

Preferred Play Activities of Children with Autism Spectrum Disorder in Naturalistic Settings

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Autism Spectrum Disorders (ASDs) are lifelong, neurobehavioral disorders that impact behavioral, social and communication skills. Introducing and designing appropriate play opportunities for children with ASD is of primary concern for educators, clinicians, and parents. The researchers set out to research the types of play most often preferred by children with autism spectrum disorders. Data collected in a children's museum over a six month period resulted in a sample size of 1,506 observations for children with ASD. Data for the six months were aggregated for each of 20 different exhibits. Each of the top five exhibits preferred by children with ASD provided strong and distinct sensory feedback and featured cause/effect results or repetitive motions. Conversely, the five least popular exhibits for children with ASD were pretend play activities, and play activities which focused on arts/crafts. At a 95% confidence interval, eleven of the twenty exhibits showed a statistically significant difference for children with ASD than would be expected by a normal distribution. Of those eleven, six were preferred less than the expected average and five were preferred more than the expected average. Preliminary results of this research study support the researchers' hypotheses that children with ASD prefer play activities with a strong sensory component and are far less likely to engage in activities involving pretend play.

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INTRODUCTION

Autism Spectrum Disorders (ASDs) are neurobehavioral disorders impacting behavioral, social and communication skills. In March 2013, the Centers for Disease Control National Center for Health Statistics and the Health Resources and Services Administration ("CDC") reported 1 in every 88 children identified as having an ASD, with a 5:1 male/female ratio. Parent-reported ASD in school-aged children are 1 per 50 children.¹ ASD can range dramatically in symptom and severity level. However, regardless of level of impairment, educators and parents of children with ASD struggle to identify and design appropriate play activities to promote learning. Children learn through play experiences and opportunities.² Development in all domains (social-emotional, communication, physical, adaptive, cognitive) is exceedingly reliant upon the existence of play in a child's daily life.³ Indeed, play is such an essential component of childhood education that Jean Piaget and Maria Montessori decreed play as the sole and decisive vocation of children.⁴

Therefore, introducing and designing appropriate play opportunities for all children, but particularly children with ASD, is a primary concern for educators, clinicians, and parents. As many children with ASD have difficulty engaging and/or staying on task, and their behaviors can be atypical, it is challenging yet imperative to find meaningful

play activities and experiences catering to their specific interests and ability levels. Limited research has been conducted examining types of play favored by children with ASD. However, one research study conducted by Holmes and Willoughby suggested children with ASD gravitate towards play experiences of a sensory, repetitive, or cause/effect nature.⁵ Unique play and sensory preferences demonstrated by many children with ASD, combined with a difficulty engaging in pretend or imaginative play, can further limit types of play skills found in their repertoire.⁶

Charman's 1997 study compared children with autism, developmental delay and typical development in four play categories: sensorimotor, ordering, functional, and pretend. Results showed no differences in production of sensorimotor, ordering or functional play; however, only one child in the group of ASD (n = 10) 10% and two (n = 9) 22.2% in the group of developmental delay produced any examples of pretend play, significantly less than in the group of typical development (n=19) 63.2%.⁷

What type of play do children with ASD prefer? The current study was designed to investigate types of play most often preferred by children with ASD. Preliminary data were drawn from area focus groups comprised of parents of children with ASD, and formal/informal interactions between the researchers and community members. Discussions centered on the issues parents of children with ASD face in finding appropriate play opportunities.

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Preliminary data indicated one of the biggest challenges for families with children with ASD was finding play and recreational opportunities where their children could learn and interact with others, while still being themselves in a safe, engaging, and understanding play environment. Events typically held in the community may be too crowded, stimulating or involve too much waiting for the child with ASD, triggering frustration and maladaptive behavior. Therefore, observing children with ASD under these circumstances would not provide an accurate demonstration of play preferences. Additionally, events held in the community may not be appropriate for the interest/ability level of children with ASD, further clouding the results of the data collection. This study was designed to observe free play preferences of children with ASD in a controlled but authentic setting, where direct observation and data collection would be possible.

