were less physically active (MacDonald, Esposito, &

Ulrich, 2011). This study found that in older children moderate to vigorous physical activity decreases and sedentary behaviors increase especially during the hours after school (MacDonald, Esposito, & Ulrich, 2011). The amount of physical activity is affected by a child's skill level and the amount of opportunities children have for engaging in physical activity.

An optimal environment for children with ASD to participate in physical activity, may include being able to perform functional motor skills, which then may lead to having more opportunities for social skill practice (MacDonald, Lord, Ulrich, 2013). This environment could be one that fosters physical activity through activities such as running, biking and sports. A few studies have found that physical activity reduces the stereotypical behaviors of individuals with ASD, which frequently corresponds with more positive behaviors or appropriate reactions (Levinson & Reid, 1993). Research has shown that physical activity has both health benefits and behavioral benefits including, decreasing self-stimulating behaviors, and stereotypic behaviors especially following vigorous physical activity (MacDonald, Esposito, & Ulrich, 2011; Lang et. al, 2010). Specific types of physical activity may influence increased on-task behaviors and appropriate motor behaviors exhibited in individuals with ASD (Lang et. al, 2010).

Early Interventions and Motor Skills

The focus of intervention for individuals with ASD is highly focused on the area of social communicative development. Early interventions frequently focus on social communicative skills, specifically in activities of daily living or a group setting. Some of these social skills are joint attention, functional play, imitation and

symbolic play. Skills of daily living may include, feeding oneself, dressing oneself, communicating what they need/want, routines of going to school or the grocery store, teaching play skills and personal hygiene.

It has been shown that an early diagnosis of ASD is reliable and relatively stable (Steiner, Goldsmith, Snow, & Chawarska, 2011). With further advances in research the ability to diagnose earlier is allowing for earlier interventions and treatments in children with ASD. The importance of these early interventions is seen through many studies highlighting the gains and positive outcomes of treatment at a young age. Most early interventions focus on the key characteristics of ASD including, appropriate play through joint attention, social development including eye contact, and cognitive development (MacDonald, Parry-Cruwys, Dupere, & Ahearn, 2014). Historically these approaches are focused upon because they target the defining characteristics of ASD and focus on participation in daily activities.

Even with large deficits in motor skills early interventions for young children with ASD commonly focus on social and communication skills (MacDonald, Lord & Ulrich, 2014). These early interventions such as the Early Start Denver Model, often implement an emphasis on social communicative skills (Dawson et al., 2009). The Early Start Denver Model focuses on what enjoyable shared activities the child and parent can participate in and learning social cues. This specific intervention showed improvement in IQ, language, adaptive behavior and diagnosis level for a population of children ages 2.5 years old (Dawson et al., 2009). More recent research has started to focus on the deficits in motor skills and even more importantly the relationships between motor development and cognitive/behavioral development. One reason why

motor skills are important to focus upon is, that it has been found that a 10-year-old child with ASD performs movement skills at an equivalent level to a 5-year-old child, in other words movements of a child with ASD may be similar to a typically developing child that is half their chronological age (Staples & Reid, 2010). Motor skill deficits are prominent in early development and become more pronounced as a child ages this highlights why motor skills are important in intervention and why earlier interventions are favored (Staples, MacDonald, & Zimmer, 2012).

Fundamental motor skills include, control of one's body (turning or stopping), locomotor skills (running or skipping), and object control skills (kicking or throwing). Motor milestones (including, sitting and walking) are the stepping-stones for fundamental motor movements such as, running and throwing (Staples, MacDonald, & Zimmer, 2012). These fundamental motor movements are developed and become the basis of sport specific skills and more advanced activities (Staples, MacDonald, & Zimmer, 2012). The importance of fundamental motor movements is that they must be learned and are primarily learned through imitation. One does not instinctively know how to pedal a bike, skip or throw a ball without the appropriate practice. These types of motor skills are common in childhood play and influential in respect to social norms. For young children to participate with their peers they need the skills necessary to participate in play, including fundamental gross motor skills (MacDonald, Parry-Cruwys, Dupere, & Ahearn, 2014). This can be illustrated on the playground or in physical education. For example young children need to be able to run (locomotor skill) to participate in tag, be able to kick a ball to participate in a

soccer game and lastly they would need to be able to control their body by stopping and going quickly, in order to participate in the game Duck Duck Goose.