Prior research examining the play preferences of children with ASD has been conducted in contrived or clinical settings;^{8,9,10} this research study was novel in that it was conducted in a public museum in a community setting. None of the exhibits were altered or modified in any way for this study; all play materials and exhibits had been in place for

years. A unique play opportunity for children with ASD was designed, entitled “Au-some Evenings”. Specifically, this research study investigated types of play activities preferred by children with ASD and sought to test the hypothesis that they prefer categories of play providing strong sensory feedback, or involving movement/motion.

This study is novel in the area of studying the free play choices of children with ASD because it was conducted in a naturalistic setting, without adult prompting, or contrived situations. The children were allowed to freely select play activities, and did not realize they were being observed, so responses and behaviors were authentic. These attributes add to the novelty of this study.

The importance of our research findings demonstrates what types of play children with ASD prefer and which they do not prefer. This information is critical to educators, practitioners, and parents in designing meaningful, constructive, and valuable play opportunities to foster growth, and development in children with ASD, as well as providing opportunities for them to engage in preferred play activities with peers, increasing social opportunities.

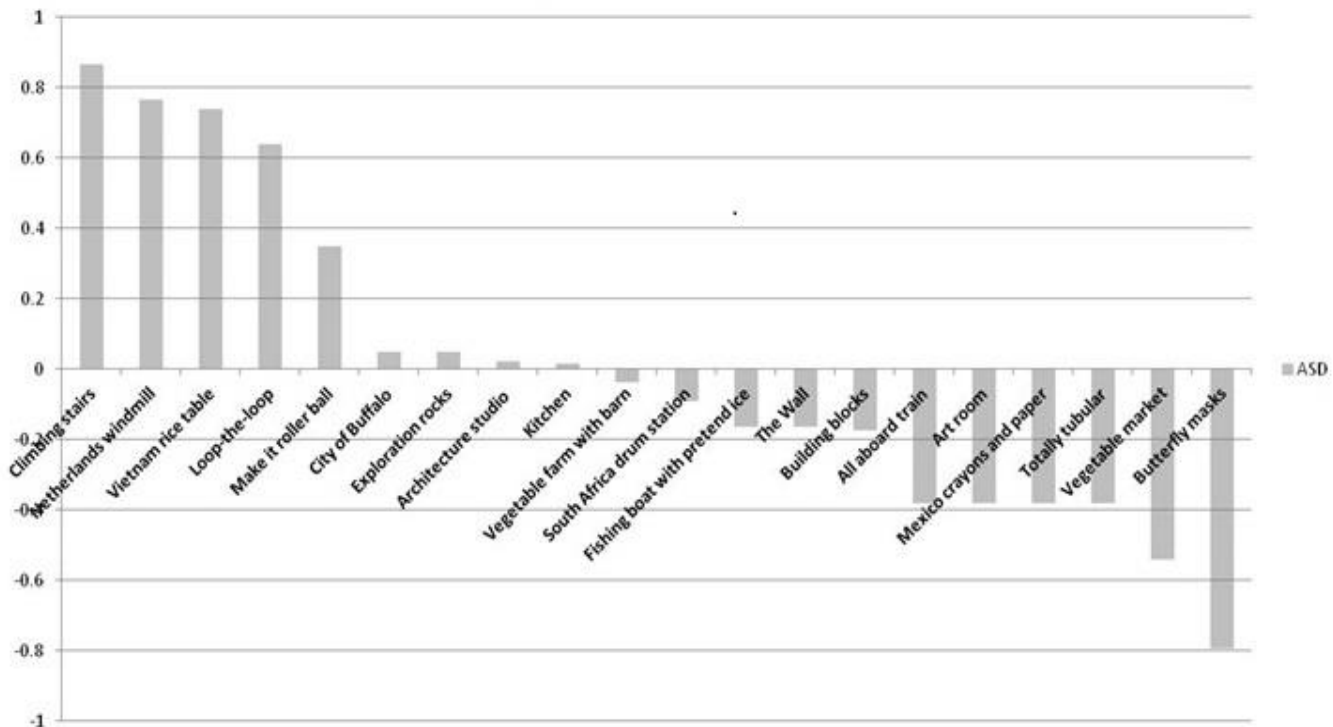


Figure 1. ASD deviations of place $Pr > ChiSq > 0.0001$.