Another reason why interventions focus on younger children is that more gains have been seen in these populations (MacDonald, Parry-Cruwys, Dupere, & Ahearn, 2014). For an early intensive behavioral intervention study the best long term outcomes and greatest changes were in participants who started at 1 year old, showing that the earlier a child with ASD begins treatment the more pronounced outcome (MacDonald, et al., 2014). In a study that had participants who were 18-59 months of age, interventions showed gains in social, cognitive and language development for this young population of children with ASD (MacDonald, et al., 2014).

Relationship of Social Communicative Skills and Motor Skills

Few studies have examined the relationship of social engagement and physical activity in children with ASD even though engagement in social interaction is one of the key diagnostic features of ASD (Pan, 2009). Research surrounding the topic of social interaction alongside physical activity is still new and the true interaction between motor and social skills is unknown. Interestingly enough, one study found that children who engaged in more social interactions didn't have more physical activity than those who were less socially active (Pan, 2009). Yet, it was observed that non-interactive engagement with adults had a positive correlation with vigorous physical activity and steps/min during Physical Education classes (Pan, 2009).

Examining the relationship between social communicative skills and motor skills in children with ASD is a growing topic (MacDonald, Lord & Ulrich, 2014). A clear relationship between motor skills and social communicative skills has not been

discovered, but they frequently influence one another during play (MacDonald, Lord, Ulrich, 2013). A study with 35 participants from ages 6-15 years old, used assessments including the TGMD-2 and Social Skills Improvement System Rating Scales to measure motor skills and social skills respectively (MacDonald, Lord, Ulrich, 2013). Future areas of research include, defining the relationship between motor skills and social development (MacDonald, Lord, Ulrich, 2013).

MacDonald, Lord, and Ulrich found that children ages 14-33 months old (n=159) who had lower gross and fine motor skills also had a higher calibrated autism severity (2014). This study agrees with previous studies that children with ASD are observed to have both weaker motor skills and greater social communicative deficits. In the early years of life motor skills affect skill development in other areas such as, functional play skills, skill-based games and social activities (MacDonald, Lord, Ulrich, 2014). This study showed a direct relationship between motor skill level and calibrated autism severity (MacDonald, Lord, Ulrich, 2014).

Impairments in play skills have been observed in children with ASD. One distinction of toddlers with ASD is that they often have limited imagination and creativity; both of these traits can improve play experiences especially with others (Steiner, Goldsmith, Snow, & Chawarska, 2012). One study found that children with ASD who played with miniature toys (including cars and dolls) focused upon the sensory qualities such as, the texture and noises they made (Steiner, Goldsmith, Snow, & Chawarska, 2012).

Free Play and Motor-Based Environments

Play allows children to interact, and grow in their emotional, motor, social and cognitive domains. Frequently children with ASD focus on the sensory aspects of toys, play in a repetitive way, or move from one toy/activity to the next frequently (Steiner, Goldsmith, Snow, & Chawarska, 2011).

In a study that examined behavior across three social environments including, free-play, mealtime routines and inclusive group activities, children with ASD were compared to children with varying disabilities (Kemp, Kishida, Carter, & Sweller, 2012). This study found that children with ASD, respond less to the teacher, play with materials less than other children with disabilities and engage with peers less during biking, sand and water play indoors and outdoors. This suggests that the level of peer engagement varied based upon the social environment (free-play, routine activities and group activities) in a childcare setting (Kemp et al., 2012). This study looked at the engagement of children with ASD in different play settings at a preschool. Active engagement was highest in free play (recess), while passive engagement was highest during the group-based activities including: gross motor, story time, music and language (Kemp et al., 2012). Active engagement can be observed through the manipulation of an object such as when a child plays with blocks, or responds to a peer or teacher with a gesture or verbal answer to a teacher's question (Kemp et al., 2012). Passive engagement can be observed through looking at the teacher during a group activity or watching a peer play (Kemp et al., 2012). Children with ASD were most engaged in routine activities and least when it is a group activity. Compared to children with other types of disabilities children with ASD were found to be less engaged and interact less with peers, this matches with the typical social

tendencies/difficulties of children with ASD (Kemp et al., 2012). Expanding upon the findings of this study can contribute to the development of inclusive physical activity programs for children with ASD.