METHODS

Setting

The concept of Au-Some Evenings was born during a meeting with the directors of a local children’s museum. The researchers trained all staff in working with children with ASD, emphasizing the unique communicative and behavioral

needs of the population. An area law firm graciously agreed to sponsor the evenings, to ensure the museum would incur no cost in hosting the event and it could be offered free to families.

The 5,000 square-foot museum offered 20 exhibits of approximately similar dimensions. Although several exhibits were categorized as providing sensory-feedback, they were not in close proximity to each other, so participants were required to deliberately travel to visit an exhibit. Clear travel space allowed for easy movement between exhibits, and delineated physical parameters for each exhibit. Exhibits were uniform in carpet and lighting although murals or coverings adorned some walls. Noise volume did vary between exhibits, particularly in those which housed materials of a musical or movement/motion nature. Other areas were noticeably and intentionally hushed, such as the arts/craft room or the "quiet" room (providing respite from sounds/stimulation).

The sole entrance and exit door was manned by an exceptional education teaching candidate, allowing parents to relax in knowing children were in a secure environment. A sign-in table, with additional adults, was directly outside this door, providing another layer of supervision and barrier to any fleeing participant.

Participants

Invitations for Au-Some Evenings were extended to families via listservs, websites, school backpacks and calendars. An article describing Au-Some Evenings was also predominantly featured on the front page of a local newspaper. Children with parent-reported ASD, parents, siblings, and invited guests were welcomed. Monthly attendance averaged approximately 100 people, with some sessions exceeding 140.

Informal observation established an ASD- participant age-range of 3-18, with the most common age range being 5-10 years old. The male participants clearly outnumbered the females, consistent with the five-fold higher male incidence as reported by the CDC. In guests without ASD, there was no evidence of gender disproportionality; ages ranged from 1 to 17 years old. Four total participants had "other" parent-reported disorders (ADD, ODD, and Down Syndrome) and were grouped in the "non-ASD" category. Some families had multiple children with ASD; in these situations, children within the same family were placed in the category as having an ASD, accordingly. Most children without ASD were siblings of a participant with ASD, although three families invited first cousins and two families invited close friends.

Parental Consent

Parents/guardians were informed the study was anonymous, and only involved counting the number of children with ASD to determine play preferences. During the six-month study, just one family declined to participate but still continued to attend and enjoy the events.

Data Collection Procedures

Graduate exceptional education teacher candidates were recruited to volunteer for the Au-Some Evenings, and received autism-specific training from one of the researchers in observation and data collection but were blind to the study's hypothesis. They had the unique opportunity to

observe students with ASD and family members in non-academic settings, outside of the classroom. The teacher candidates were paired with a museum employee, who was familiar with each exhibit by name and purpose. The data collection dyads observed the participants on the same interval schedule, utilizing an app called "Rerun" set to five minutes, but collected data independently of each other to ensure inter-observer reliability. The number of children at each exhibit was tabulated and recorded on a data collection sheet during 30, five-minute intervals. Some evenings totaled fewer than 30 intervals, however, as often the very first and last intervals of the evening produced observations of "zero" if the museum was empty.

Children with ASD wore blue nametags, while children without ASD wore red, allowing both data collectors to quickly and independently count the number of children with ASD at each exhibit. During analysis, the number of children observed by the individual data collectors was compared to tabulate a percentage for inter-observer reliability and then averaged per exhibit. For data collection purposes, "children at each exhibit" was operationally defined as the number of children who were standing or sitting on, under, near, or in front of each exhibit.