A study that looked at the types of motor activity exhibited during indoor free play had 41 participants who were 16-36 months old (Fees, Fischer, Haar, & Crowe, 2015). It was found that toddlers often choose sedentary behaviors in free play environments. This study observed that toddlers were sedentary (examples including: sitting, laying, and standing) 74% of the time during the free-play sessions (Fees, et al., 2015). Toddlers who were 2.5 to 3 years old spent an increased amount of time observing others through a task called “onlooking”, although this behavior is sedentary it is important for learning behavior expectations (Fees, et al., 2015). During this same age period, toddlers are learning locomotion such as walking and running, and object manipulation such as, catching, kicking and increased hand-eye coordination; all in all at this age there are large amounts of opportunity for gross motor growth.

Engagement and Social Relationships

Another change observed as children age developmentally is that their engagement becomes more sophisticated (Almqvist, 2006). This study found that children with disabilities spent more time passively non-engaged than typically developing peers. Regardless if the child was developmentally delayed it was found that engagement improved along with interaction skills and availability of activities (Almqvist, 2006). Another study found that social engagement was higher when children were participating in large motor behaviors (Reszka, Odom, & Hume, 2012).

This study agreed with previous findings that children with ASD have low levels of engagement, but they found that environmental factors could enhance and increase social interaction (Reszka, Odom, & Hume, 2012). These studies consistently show the intertwining relationship of social development and environment.

Attachment/Parent Child Relationship

A study using the Focused Playtime Intervention, as a parent education program showed positive increases in attachment-related behaviors (Siller, Swanson, Gerber, Hutman, & Sigman, 2014). Attachment behaviors have previously been connected to language and cognitive development (Siller et al., 2014). The parent-child relationship is an important context for early social, emotional, and communicative development.

With the aid of an extensive literature review that dove into topics of motor skills, play environments and the behaviors of children with ASD a hypothesis was formed that more positive behaviors of children with ASD will be seen in the motor-based play setting compared to the free play setting. The reasoning for this hypothesis was that previous studies have seen children with ASD decrease stereotypical behaviors and increase positive behaviors following physical activity (Levinson & Reid, 1993). Another study showed similar results in behaviors of individuals with ASD and stereotypic behaviors following vigorous physical activity (MacDonald, Esposito, & Ulrich, 2011 and Lang et. al, 2010). Along with that one study found that toddlers were primarily sedentary during play in a free-play environment (Fees, et al., 2015). Being sedentary (sitting, laying, standing) doesn't mean that they wont exhibit the child behaviors observed in this study but the opportunities for it may be less if

the child is interacting less with the toys, parent or environment. Connecting this to the present study, the act of physical activity is more likely to occur in a motor-based play setting that has space and equipment. Studies have shown that children with ASD are typically most engaged when it is a routine activity and tend to be less creative than their typically developing peers, these two factors may incline that the free-play setting would not be an engaging environment for child and parent but rather they may only stick to one toy or move from toy to toy frequently which could cause frustration for the child and negatively influence their behaviors of connectedness and positivity toward their parent (Kemp et al., 2012 and Steiner, Goldsmith, Snow, & Chawarska, 2011). Along with this another study looked at positive emotions and engagement of preschoolers and found that they were lower during free play than typically developing preschoolers (Hirschler-Guttenberg, et al., 2014). This study was comparing children with ASD to typically developing children. It is unknown if the same result of child behaviors will be seen when comparing the free-play setting to a motor-based play setting.

The purpose of this study was to test this hypothesis by comparing the same child behaviors of children with ASD in two distinctive environments, a motor-based play setting and a free or traditional play setting. This study will answer the question of which play setting may be more suitable for an intervention that wants to improve child behaviors of children with ASD. The behaviors examined are influential in a learning environment such as home or school and are expected for typical development of young children. These behaviors include interactions with the child's

parent or caregivers such as, positive communication, connectedness, sustained attention and negativity toward parent.

Methods

This study assessed data from a larger study done at Oregon State University. The Institutional Review Board approved this study.

Participants

This study included 9 participants between the ages of 44 to 91 months old (this is equivalent to about 3-7 years old). The average age of the participants was 62.1 months (SD =16.8). Autism Diagnostic Observation Schedule (ADOS) was given to confirm diagnosis for ASD, verifying that all of the participants met this criterion (Lord et al., 2000).