Data Analysis

For data analysis purposes, experts in play were recruited to categorize each exhibit by type of play: sensory-feedback, cause/effect, pretend/dramatic play, arts/crafts, or movement/motion. Using these categories of play, the researchers were able to determine what specific types of play were predominantly preferred or avoided by children with ASD during the Au-Some Evening events.

RESULTS

Data collected over six months resulted in a sample size of 1,506 observations for children with ASD and 985 without. Data were aggregated for each of the 20 different play stations. The number of children with ASD at each evening ranged from 21 to 42 children, averaging 31; the number of children without ASD ranged from 15-29, averaging 22. Collected every session (100%), inter-observer reliability (percentage of agreement between the two independent data collectors) ranged from 83%-92%, averaging 87% agreement.

If the participants were distributed uniformly among the 20 exhibits, an average of 5% of the children with ASD could be expected to be at each exhibit during each sampling point over the course of the study. Using SAS software, the observed percent of children was compared to the expected 5% for each location. The chi-square tests at $p < .0001$ show the locations are significantly and not uniformly distributed for children with ASD.

For children with ASD, the percentage of observations at each station ranged from 1.02% to 9.34%, with a median of 4.68%. The Chi-square test value for children with ASD was 303.004: DF 19: $PR > ChiSq < .0001$, meaning there is strong support for the difference in preferences and minimal

statistical evidence to support these results were due to chance. Given characteristics of children with ASD and anecdotal reporting of parents, educators, and clinicians, one would hypothesize children would gravitate towards exhibits offering sensory feedback and would be less interested in exhibits lacking sensory feedback but involving pretend play.¹¹ The results of this study were consistent with this hypothesis.

At a 95% confidence interval, eleven of the twenty exhibits showed a statistically significant difference for children with ASD than would be expected by a normal distribution. Of those eleven exhibits representing a statistically significant difference from the normal distribution, six were preferred less (pretend play, arts/crafts) than the expected average and five were preferred more (sensory or cause/effect in nature) than the expected average. Each of the top five exhibits preferred by children with ASD provided strong and distinct sensory feedback and featured cause/effect results or repetitive motions, as categorized by play experts recruited by the researchers.

The five exhibits most significantly preferred by children with ASD were the Netherlands Windmill, Loop the Loop and the Vietnam rice table, the Climbing Stairs and Make it Roller-Ball. Descriptions of each of these exhibits are shown in **Figure 1**. Each exhibit preferred by children with ASD offered strong sensory input and feedback to the participant, while many featured repetitive movement or motion (Make it Roller-Ball), and cause/effect attributes, such as propelled balls (Loop the Loop), and spinning objects (Netherlands Windmill).

Conversely, the five *least* popular exhibits for children with ASD were pretend play activities, such as the Vegetable Market and the Butterfly masks. Additionally, play activities which focused on arts/crafts, such as the Art Room or Mexico crayons/paper, were significantly **not** preferred by children with autism. These results are depicted in graphic form in **Figure 1** and dramatically illustrate the strong preferences and non-preferences demonstrated by children with ASD while engaged in free-play.