Demographic

A demographic questionnaire gathered information about each participant, shown in Table 1. The participants were primarily male (n=8). All 9 participants in the study had ASD. Part of a developmental assessment includes non-verbal ratio IQ. This value is calculated by taking the average age equivalent for non-verbal subtest results (from the cognitive assessment DAS II), divided by the participant's chronological age in months, and then multiplied by 100. This method is common in practice (for an example see, Tyler, MacDonald, & Menear, 2014). Out of the 9 participants only 8 participants were used in this study. The non-verbal ratio IQ scores for all 8 participants were from 31 to 108 with an average of 76.4 (SD = 26.7). The majority of the participants identified as Caucasian (n=6), a few identified their race as mixed (n=2) and one identified their ethnicity as other (n=1). Out of 8

participants the majority identified that they had no other disability (n=7) and one participant had Asthma (n=1).

Behavior Coding

Two settings distinguish the data comparison for this study. The first setting, labeled as a free play setting, consisted of having many toys available. These toys included but were not limited to, cause/effect, blocks, string, and cars. The second setting, labeled as a motor-based play setting, consisted of a large area with steps, wedge mats, a teeter-totter, balance beam, a tunnel, a tricycle and a variety of balls. Videos of each play setting were recorded for 10 minutes (for a total of 20 minutes per child/parent-caregiver pair).

The four behaviors observed were: sustained attention of child, child negativity toward parent, child engagement with parent and connectedness between parent/caregiver and child. Child sustained attention can be described as focusing upon or interest of an object. Child negativity is illustrated through anger, disgust and dislike toward parent. Child engagement is illustrated through positive communication and interaction with parent. Lastly, connectedness also described as mutuality, is the synchrony and comfort between the child and parent. The videos were coded with a 7-point scale ranging from “very low” to “very high” where a value of 1 is low and value of 7 is high. The four scales used, illustrated each of the four behaviors recorded and observed. These scales are from the study, Early Head Start (EHS) 24-Month 3-Bag Scales (Brady-Smith, O'Brien, Berlin, Ware, & Brooks-Gunn, 1999). Original coding included videos of typically developing children and children with ASD, the video coders were blind to which participants had ASD.

Coders watched the 10-minute play session from minute 3 thru minute 8, this time frame accounted for the participant's acclimation to the video camera and environment.

Data Analysis

Descriptive analyses were used to record all participant and demographic data. A paired t-test was run for all four behaviors in each respective setting (traditional/free play and motor-based). Out of the 9 participants only 8 had data for the four behavior codes and since that was the focus of this study only 8 participants were included. The four behavior variables include: child engagement with parent/caregiver, child sustained attention, child negativity, and connectedness between child and parent/caregiver pair. With this there were 4 different pairs of the same behaviors represented in each setting. The settings are independent variables and the child behaviors are dependent, allowing a correlation for the two different settings to be made. Table 2 shows the results of the paired sample comparisons and significance values for each behavior and setting pair.

Results

Following data analysis correlation results were found for the four child behaviors in each setting (free play and motor-based). When comparing the free play setting with the motor-based setting, a t-test presented statistically significant differences for all four child behaviors (Table 2). The t-test values for child engagement, child sustained attention, child negativity toward parent and connectedness are shown in Table 2. These results illustrate that when comparing the two settings of the group of children with ASD (n=8), the child behaviors that related

to positive behaviors were shown more in the free-play setting. Table 1 shows the descriptive characteristics of the participants and Table 2 shows the means and correlating values for each child behavior in each respective play setting.

Table 1. Descriptive characteristics of children in this study

Autism Spectrum Disorder (n=9)		
	Mean (SD)/ Frequency	Range
Age (months)	62.1 (16.8)	44 – 91
Gender		
Male	8	
Female	1	
Non-verbal IQ	76.4 (26.7)	31 – 108
Ethnicity		
Caucasian	6	
Mixed	2	
Other	1	
Other Disabilities		
None	7	
Asthma	1	

Table 2. Mean differences of child behaviors based upon play setting

Child Behaviors	Settings		<i>t</i>	<i>P</i> *
	Motor-Based	Free play		
Child Engagement	3.50	4.75	-3.42	.011
Child Sustained Attention	3.50	5.37	-3.91	.006
Child Negativity to Parent	1.87	1.12	2.39	.048
Connectedness/Mutuality	3.75	4.87	-2.55	.038

**P*=significance 2-tailed ($\alpha = 0.05$)

Discussion

The results from this study did not support the hypothesis of more positive child behaviors in the motor-skill based setting but rather the opposite, that the free play setting had more positive child behaviors. The mean values for the child behaviors were greater or more positive in the free play setting. Comparing the two settings showed significance that there was less negativity, more connectedness, more sustained attention and more positive communication in the free play setting.