Name of Exhibit	Description	Observed Rate %	Deviations of place	LCI 95	UCI 95
All aboard train	Train children could climb on - first exhibit in museum.	3.09	-0.382	2.21%	3.96%
Architecture studio	Activities where child could draw, build, make a rubbing	5.11	0.022	4.00%	6.23%
Art room	Separate room where children could create art with supplies	3.09	-0.382	2.21%	3.96%
Building blocks	Wooden inter connecting boards that could be configured into a house or other structure	4.12	-0.176	3.11%	5.12%
Butterfly masks	Dress up masks	1.03	-0.794	0.52%	1.54%
City of Buffalo	Lock and crane components that children could manipulate	5.25	0.05	4.12%	6.37%
Climbing stairs	Stairs led to platform where children could have high view of museum and also gave them access to "roller coaster" where they could drop a ball in a track and watch it go over "hills"	9.33	0.866	7.86%	10.80%
Exploration rocks	Table with many different types of rocks and magnifying glasses	5.25	0.05	4.12%	6.37%
Fishing boat with pretend ice	Fishing boat and poles where children could sit and catch magnetic fish which they could later pretend to sell in the market on ice.	4.18	-0.164	3.17%	5.19%
Kitchen	Play kitchen with table, stove, refrigerator, cupboards and lots of dishes and pretend food.	5.08	0.016	3.97%	6.19%
Loop-the-loop	Drop ball into track where it spins in a vertical loop before it flies out and exits into a numbered bin.	8.2	0.64	6.82%	9.59%
Make it roller ball	Similar to Rube Goldberg machine. Child launches ball and it traverses obstacle course back to exit.	6.74	0.348	5.47%	8.01%
Mexico crayons and paper	Children could create "rubblings" of different scenes with crayons and paper	3.09	-0.382	2.21%	3.96%
Netherlands windmill	Interactive, visually and physically stimulating. Children could spin windmill on wall which also turned base. Small children could ride on base.	8.83	0.766	7.40%	10.26%
South Africa drum station	Children could play drums	4.55	-0.09	3.50%	5.60%
The Wall	Open wall of "house" with lighted ropes and flickering flame.	4.18	-0.164	3.17%	5.19%
Totally tubular	Velcro board and PVC tubes with velcro that children could stick on the board	3.09	-0.382	2.21%	3.96%
Vegetable farm with barn	Children could "pick" tomatoes, beans and corn and go into barn to collect eggs from chickens	4.81	-0.038	3.73%	5.90%
Vegetable market	A stand where children could pretend to "sell" vegetables	2.29	-0.542	1.54%	3.05%
Vietnam rice table	Table filled with rice and a few funnels.	8.7	0.74	7.28%	10.12%

Sample size = 1,506 observations

Chi-Square Test for Specified Proportions	
Chi-Square	303.004
DF	19
Pr>ChiSq	<.0001

Figure 2. Observations of children with Autism Spectrum Disorders – descriptions of exhibits.

The relative deviations (real%-5%)/5% ranged from -0.794 to .8666 with the closer to 0 representing the closer to the average of 5% at each space, or the normal distribution expected if all exhibits held equal appeal and preference for children with ASD. For the participants in the study, distributions ranged from the Butterfly Masks at -0.794 (strongly non-preferred) to the Climbing Stairs at 0.8666 (strongly preferred). The graph of the deviations by location and exhibit is provided below in **Figure 2**.

Results of this research study support the researchers' hypotheses: children in this study with ASD prefer play activities with a strong sensory component and are far less likely to engage in activities involving pretend play.

DISCUSSION

Previously-published research studies support the hypothesis that children with ASD struggle with pretend play,^{12,13} and therefore, infrequently choose to engage in pretend play when given the choice. However, little research has been conducted to further examine the Holmes and Willoughby study, finding children with ASD often select toys, activities, and play materials based upon the sensory stimulation and feedback they provide.¹⁴ Results of the present study support this statement; Au-Some Evening participants with ASD were presented with the possibility of visiting twenty different museum exhibits and definitively and predominantly self-selected exhibits of a sensory or movement/motion category.

It is interesting to note the type of play expertly categorized as pretend in this study all require children to demonstrate a phenomena called Theory of Mind (ToM). ToM is the ability to place oneself in the place or shoes of another.¹⁵ For example, when engaging in pretend play, a child would have to possess the ability to assume the identity of another: to think, act, or speak as another would. Children often demonstrate ToM when playing house, for example. During this type of play activity, a child must put himself in the position of playing another character or fulfilling another role, demonstrating he can imagine himself as someone other than who he is. As evidenced by research, children with ASD struggle to develop ToM, although children with typical development may acquire ToM by age 4-6.¹⁵

While engaging in play activities of a sensory nature, however, children do not need to possess these higher-level cognitive abilities, which may explain why the participants in the present study so frequently preferred the exhibits depicting sensory stimulation or movement/motion. Presumably, a child would not prefer a play activity beyond his present cognitive ability, as a pretend play activity may be. When given the choice of where to play, participants in our study overwhelmingly avoided pretend-play exhibits.