Although the findings were contrary to my hypothesis some explanations can be pulled for why this occurred. It was hypothesized that positive child behaviors would be greater in the motor-based play setting. This hypothesis was partially based upon the idea that physical activity causes more positive behaviors and can even decrease stereotypic behaviors of children with ASD after engaging in physical activity (MacDonald, Esposito, & Ulrich, 2011 and Lang et. al, 2010). The likelihood for this study is that the motor-based setting probably did not cause a level of physical

activity high enough to show this relationship. Another influence upon the given hypothesis is the idea that children with ASD are often not as creative as typically developing peers and thus may have had a more difficult time engaging in the free play setting. Two factors may have contradicted this one being that there were common toys that the child had probably played with before and two that the relationship observed was of a familiar individual their parent/caregiver. This influence of it being a parent relationship means that they likely have played with their child in a similar free play setting. Since it likely was a familiar environment (including the individual the child is playing with, type of play and types of toys), it makes sense that engagement and connectedness are both shown to be higher in the free play setting.

Early interventions focus upon a free play setting similar to the one in this study. In early interventions the emphasis is on social communicative skills such as joint attention, eye contact and appropriate play skills. From the focus of early intervention on social communicative skills it would be expected that the free play setting may have more success with these skills since they are more familiar to this population (both parent/caregiver and child). This goes with the results of this study since the child behaviors were more positive in the free play setting. This further shows the need for expansion upon teaching children and parent's how to interact in a motor-based play environment along with in the free play environment. The results of this study show the need within early intervention for increasing focus on motor-based settings. Within these two settings both social and motor skills during play need to be encouraged and fostered through parents/caregivers as models.

Studies that have looked at both motor and social skills found that children with ASD have deficits in both areas. There are correlations between children with ASD who have weaker motor skills also having greater social communicative deficits (MacDonald, Lord, & Ulrich, 2014). This study is different in that the environment observed is of a parent and child together rather than just the child themselves. This idea and the results of this study show potential reasoning for why the motor-based play setting needs to be focused upon in early intervention.

Previous studies have compared children with ASD to typically developing children when looking at different social components such as positivity and engagement (Hirschler-Guttenberg, et al., 2014). This study adds to this body of research because it compares two common play settings for young children. Research has shown that children with ASD have deficits in both social and motor domains. With this information comes the question of how best to improve these deficits through early intervention. This study is influential because it looks at the play setting and begs the question of which play setting interventions need to improve upon.

Current literature acknowledges the motor deficits of children with ASD and the need to expand intervention to include motor skills. This connects to the idea of making an optimal environment for learning motor skills and giving opportunities for social skill development. With the recurring interaction of motor and social skills there is demand for studying how this interaction influences outcome and what can be done to decrease the deficits in both domains of motor and social skills for children with ASD.

Limitations

The greatest limitation of this study is the small sample size. Interestingly enough even with a small sample size the significant values for this study are very compelling. A similar study with a larger sample size and even a longitudinal study of the preschool years would be interesting to compare to these results. Another limitation is the potential influence of confounding variables such as autism severity and motor skill level.

Future Research

Future research should investigate the topic of child behaviors in different play settings in a larger sample size in order to see if these results are truly conclusive. Another path of future research related to this research question is looking at the respective motor skills of the participants in correlation to their social skills (in this case child behaviors). Current research has started to build the argument for the connection of these domains and their influence on child development. When looking at these two skill sets in a common play setting it would be interesting to see if motor skills affected the amount of positive child behaviors exhibited in a motor-based play environment. Another topic of future research is comparing similar child behaviors in a peer context or in a group setting. This would be a noteworthy environment to relay this same study question to. Previous research shows that many opportunities of learning motor skills come from playing with peers and learning through imitation. For children at young ages the school and home play environments are both prevalent.

Conclusion

This study showed that child behaviors were significantly more positive in a free play setting compared to a motor-based setting. However due to a small sample size and other confounding variables such as motor skill ability this is not a conclusive relationship. On the other hand, it is interesting that in a population defined as having deficits in the social domain, they exhibit less positive behaviors in the motor-based environment. One may venture to say this backs up numerous other studies showing that the motor skills in the population of children with ASD are just as important if not more important than social skills. The results of this study emphasize the need for focusing on motor-based environments when looking at child behaviors of children with ASD. For this specific population (n=8) it was shown that the free play setting might be more nurturing for learning and developing. This study starts to press the question of what environment is a best fit for the population of children with ASD especially in the context of therapy or early intervention.

Disclaimer

The data used in this study was part of a larger study done at Oregon State University.

References

- Almqvist, L. (2006). Patterns of Engagement in Young Children with and without Developmental Delay. *Journal of Policy and Practice in Intellectual Disabilities*, 3(1), 65-75. doi:10.1111/j.1741-1130.2006.00054.x
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5™ (5th ed.)*. Washington, D.C.: American Psychiatric Publishing, Inc.
- Arciuli, J., & Brock, J. (2014). *Communication in autism*. Amsterdam/Philadelphia : John Benjamins Publishing Company.
- Brady-Smith, C., O'Brien, C., Berlin, L., Ware, A., & Brooks-Gunn, J. (1999). *Early Head Start Research & Evaluation Project: Child-Parent Interaction Rating Scales for the Three-Bag Assessment 24-Month Wave*. New York, NY: National Center for Children & Families.
- Centers for Disease Control and Prevention [CDC], (2016). Data & Statistics. Retrieved from <http://www.cdc.gov/ncbddd/autism/data.html>.
- Christensen, D. L., Baio, J., Braun, K. V., Bilder, D., Charles, J., Constantino, J. N., . . . Yeamgin-Allsopp, M. (2016). Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012. *MMWR. Surveillance Summaries MMWR Surveill. Summ.*, 65(3), 1-23. doi:10.15585/mmwr.ss6503a1
- Dawson, G., Rogers, S., Munson, J., Smith, M., Winter, J., Greenon, J., . . . Varley, J. (2009). Randomized, Controlled Trial of an Intervention for Toddlers With

Autism: The Early Start Denver Model. *Pediatrics*, 125(1).

doi:10.1542/peds.2009-0958

Fees, B. S., Fischer, E., Haar, S., & Crowe, L. K. (2015). Toddler Activity Intensity During Indoor Free-Play: Stand and Watch. *Journal of Nutrition Education and Behavior*, 47(2), 170-175. doi:10.1016/j.jneb.2014.08.015

Hirschler-Guttenberg, Y., Golan, O., Ostfeld-Etzion, S., & Feldman, R. (2014).

Mothering, fathering, and the regulation of negative and positive emotions in high-functioning preschoolers with autism spectrum disorder. *Journal of Child Psychology and Psychiatry*, 56(5), 530-539. doi:10.1111/jcpp.12311

Kemp, C., Kishida, Y., Carter, M., & Sweller, N. (2012). The effect of activity type on the engagement and interaction of young children with disabilities in inclusive childcare settings. *Early Childhood Research Quarterly*, 134-143.

Kozlowski, A. M., Matson, J. L., Horovitz, M., Worley, J. A., & Neal, D. (2011).

Parents' first concerns of their child's development in toddlers with autism spectrum disorders. *Developmental Neurorehabilitation*, 14(2), 72-78.

doi:10.3109/17518423.2010.539193

Kleinman, J. M., Ventola, P. E., Pandey, J., Verbalis, A. D., Barton, M., Hodgson, S., . . . Fein, D. (2007). Diagnostic Stability in Very Young Children with Autism Spectrum Disorders. *J Autism Dev Disord Journal of Autism and Developmental Disorders*, 38(4), 606-615. doi:10.1007/s10803-007-0427-8

Lang, R., Koegel, L. K., Ashbaugh, K., Regester, A., Ence, W., & Smith, W. (2010). Physical exercise and individuals with autism spectrum disorders: A

systematic review. *Research in Autism Spectrum Disorders*, 4(4), 565-576.