Identifying the types of play preferred by children with ASD has practical and vital implications for educators, clinicians, and parents. For example, the results yielded by this study can be implemented in the creation of community activities geared towards children. This study's participating museum

is actually incorporating our results in the design and subsequent building of a new and expanded children's play museum. Similar community facilities and programs, such as recreational centers, after-school programs, playgrounds, game zones, or any type of hands-on facility could consider the results of this study when designing programs and services geared to children with ASD.

The information from this study could also be utilized in the creation of inclusive programs and services to encourage social interaction between children with ASD and peers. Prior research in the area of play has demonstrated children interact and socialize with each other while engaging in meaningful play-based activities.¹⁶ Parents, educators, and clinicians must know how to appeal to the play preferences and interests of children with ASD to garner and hold their attention during recreational opportunities with peers of typical development. The participants in this research study conclusively demonstrated that they preferred play experiences of a sensory-based nature, further guiding the design and implementation of inclusive programming.

Further, educators and clinicians can utilize this information in designing treatment sessions and intervention strategies for children with ASD. Preferred activities and manipulatives are frequently used as tangible and concrete positive reinforcement in the teaching of children with ASD. Often, it is difficult to identify preferred objects for contingent reinforcement of appropriate behavior. This difficulty is further intensified if the child with ASD demonstrates communicative challenges, unable to select a preferred object or toy by pointing, gesturing, signing, or speaking. Results in this study demonstrated participants with ASD would likely favor a toy with sensory feedback or repetitive movements, which would help to eliminate the educator or clinician's uncertainty in selecting an appropriate reinforcer. This information can be used by an educator to create a play station or learning center.

Parents could utilize this information in selecting toys and family activities to appeal to the interests and abilities of a child with ASD. One of the researchers involved in this study is a parent of a child with ASD, and recognized firsthand the need to identify meaningful and constructive opportunities for her son to engage in play. The capacity to engage in preferred play promotes independence for the child with ASD, thereby providing a parent or caregiver an opportunity to cook dinner, attend to another child, or just take a break for a few moments. Prior research indicates the need for leisure activities to support families living with a child on the spectrum.¹⁷

Limitations

Some limitations were noted in this study. Due to the number of children at each evening, it was not possible to measure the duration of time each participant spent at each exhibit or if a participant visited an exhibit multiple times. It was also not possible to formally observe patterns of social interactions at each exhibit, although informal anecdotal observations were recorded in the form of field notes.

Another limitation involved the issue of a diagnosis. Because the nature of the evening was to provide families and participants a non-threatening, relaxed environment in which to spend recreational time, parents were not required to produce documented proof of a diagnosis as a requirement of admittance; consequently, the researchers relied upon parent report for diagnosis of ASD or any other disorder. Similarly, parents were not asked to share results from prior communicative or behavioral assessments to attest to their child's level of functioning.

Lastly, although the data collectors were blind to the researchers' hypothesis serving as the foundation of this study, they did know children with and without ASD wore different colored name tags. This potentially could result in observer bias, if the observers believed children with ASD would gravitate toward certain exhibits.

Directions for future research

The results of this study demonstrated the play preferences of the participants with ASD who visited the museum during the Au-Some Evening events over a six-month period of time. Before generalizing the results of this study by attributing the same play preferences to *all* children with ASD, further research is necessary and warranted.

Possible directions for future research include following individual children with ASD, and measuring the time spent by an individual child at each exhibit. The researchers are also currently conducting a secondary study, comparing the play preferences of children with ASD to children with typical development in the same naturalistic environment.

CONFLICT OF INTEREST

None.

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