doi:10.1016/j.rasd.2010.01.006

- Levinson, L. J., & Reid, G. (1993). The Effects of Exercise Intensity on the Stereotypic Behaviors of Individuals with Autism. *Adapted Physical Activity Quarterly*, 10, 255-268.
- Liu, T. (2012). Motor milestone development in young children with autism spectrum disorders: An exploratory study. *Educational Psychology in Practice*, 28(3), 315-326. doi:10.1080/02667363.2012.684340
- Lloyd, M., MacDonald, M., & Lord, C. (2013). Motor skills of toddlers with autism spectrum disorders. *Autism*, 17(2), 133-146. doi: 10.1177/1362361311402230
- Lord, C., Risi, S., Dilavore, P. S., Shulman, C., Thurm, A., & Pickles, A. (2006). Autism From 2 to 9 Years of Age. *Arch Gen Psychiatry Archives of General Psychiatry*, 63(6), 694. doi:10.1001/archpsyc.63.6.694
- Lord, C., Risi, S., Lambrecht, L., Cook, E., Leventhal, B., DiLavore, P., . . . Rutter, M. (2000). The Autism Diagnostic Observation Schedule- Generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders*, 30(3), 205-223.
- Macdonald, M., Esposito, P., & Ulrich, D. (2011). The physical activity patterns of children with autism. *BMC Research Notes BMC Research Notes*, 4, 422-422.
- MacDonald, M., Lord, C., & Ulrich, D. (2013a). The relationship of motor skills and adaptive behavior skills in young children with autism spectrum disorder.

Research in Autism Spectrum Disorders, 7(11), 1383- 1390. doi:
10.1016/j.rasd.2013.07.020

MacDonald, M., Lord, C., & Ulrich, D. (2013b). The relationship of motor skills and social communicative skills in school-aged children with autism spectrum disorder. *Adapted Physical Activity Quarterly*, 30(3), 271- 282.

MacDonald, M., Lord, C., & Ulrich, D. (2014). Motor skills and calibrated autism severity in young children with autism spectrum disorder. *Adapted physical activity quarterly*, 95- 105. doi: 10.1123/apaq.2013.0068

Macdonald, R., Parry-Cruwys, D., Dupere, S., & Ahearn, W. (2014). Assessing progress and outcome of early intensive behavioral intervention for toddlers with autism. *Research in Developmental Disabilities*, 35(12), 3632-3644. doi:10.1016/j.ridd.2014.08.036

Pan, C. (2009). Age, social engagement, and physical activity in children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 3(1), 22-31. doi:10.1016/j.rasd.2008.03.002

Reszka, S. S., Odom, S. L., & Hume, K. A. (2012). Ecological Features of Preschools and the Social Engagement of Children With Autism. *Journal of Early Intervention*, 34(1), 40-56. doi:10.1177/1053815112452596

Siller, M., Swanson, M., Gerber, A., Hutman, T., & Sigman, M. (2014). A Parent-Mediated Intervention That Targets Responsive Parental Behaviors Increases Attachment Behaviors in Children with ASD: Results from a Randomized Clinical Trial. *J Autism Dev Disord Journal of Autism and Developmental Disorders*, 44(7), 1720-1732. doi:10.1007/s10803-014-2049-2

- Steiner, A. M., Goldsmith, T. R., Snow, A. V., & Chawarska, K. (2011).
Practitioner's Guide to Assessment of Autism Spectrum Disorders in Infants
and Toddlers. *J Autism Dev Disord Journal of Autism and Developmental
Disorders*, 42(6), 1183-1196. doi:10.1007/s10803-011-1376-9
- Staples, K., & Reid, G. (2010). Fundamental movement skills and autism spectrum
disorders. *Journal of Autism & Developmental Disorders*, 40(2), 209-217. doi:
10.1007/s10803-009-0854-9
- Staples, K. L., MacDonald, M., & Zimmer, C. (2012). Assessment of motor
behaviour among children and adolescents with Autism Spectrum Disorder.
International Review of Research in Developmental Disabilities, 42, 179-214.
doi:10.1016/B978-0-12-394284-5.00007-3
- Tyler, K., MacDonald, M., & Meneer, K. (2014). Physical activity and physical
fitness of school-aged children and youth with autism spectrum disorders.
Autism research and treatment, 2014, 1-6.